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Background paper

Income approach to GDP,
and other issues relating to the compilation of household income and consumption expenditures

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This paper provides a synopsis of important issues discussed in this workshop relating to compilation of GDP by income approach, compilation of income and use of income accounts for the household sector, review of the three compilation approaches to GDP, data sources for the benchmark year and estimates for subsequent periods.

I. GDP by income approach

This part will discuss the general characteristics of the income approach by contrasting it with the production approach. In the income approach, it will be pointed out that the approach is basically applied only to the corporations sector where their business accounting allows for the direct measurement of gross operating surplus and value added. For other sectors where either output is nonmarket like the case of the government sector, or no formal business accounts are kept like household unincorporated sector, their value added must be measured by the production approach.

1. General characteristics of the income approach

GDP is defined as:

GDP = Value added at basic prices + Taxes less Subsidies on products.

With the production approach, value added is measured as the difference between output (at basic prices) and intermediate consumption (at purchasers' prices). This is similar to measuring gross operating surplus as residuals given data on compensation of employees (COE), other taxes less subsidies on production activities are available. This residual approach is applied to activities where market output can be measured. For nonmarket activities, net operating surplus is assumed to be zero, so value added can be measured directly as the sum of COE and consumption of fixed capital. For nonmarket activities, the measurement of value added is similar for both the production and the income approaches.

GDP by income approach, similar to GDP by production approach, also aims at measuring value added, but there are two fundamental differences between the two approaches.

The first one is that GDP by income approach measures GDP as the sum of all components of value added while GDP by production approach measures value added as a residual -- the difference between gross output and intermediate consumption. By income approach,

Value added = Compensation of employees + Mixed income + Other taxes less subsidies on production + Gross operating surplus.

With:

Gross operating surplus = Net operating surplus + Consumption of fixed capital.

Direct measurement of value added requires direct measurement of gross operating surplus, thus leading to the second fundamental difference between the two methods.

The second fundamental difference is that the statistical unit for the income approach is the enterprise unit while the statistical unit of the production approach is the establishment unit. Only with enterprise as statistical units, can one measure operating surplus in terms of depreciation and profits, or net income the terminology that are used in business accounting.

2. The use of business accounting in compiling gross operating surplus and value added

The income approach can be applied only to corporations where business accounting allows for the direct measurement of gross operating surplus.

For non-market activities, value added is equal to the sum of compensation of employees plus other taxes on production and consumption of fixed capital as net operating surplus of non-market activities are assumed to be zero.[1] Value added is thus measured in a similar way as in production approach.

For household unincorporated enterprises, as business accounts are not kept, their value added can only be measured indirectly as residuals similarly to the production approach. In addition, for household unincorporated enterprises, it is not possible to distinguish between compensation of employees paid by the owners to themselves and their relatives and net operating surplus, therefore the concept of mixed income is used instead to represent the sum of compensation of employees and net operating surplus . (See table 1 for the compilation of GDP by income approach and by sectors).

Table 1. GDP by income from production side

	Compensation of employees		**Mixed income**	**Other taxes less subsidies on production**	**Gross operating surplus (or consumption of fixed capital)**	**Value added/ GDP**
	Wages and salaries	Employers' social contribution				
Corporations					GOS	
Agriculture					GOS	
Construction					GOS	
Manufacturing					GOS	
Services					GOS	
Household unincorporated enterprises/activities					COF	
Agriculture					COF	
Construction					COF	
Manufacturing					COF	
Services					COF	
Owner-occupied housing services					COF	
Other production for own consumption at home						
General government					COF	
Goods and services for individual consumption (education, health, postal, etc.					COF	
Goods and services for collective consumption (public administration, public and national security, etc.)						
Non-profit institutions serving households					GOS	
TOTAL						
Taxes less subsidies on products						
GDP						

In business accounting, net income is the difference between revenues and costs. Net income, after being used to pay for business income taxes and dividends, is recorded as additions to retained earnings. Thus, to get to the national account concept of gross operating surplus, one must go backward from additional to retained earnings. Table 2 shows an abbreviated business income statement. Table 3 shows in detail the derivation of gross operating surplus and value added from business income statement.[2]

[1] Cconsumption of fixed capital is a national account concept which is not the same as depreciation used in business accounting. The two concepts both reflect the decline in the value of the fixed assets during a given production period due to normal wear and tear, foreseeable obsolescence and a normal rate of accidental damage. However, in business accounting, fixed assets are book values while in national accounting, fixed assets have to be revalued at market prices at the period in which fixed assets and consumption of fixed capital are measured.

[2] For complete discussion of the use of business accounting for national accounting, see Chapter I, Vu Quang Viet, "Compilation of national accounts from business accounts: non-financial corporation", *Handbook on National Accounts: Links between business accounting an national accounting (*ST/ESA/STAT/SER.F/76, *2000)* http://unstats.un.org/unsd/publication/SeriesF/SeriesF_76E.pdf

In order to obtain proper gross operating surplus as defined by national accounting, the following adjustments to the preliminary gross operating surplus shown in table 3 are needed.

1) *Adjustment of own-account research and development (R&D) and own construction, etc.*: These expenditures are treated as capital expenditures by both business accounting and national accounting (SNA2008 only). In national accounting, these expenditures must also treated as output from which value added are generated. In business accounting, own-account capital expenditures are only recorded in the balance sheet as the concept of output is non-existent. It is thus necessary to add in components of value added of own-account capital expenditures (which are made up of compensation of employees, consumption of fixed capital).

2) *Adjustment for interest receivable and interest payable to the SNA concept of interest*. This adjustment takes into account fisim (financial intermediation indirectly measured). This will be discussed as a separate title in this document.

3) *Adjustment for insurance premium payments*: Similarly to fisim, premium payment should net out imputed cost paid to insurance corporations.

4) *Replacement of depreciation (a business accounting concept based on book value) by the SNA concept of consumption of fixed capital (which is based revaluation of fixed assets in market prices)* after gross operating surplus is obtained in order to get net operating surplus in accordance with national account concept.

Table 2. Business income and expenditure statement

	Sales or revenues
	Sales or revenues
	Other income (income from supplementary activities, capital gains)
Less	**Cost and expenses**
	Cost of goods sold
	Operating expenses
	Other expenses (interest payable less interest receivable, payment of rent)[3]
Equal	**Net income before income taxes**
Less	Income taxes
Equal	**Net income (which is also called profits)**
Less	Dividends payable
Equal	**Addition to retained earnings**

Net operating surplus in national accounts is conceptually similar to corporate profits (or net income) but is adjusted to eliminate those that are not considered production income by national accounts such as capital gains, property income receivable and add in those that are not considered cost such as depletion, write-down of inventory,[4] bad debt allowance[5] and net current transfers payable.

[3] Payment of royalties for the use of patented entities is no longer treated as property income as in the 1993 SN A but as payment for services (i.e. intermediate consumption) in the 2008 SNA.

[4] Refers to making an entry, usually at the close of a period, to decrease the cost value of the inventories asset account in order to recognize the lost value of products that cannot be sold at their normal markups or will be sold below cost. In national accounting, this is a revaluation, not a cost of production.

Table 3. Gross Value added from business accounting

GROSS VALUE ADDED AT BASIC PRICES equals		**539**
Other taxes less subsidies on production		**50**
Compensation of employees which includes:		**395**
	Direct and overhead manufacturing labour cost	285
	Direct selling and general labour cost (part of operating expenses)	110
Gross operating surplus		**94**
Gross operating surplus equals:		
	Depreciation which includes:	**26**
	Depreciation of plants and equipment (part of cost of goods manufactured)	16
	Depreciation of office equipment, buildings (part of operating expenses)	10
Plus	**Addition to retained earnings**	**10**
Plus	**Dividends payable**	12
=	***Net income (also called corporate profits)***	*48*
Less	**Property income receivable** which includes:	**-3**
	Interest receivable	-2
	Rents of non-produced assets such as land and subsoil assets	-1
	Dividends receivable	0
Plus	**Property income payable** which includes:	**10**
	Interest payable	10
	Rents payable for non-produced assets	0
Less	**Current transfers receivable** which include:	**0**
	Non-life insurance claims, non-insured compensation payment for damages	0
Plus	**Current transfers payable** which include:	**36**
	Non-life insurance premiums payable	22
	Income taxes and net taxes on capital gains	12
	Charitable contribution	2
Less	**Net capital gain from selling financial and non-financial assets**	**-2**
Plus	**Depletion**	**0**
Plus	**Write-down of inventory**	**0**
Plus	**Bad debt allowance**	**5**

3. Data sources

As said, value added of household unincorporated enterprises and the government sector must still be estimated on the basis of the production approach, which have been discussed previously and will not be repeated here. [6] For the corporations sector, surveys of enterprises

[5] This is an assumed loss due to uncollectible debt. In national accounting, it is a change in balance sheet, not a cost of production.

[6] Vu Quang Viet, *Gross Domestic Products by Production Approach, A general Introduction with Emphasis on Integrated Economic Data Collection Framework* and *Gross Regional Products: Concepts and Country Practices*,

are needed to get compensation of employees and additional information to compile gross operating surplus. For quarterly accounts, COE can be estimated by data on employment and wage rates collected by monthly labor force survey, corporate profits of all corporations are available from tax returns to tax authority. Up-to-date information but limited in scope on corporations whose shares are traded in the stock exchanges are available from their income statements, which can be used as indexes for quick and preliminary estimation of profits.[7]

4. Advantages of the income approach to GDP

The articulation of the corporate sector within the economy allows for a close monitoring of the progress of this sector that guides economic policy. Although every sector is important to the economy but the growth in the contribution to GDP of the corporations signifies especially for developing countries the growing modernization of the economy.

Compensation of employees in the corporate sector and corporate profits can be easily subject to taxation than in the incorporated enterprises, thus the growth of this sector expands the tax base of the economy. At the same time, the growth of compensation of employees also allows for the introduction or expansion of social policy with respect to health insurance, pension and contribution to social security. Mixed income generated by household unincorporated enterprises are not easily subject to taxation (except for taxes in the form of other taxes on production) nor to the expansion of social policy. Unincorporated enterprises do pay out wages and salaries but these payments are normally not subject to taxation.

	Corporations sector	Household unincorporated enterprises sector	Government sector
Compensation of employees	ð		ð
Mixed income		ð	
Corporate profits	ð		

In terms of data collection, as corporations must be incorporated and submit regularly, either quarterly or annually, their business accounts to tax authority can be made administratively available. Their addresses, particularly the larger ones with number of employees beyond a certain cut-off point, are known, kept in business registers and can be easily updated, .

The articulation of the corporate sector also singles out more clearly the household unincorporated enterprises sector for examination with respect to data adequacy. This sector includes three separate activities of households:

(i) Subsistence unincorporated enterprises which produce mainly for own consumption, like farmers although they may have incidental sales;

(ii) HUEMs (Household Unincorporated Enterprises with some Market Production).[8] HUEMs are defined as those who do not keep business accounts, but must engage

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China International Statistical Training Centre and United Nations Statistics Division, March 2011. http://unstats.un.org/unsd/China_UNSD_Project/GDP%20by%20production%20approach.pdf

[7] See Charles P. Himmelberg, James M. Mahoney, April Bang, and Brian Chernoff, "Recent Revisions to Corporate Profits: What We Know and When We Knew It," *Federal Reserve Bank of New York,* Volume 10, Number 3 March 2004. http://www.newyorkfed.org/research/current_issues/ci10-3.pdf. The US is a few countries that implement the income approach to GDP so it is useful to read this paper that reviewed the methodology and the data.

[8] See:
Vu Quang Viet, *Compilation of output and gross value added from sample survey data on Household Unincorporated Enterprises with At Least Some Market Production (HUEMs)*, United Nations ESCAP Statistics Division, 2009, http://www.unescap.org/stat/isie/project-resources/technical/Working-paper-no2.pdf

in regular business with an entrepreneurial spirit in the sense that the units intend (and try) to pursue production for the market on a regular basis. For the case of seasonal production, the units would be regarded as producing on a regular basis if production takes place regularly;

(iii) Households as consumers who earn their income from labor provided to other sectors and/or from receiving property income and current transfers from other sectors. The only production action of these households is imputed own-occupied housing services.

With the production approach, which uses the establishment as the statistical unit, one can single out compensation of employees (COE) but the approach would not allow for identifying easily COE by the corporate sector and it is unable to provide data on corporate profits.

Pietro Gennari, Margarita F Guerrero, Zeynep Orhun, Ivo Havinga and Gulab Singh (2009): The "1-2" Survey: A data collection strategy for informal sector and informal employment statistics, United Nations ESCAP Statistics Division, 2009, http://www.unescap.org/stat/isie/project-resources/technical/Working-paper-no1.pdf

Vu Quang Viet, Gross Domestic Products by Production Approach, A general Introduction with Emphasis on Integrated Economic Data Collection Framework and Gross Regional Products: Concepts and Country Practices, China International Statistical Training Centre and United Nations Statistics Division, March 2011. http://unstats.un.org/unsd/China_UNSD_Project/GDP%20by%20production%20approach.pdf

II. Household institutional sector accounts

The household institutional sector accounts are a set of accounts describing the activities and the economic behaviors of households. As owners of the two factors of production -- labor, capital (in the form of fixed asset capital and in the form of nonproduced asset): labor provides compensation of employees, fixed capital that are own-used in production provides mixed income, nonproduced assets provide rents and investment of financial capital provides dividends and interest. As a member of the society in its interaction with other sectors of the economy, a household pays taxes and income and wealth, contribution to social security, insurance premiums, pension contributions and receive social benefits, current transfers, etc.

The use of disposal income either for final consumption, saving, investment would have important impact on the economy. Data provided by the household sector accounts would allow for study of economic behavior of households particularly with respect to their final consumption expenditure and savings, and investment in both fixed assets and financial assets (in equity, bank deposits, etc.) if the accounts are extended to cover the financial accounts and balance sheets.

1. Conceptual differences of income and expenditure used in national accounts and household income and expenditure survey

Table 4 shows the household sector accounts only up to gross capital formation, net lending/borrowing. It shows areas where there are conceptual differences between transactions that are covered by household survey but must be adjusted and or imputed by national accountants to make the household sector compatible with national accounting concepts.

Major differences between income and expenditure in household survey and income and in national accounts are:

(i) Employers' imputed social contribution (calculated by statisticians and unknown to employees) particularly for the government sector to guarantee that contribution is adequate for the government to pay future social benefits to current employees in cases of defined benefit scheme;

(ii) Correction by national accountants for fisim in interest payable and interest receivable and insurance service charges by national accountants in pension and insurance schemes in order to distinguish between service charges (production) and income flows;

(iii) Imputation of services from owner-occupied housing, a purely national account concept.

Table 4: Household sector accounts: conceptual differences between household survey and national accounts and complementary data sources for national accounts

	Household survey	National accounts
Compensation of employees (COE)		
		COE based on labor force survey is similar in concept to those covered by household survey. They are income receivable by residents.
Wages and salaries	ð	COE based on establishment survey are COE payable or generated by resident producers must be adjusted to exclude COE payable to abroad and include those earned from abroad.
Employers' social contribution		
Actual social contribution	ð	Same as above.
Imputed social contribution	Not covered by survey	This item reflects the social contribution estimated by accountants to guarantee that contribution is adequate to pay for the future benefits of current employees. This affects mainly government employees with defined benefit scheme.
Mixed income		
Mixed income from agricultural activities (from sale and own consumption except owner-occupied housing)	ð	For major crops, national accountants can estimate output, intermediate consumption and mixed income by land use and per yield, but for minor backyard activities, national accountants have to rely on household surveys
Residential rental income and other rental income less cost	ð	National accountant has to rely on household survey for this item.
Mixed income from other activities	Questions must be asked from production approach point of view in order to derive mixed income	National accountant has to rely on household survey for this item, such as own-production of goods at home, own-construction, teaching at home for a fee, etc.
Property income		Alternative sources: banking statistics, enterprise statistics and government finance accounts that are used by national accountants to supplement/replace property income from household surveys.
Interest receivable less interest payable	ð	National accountants must: (i) adjust for fisim; (ii) impute investment income earned by social insurance funds to households.
Dividends receivable	ð	Alternative sources: enterprise statistics, tax return records.
Taxes on income and wealth	ð	Alternative source: government finance.
Net social contributions (pension, insurance, social security with respect to government and insurance plans)		
Net social contribution payable	ð	National accountants make three adjustments: i) add in employers' imputed social contribution; ii) add in employees' contribution and investment income supplement to insurance and pension schemes; iii) deduct service charges in the case of pension fund, life and non-life insurance.
Social benefits	ð	Alternative sources: government finance, insurance and pension plans
Other net transfer income/gifts (receipts less payments)		Alternative sources for national accounts: government finance, nonprofit institutions serving households, household to household transfers: mainly from household survey.
From the economy	ð	
From rest of the world (ROW)	ð	
DISPOSABLE INCOME		
Final consumption expenditure on goods and services	ð	Estimation is based on household surveys, supplemented by commodity flow approach taking into account supply and use of each class of products in order to estimate final consumption expenditures.
Purchased from market	ð	

	Household survey	National accounts
Food and beverages Manufactured goods Health Education Transport Communication Other services		
Production for own consumption	ð	Mainly rely on household survey
Food Other goods		
Imputed owner-occupied housing services	Not covered.	Estimated by national accountants based on equivalent market rentals.
GROSS SAVING		
Gross capital formation (fixed assets and land)	ð	Mainly based on household surveys supplemented by other sources such as construction of residential buildings and other techniques.
Purchase from market less sales Own-construction of residential housing Other own-manufactured assets		
NET LENDING/BORROWING		

2. Household income and expenditure survey and its use

In most countries, Household Income and Expenditure Survey (HIES) is done once every 5 years for the purpose of updating the base for the Consumer Price Index (CPI). This does not include questions on incomes. The common reasons for not including incomes are the facts that households tend to hide their income and there are alternative sources of data for income that are available to national accountants as discussed in table 4.

For the purpose of national accounts, household final consumption expenditure is more than those covered by HIES. The aim of CPI is to capture changes in market prices of consumer goods and therefore HIES does not, in principle, need to cover all non-market goods and services.

Other efforts such as of the World Bank and Asian Development Bank etc. have aimed at extending the coverage of HIES to capture as much as possible the incomes, consumption and investment of households in their programme of Integrated Household Living Conditions (IHLC). The purpose is to cover fully household income and expenditure, whether the goods and (some) services are market or non-market in order to calculate purchasing power parity. In this way IHLC is more compatible with the concepts of national accounting. IHLC is helpful for measuring national accounts in developing countries particularly with respect to household production for own consumption and income transfers among households.

However, IHLC suffers the same problem of reliability faced by HIES, thus data collected by household surveys should be verified and improved by the commodity flow approach. This approach has been discussed in another document and will not be repeated here.[9]

[9] Vu Quang Viet, GDP *by final expenditure approach: An operational guide for using commodity flow approach*, (not yet published), posted on website of United Nations Statistics Division, 26 May 2011, http://unstats.un.org/unsd/economic_stat/China/GDPFE/GDP%20by%20Final%20Use%20-%20Operational%20Guide.pdf

As HIES or IHLC are conducted very infrequently, it can help only in compiling benchmark data for household income (particularly compensation of employees) and final consumption expenditure for a base year.

3. Extrapolation of household income and final consumption expenditures for annual and quarterly accounts

Annual and quarterly data mainly for GDP must be extrapolated by using various indexes. Among them the most important ones are:

a) For household final consumption of market goods and services:
   - Indexes of retail sales
   - Administrative data on water, gas and electricity, communication, etc.
   - Employment data collected by monthly Labor Force Survey (LFS).

b) For household final consumption of nonmarket goods and services:
   - Production indexes (particularly for agriculture).

c) For compensation of employees: extrapolated by LFS.

d) For mixed income: extrapolated by informal employment estimated as the difference between employment in LFS and in Establishment Survey (ES).

e) For household gross capital formation: data on construction of residential building and estimation of own-account construction based on construction materials. Increase in machinery and equipment for unincorporated enterprises may be based on benchmark capital/output ratios.

Labor Force Survey (LFS): LFS data are used to produce the well-known unemployment rate as well as other standard labor market indicators such as the employment rate and the participation rate. The LFS is commonly designed to also provide employment and estimates of wage rates, tips, commissions, other bonus by industry, occupation, public and private sector, hours worked and much more, all cross-classifiable by a variety of demographic characteristics. The statistical unit of LFS is the household. In this case, LFS covers data on employees for both corporations and unincorporated enterprises and government.

Establishment Survey (ES): This survey is also normally carried out monthly that provides data to produce production indexes and labor by establishments (covered in business registers).

Informal employment: Informal employment is estimated as the difference between employment in LFS and in ES. It is used to estimate mixed income for the household sector beyond agriculture.

The household sector account is normally compiled on an annual basis as information on other income and current expense flows such as interest, dividends, etc. are more difficult to get on a monthly or quarterly basis.

III. Estimation of fisim payable by households

The methodology introduced here will be the same whether it is applied to find financial intermediation services indirectly measured (fisim) payable by the household sector, the financial sector, the corporations sector or the government. Focusing mainly on the household sector serves both purposes: find fisim payable by the household sector as final consumption expenditure in the context of compiling the household sector and show it in simple manner for clearer exposition.

1. Calculation of fisim – the most important part of output of banks

Main activity of banks is to accept deposits and to lend them out. They create income for themselves by charging interest rates on loans that are higher than interest rates paid out on deposits. Banks may also create income (for fees and capital gains) by buying and selling securities, foreign exchanges and investing in bonds, etc. The tradition of national accounting is to measure output of banks as the sum of explicit service charges and the implicit service charges. The latter is generated by the difference between interest receivable on loans and interest payable on deposit. This implicit part is called financial intermediation services indirectly measured (fisim):

Output of banks = fisim + explicit service charges

The SNA2008 decides that fisim should be calculated only on deposits and loans. Interest receivable on bonds, dividends receivable on stocks and capital gains on trading will not be taken into account in calculating fisim. Fisim calculated by the SNA2008 is different from that of the SNA1993 where fisim is the difference between property income receivable less property income payable.

The method recommended by the SNA2008 is simpler than the one suggested by SNA1993 and is believed to produce more stable value of output. It is as follows.

If rr is the reference interest rate, rd is interest rate on deposits, rl is interest rate on loans, according to the SNA2008:

(1) fisim on deposits can be calculated as: rr – rd
(2) fisim on loans can be calculated as: rl - rr

Fisim charged by banks = fisim on deposits + fisim on loans.

In principle, financial services provided by the banking system and used by different sectors can be treated as follows:

a) Fisim and other explicit service charges on deposits and borrowings of corporations, government, non-profit institutions serving households, and household unincorporated enterprises (including the borrowing for the purpose of purchasing residential housing to produce own-occupied housing services) are treated as intermediate consumption of these sectors.

b) Fisim and other explicit service charges on deposits and borrowing by households acting as consumers for the purpose of purchasing consumer goods and services are treated as household final consumption expenditure.

However, in general, for the case of households, it may not be possible to distinguish the two objectives of deposits, all fisim on deposits may be treated as household final consumption expenditure. Borrowing should be distinguished for two separate purposes : for production or for final consumption.

Fism, as one part of interest, is the output of banks that are consumed as intermediate inputs by producers and as final products by consumer-households. The other part of interest on loans and deposits are pure interest (i.e. income transfers) from the borrowers to the depositors for the use of the depositors' financial assets. The SNA2008 calls this *SNA interest*.

Interest on loans = SNA interest on loans + fisism on loans
Interest on deposits = SNA interest on deposits – fisim on deposits

In the SNA1993, the formula for fisim is based on the theoretical foundation that banks are intermediaries channeling funds from depositors to borrowers, thus also transferring the payment for use of funds (SNA interest) from the borrowers to depositors and charging fisim for doing it. Based on that theoretical foundation, SNA interest on loans must equal SNA interest on deposits. The SNA2008 does not uphold that theory anymore and simply designs a way to calculate fisim in a simple way.

Example

The following simple example will illustrate how fisim should be calculated. It assumes that banks accept deposits from households and then lend back to households just not to complicate the exposition.

Table 5.1. Balance sheet and income statement of banks

Assets and liability of banks

Assets		**Liability**	
Loans	800	Deposits	1000
Securities	50		
Currency	100		
Fixed asset	50		
Total assets	1000	Total liability	1000

Part of income statement

Expenses		**Receipts**	
Interest on deposits	50	Interest on loans	64
		Dividends and other income	0
Net operating income	14		
Total expenses and net income	64	Receipts	64

From the data above, interest rate on loans is 8% (64/800) and interest rate on deposits is 5% (50/1000). Inter-bank rate is normally picked as the reference rate. However, in developing countries, monetary policy may allow the inter-bank rate to be lower than the deposit rate, producing negative fisim on deposits, which means that depositors are "subsidized" by banks. It is possible to go along with negative fisim. In order to avoid this situation which creates instability in output of banks over time, one may choose the reference rate to be the weighted average of the deposit interest rate and the loan interest rate,

weights being the volume of deposits and volume of loans. In this example, the alternative rr may be set equal to: rd x [deposits/(loans+ deposits)] + rl x [loans/(loan s + deposits)] = 6.3%.

However for this example it is assumed that rr is equal to the reference rate, which is 6%, fisim on depositors is 10 (=0.06-0.05)*1000 and fisim on loans is 16 (=(0.08-0.06)*800). Total fisim is 26.

Output of banks is equal to explicit service charges + fisim.

In this example explicit service charges is non-existent, thus output of banks is 26. This output is consumed by households. Here, fisim on deposits is treated as household final consumption expenditure. Fisim on loans, let us also assume here that they are used for financing purchase of consumer goods, will be also treated as household final consumption expenditure.

Table 5.2. Bank operations

	Banks		**Households**		**Notes**
	Uses	Resources	Uses	Resources	
Interest on deposits	50			50	Interest paid by banks to depositors are equal to SNA interest (based on reference rates by can borrow) – fisim (kept for banks for its services).
Fisim	-10			-10	
SNA interest	60			60	
Interest on loans		64	64		Interest charges on loans charged by banks are equal to SNA interest (based on rates banks can borrow) + fisim (charges by banks for its services)
Fisim		16		16	
SNA interest		48		48	
Net income or expenses on deposit/loans	14		-14		
Dividends and other property income		0			In the example, dividends plus is assumed to be zero. If nonnegative it has to be balanced with the payment in the account of payers.

Table 5.3. SNA account for banks and households (relating only to interest)

Banks			**Households**		
	Uses	Resources		Uses	Resources
Part of production/uses of goods and services					
Output		26	Final consumption	26	
Fisim on deposits		*10*	*Fisim on deposits*	*10*	
Fisim on loans		*16*	*Fisim on loans*	*16*	
Part of income account					
SNA interest (total)	60	48		48	60
SNA interest on deposits	60				60
SNA interest on loans		48		48	
Income	14		**Income**	-14	

IV. GDP estimation and benchmarking

This section of the paper reviews three different approaches in compiling GDP and summarizes sources of data that are needed for the compilation. In general, statisticians in most countries have to produce GDP and other national accounts aggregates in a very timely manner in response to the need for decision making of policy makers and therefore cannot compile the best reliable GDP possible as they do for a reference year. For quarterly and annual national accounts, short-term indicators based on surveys have to be used to extrapolate data from the benchmark year. Because of that, preliminary estimates may miss the marks set by the new benchmark year. Thus benchmarking the estimates to the new benchmark is necessary.

1. Review of GDP by three approaches

GDP in principle can be derived by one of the three approaches: the production approach, the final expenditure approach and the income approach. In obtaining only GD, either one of the three methods may be sufficient. However in order to know how GDP are used, the final expenditure approach is necessary. To go beyond GDP to the full accounting of incomes and uses of incomes the income approach is necessary. The three approaches would allow statisticians to check on the reliability of data as GDP derived by different methods should be the same.

Production approach

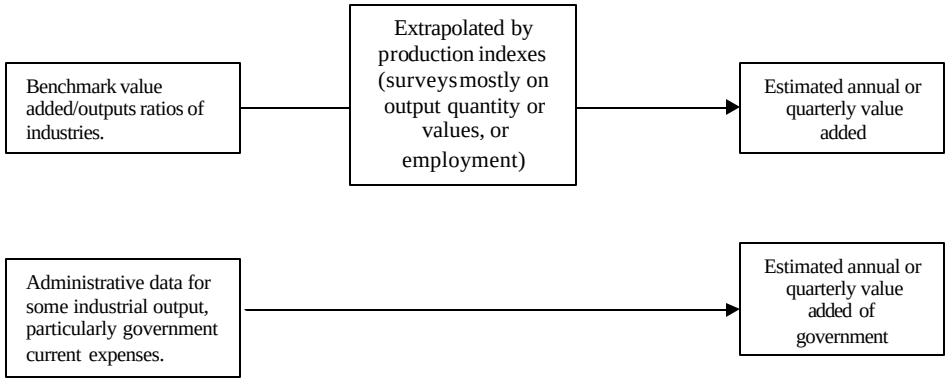
The most widely-used approach to GDP is the production approach because it provides many advantages although without some drawbacks:

(a) Minimum data are required in estimating by extrapolation annual and quarterly GDP. What are needed are ratios of value added over output of a benchmark year and the output of the year or the quarter to be estimated. The extrapolation is used because value added ratios are shown to be fairly constant over short period of time as reflected in the well accepted basic assumption in input-output analysis(which has also been verified in practice) that value added ratios are constant and linear over short period of time.

(b) The approach provides data on contribution of individual industries to GDP thus allowing studies of productivity not only of the total economy but also of individual industry.

(c) However, there are also draw-backs to this approach if constant benchmark ratios are used for a long period of time. The first one is that value added ratios are not constant over a long period of time and therefore estimated GDP may not be a reliable approximation when the current year is far away from the benchmark year. The second one is that the change in the industrial structure of the economy is not reflected in price indexes and tend to produce growth rates higher than they should be.

Figure 1: Extrapolation of value added from a benchmark year

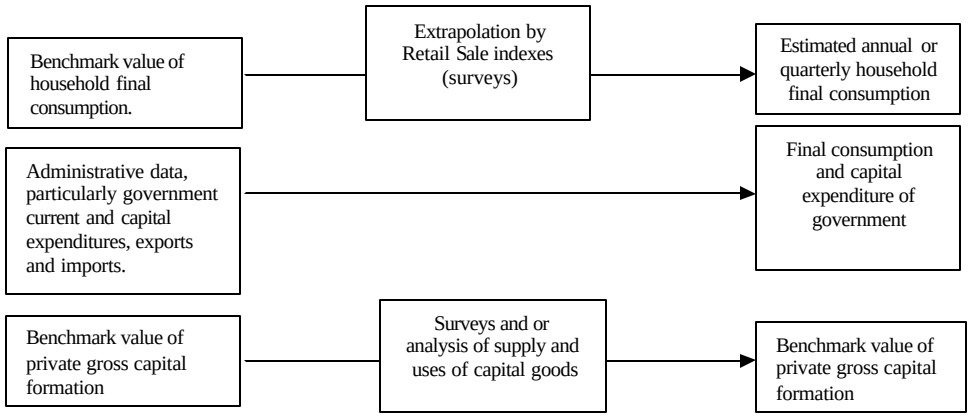


Final expenditure approach

The final expenditure approach relies on surveys of household consumption expenditures on goods and services, surveys on gross capital formation in addition to administrative data on government expenditures. Survey on household consumption expenditure is expensive, as diary on detailed goods and services must be kept and filled out throughout the year in order to capture seasonal pattern of expenditure. Human behaviors with respect to economic decisions either on investment or consumption cannot be treated as constant in terms of benchmark ratios as in the case of production approach that can be used repeatedly.

In addition, final expenditures collected in household surveys do not reflect fully all household actual consumption: some are acquired on the market, some are produced for own final use (grains and other food items in particular, other goods and fixed assets produced for own use including own construction), and some are imputed according to the concept of the SNA (in particular owner-occupied housing services) and finally some are missed altogether. Thus commodity flow approach is needed in order to reconcile detailed data on sources and uses of products from different sources, including intermediate inputs for all industries collected from special surveys in order to come up with a more reliable for a given year chosen as the benchmark. As a rule, the commodity flow approach takes the form of the supply and use tables for the benchmark year. Annually, the commodity flow approach are also used to reconcile GDP by three approaches but with the SUT of the benchmark year as the reference.

Figure 2: Extrapolation of components of final expenditures from a benchmark year

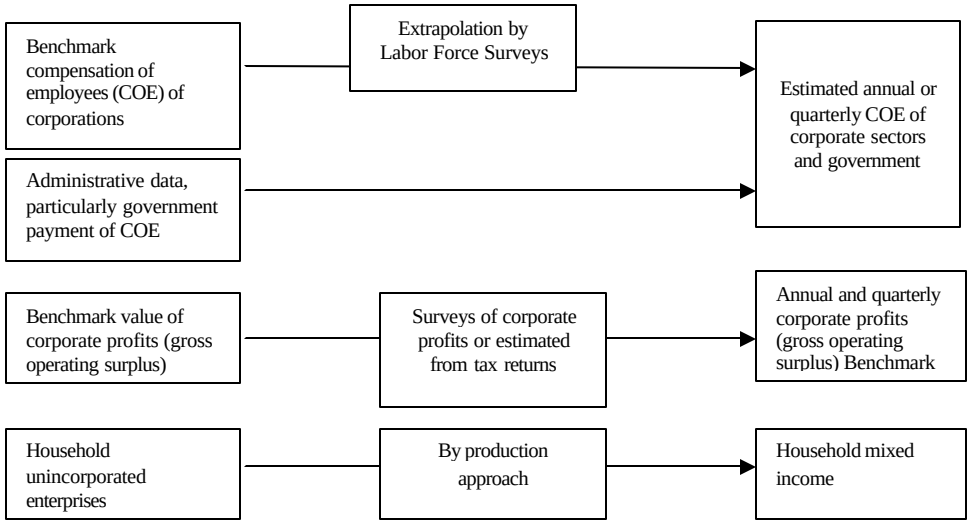


However, assuming that benchmark final consumption expenditure is available, in order to capture changes in consumption of goods and services over time during the year, survey on retail trade must be carried out monthly, even though a number of expenditures may be captured by administrative data such as expenditures on gas, water and electricity, telecommunication and postal services, education, etc.

Income approach

The income approach is based on data on compensation of employees and corporate net income (profits). Basically it relies on the estimation of compensation of employees in the corporate sector and corporate profits. The compilation of COE and gross operating surplus of the government sector and the household unincorporated enterprises are similar to the production approach.

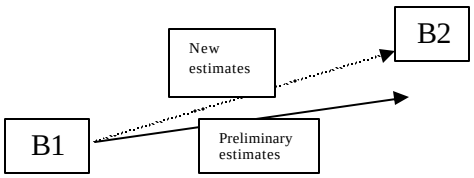
Figure 3: Extrapolation of generation of income



2. Benchmarking

Purpose

As explained before, basic statistics, particularly for national accounts, are normally collected in details only for a benchmark year. For subsequent years only limited data are collected, which are used to create physical or volume indexes to move benchmark national accounts data (B1) to the subsequent years. When a new set of benchmark basic statistics (B2) is collected, the previous estimates may not match new national accounts benchmark data. Therefore, there is a need to make the preliminary estimates based on the previous benchmark year match new the benchmark figures.



Methods

There are many reasons for discrepancies between the estimates and the actual. They must be analyzed and corrected before mechanical method for correction is used.

Examination of data: The discrepancy at the detail level may be due to two reasons. The first one is that the data used as proxies to create physical and volume indexes are not appropriate or deficient, thus requiring the re-examination of the data sources. The second one is that the technique used to create the indexes may be deficient, which also require review. The examination will be carried out at the detail level and case by case since there is no rule that can guide the adjustments.

Mechanical benchmarking: Application of the following mechanical benchmarking is carried out only after the examination of data is exhausted. Mechanical benchmarking of annual data presented here is different from the benchmarking of quarterly data. In the latter case, the sum of quarterly data must equal the annual value in current value. In the previous case, which is the focus of this part, the rate of growth between the two benchmark years must equal the accumulation of annual growth over the years between the two benchmark years.

To implement the benchmarking, the annual growth rates of the old series must be adjusted to the new growth rates such that at the end, the accumulated growth rate over the periods between the two benchmark years matches the growth rate of the two benchmark years. To do that previous estimated have to be multiplied by the annual incremental growth rate. The calculation is as follows:

Accumulated incremental growth rate =

$$bg = \frac{\text{New benchmark value}}{\text{Estimate for the same benchmark year}}$$

=1.083

Annual incremental growth factor = $ig = \mathbf{bg}^{\frac{1}{n-1}} = 1.083^{1/3} = 1.027$

New growth rate = *Old growth rates* * *Annual incremental growth factor*

The table below shows the example and the results.

Scheme for growth and value benchmarking of annual data

Time period	1	2	3	4	Notes
Preliminary GDP	10	11	11.5	12	**Original values**
Preliminary growth index	100	110	115	120	Index with period 1=100
Preliminary growth rates		1.1	1.045	1.043	Index with previous period =1
Actual benchmark value				13	
Actual benchmark growth index				130	Compared 13 to 10
Accumulated incremental growth rate				1.083	Compared 13 to 10
Annual incremental growth factor equally distributed to each year				1.027	(1.083)^(1/3)
New growth rates		1.13	1.074	1.072	Preliminary growth rates*Incremental growth
New growth index	100	113	121.3	130	New growth rate applied to period 1 = 100
New value	10	11.3	12.13	13	New growth index applied to base year value