

MIT OpenCourseWare
<http://ocw.mit.edu>

11.481J / 1.284J / ESD.192J Analyzing and Accounting for Regional Economic Growth
Spring 2009

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

IMPUTATIONS

NATIONAL INCOME AND PRODUCT ACCOUNTS

Kendrick, John. 1979. "Expanding Imputed Values in the National Income and Product Accounts" *The Review of Income and Wealth*. 25 (4): 349-363.

Carol Carson. 1984. "The Underground Economy: An Introduction," *Survey of Current Business*, 64 (5) (May): 21-37.

Edgar L. Feige, 1990. "Defining and Estimating Underground and Informal Economies: The New Institutional Economics Approach World Development," 18 (7): 989-1000

DEFINITIONS

Conceptual framework

“New institutional economics” – relationships between the “economy” and “institutions” determine the rules of the game for economic exchange.

Definition

Underground economy: economic activities that do not adhere to, or are not protected by, the “rules of the game”.

BACKGROUND AND ASSUMPTIONS

- **Background**

- “imputations are made to place a market value on certain transactions that do not occur or observable in the market economy...that affect personal income.”
- Capture non-market, non-economic activities in National Income Product Accounts (NIPA)
- 8.7% GNP in 1929; 7.6% GNP in 1979

- **General Assumptions**

- Intermediate products to be included in GNP
- Clear delineation between economic and non-economic activities
- Market price is more appropriate than opportunity price (cost) in imputation.

A TAXONOMY OF UNDERGROUND ECONOMIES

	“Rules of the game” being circumvented	Examples	Economic Implications	Measurement
Illegal	Criminal laws	Drug trafficking	<ul style="list-style-type: none"> · Reduces transaction costs; · Hedges against fluctuations 	Anecdotal information
Unreported	Tax laws	Unreported income	<ul style="list-style-type: none"> · Budget deficits, greater reliance on monetary policy; · Distorts costs for actors in unreported economy; · Biased measuring growth rate 	Discrepancies; Currency ratio
Unrecorded	Requirements of statistical agencies	Housework	Distorts evaluation of economic indicators and policy changes	Discrepancies; Currency ratio
Informal	Administrative rules covering property rights, contracts, and licensing.	Informal land sales, unlicensed vendors	All of the above.	Qualitative or survey methods

MEASUREMENT METHODS

Measurement	Data source	Examples	Strengths	Weaknesses
Anecdotal Information	Individual observations	Participant observations	Analyzing activity that evades detection	Difficult to analyze systematically
Micro-level	Survey data	Imputations of informal sector	Analyzing characteristics of underground actors; Testing hypotheses about the effects of the “rules of the game”	Costly; Biased; Inconsistent over time.
Macro-level	National accounts	Central bank records, input-output table	Cheaper; Less biased; Long-term trends.	Depends upon assumptions

SOURCE Amy Deora and Feiya Huang, 2005

MACRO-LEVEL IMPUTED METHODS

1. Payment-Transactions

- Assumes velocity of money is constant.
- Determines theoretical amount of transactions and compares it to actual transactions to determine unreported income.

2. Currency Ratio

- Assumes cash/demand deposits have constant ratio
- Determines unreported cash and imputes unrecorded/unreported income

Benefits

- Better than discrepancy methods because empirical values aren't influenced by underground economy.
- Assumes structure of money supply is constant.

DISCREPANCY METHODS

- **National Accounts Discrepancies:**

Good indicator for finding sectors with a large unrecorded economic activity, but does NOT indicate size of informal sector.

- **Tax Discrepancies:**

Provides a rough, underestimated measure of unreported income.

- **Weaknesses:**

May reflect conceptual differences in what you are trying to measure, not actual discrepancies.

Both measurements often reflect only part of the informal sector.

CENSUS AND SURVEY DATA METHODS

- Defines “Informal workers” too narrowly
- Takes no account of activities that circumvent institutional constraints or are excluded from institutional protection.
- Underestimates the number of informal workers.

SOURCE Amy Deora and Feiya Huang, 2005

CURRENT PRACTICES IN IMPUTATION

- **Bureau of Economic Analysis**
 - “imputations are made to place a market value on certain transactions that do not occur or [are not] observable in the market economy... that affect personal income.”
 - **Six types of imputations are made:**
 - **Payments-in-kind**
 - **Employer-paid health and life-insurance premiums**
 - **Net rental value of owner-occupied farms, and the value of food and fuel produced and consumed on farms;**
 - **The net rental value of owner-occupied nonfarm housing**
 - **The net margins on owner-built housing**
 - **Interest paid by financial intermediaries expect life insurance carriers**

IMPUTATION ITEMIZATION (1)

Imputations by Sector and Type in Relation to Gross National Product				
	A. Billions of dollars			B. Percentage of GNP
	1929	1948	1966	
GNP, official	103.4	259.1	433.0	
Additional imputed values				
Personal sector, total	45.7	117.7	349.5	
Unpaid household work	27.1	73.6	180.1	
Volunteer labor	0.6	2.9	15.4	
School work	5.1	15.7	60.9	
Frictional unemployment	2.1	4.5	12.3	
Imputed rentals				
Household capital	10.4	20.5	76.5	
Institutional capital	0.3	0.5	4.3	
Business sector, total	5.8	14.7	46.9	
Investments expensed				
Tangible	0.3	0.9	1.8	
Intangible	2.2	6.9	27.0	
Consumption expensed				
Employee	2.6	5.2	11.9	
Public	0.7	1.6	6.1	
Government sector				
Imputed rentals	3.8	21.0	49.9	
Total imputed values	55.3	152.8	446.3	

$$UHW = \left(\sum_{i=1}^n T_i * N_i \right) * C_h$$

UHW=Unpaid household work;
Ti=Average hour for group i; Ni=Number
of persons in group i; Ch=The average
hourly labor compensation of household
employees;
n=number of groups;

Critique: The average hours
were based on two surveys:
one in Syracuse, N.Y., 1968,
and the other in Michigan,
1975-1976. They may not be
able to represent the national
condition. It is difficult to be
included into NIPA because of
lack of accuracy.

Figure by MIT OpenCourseWare.

IMPUTATION ITEMIZATION (2)

Imputations by Sector and Type in Relation to Gross National Product					
	A. Billions of dollars				B. Percentage of GNP
	1929	1948	1966	1973	
GNP, official	103.4	259.1	753.0	1,306.3	
Additional imputed values					
Personal sector, total	45.7	117.7	349.5	663.4	
Unpaid household work	27.1	73.6	180.1	318.4	
Volunteer labor	0.6	2.9	15.4	25.8	
School work	5.1	15.7	60.9	148.1	
Frictional unemployment	2.1	4.5	12.3	24.1	
Imputed rentals					
Household capital	10.4	20.5	76.5	138.5	
Institutional capital	0.3	0.5	4.3	8.5	
Business sector, total	5.8	14.7	46.9	75.5	
Investments expensed					
Tangible	0.3	0.9	1.8	2.3	
Intangible	2.2	6.9	27.0	45.6	
Consumption expensed					
Employee	2.6	5.2	11.9	17.4	
Public	0.7	1.6	6.1	9.2	
Government sector					
Imputed rentals	3.8	21.0	49.9	91.2	
Total imputed values	55.3	152.8	446.3	830.1	

$$VL = TT * C_s$$

VL= Volunteer labor; TT= Total hours worked; Cs= Average hourly compensation in the service sector.

$$SW = \sum_{i=1}^n N_i * C_{li}$$

SW= School work; Ni= Number of students at educational level i; Ci= Average annual labor compensation of persons in the same age bracket who started working after attaining the (i-1) level of education. n= number of educational levels.

$$FU = N * C$$

FU= Frictional unemployment; N= Average number of frictional unemployment; C= Average compensation of all employees.

CRITIQUE

- 1. The annual labor compensation for people of different educational levels cannot fully represent the value of school work.**
- 2. The average compensation of all employees is not a good indicator of the opportunity cost of frictional unemployment.**
- 3. The use of trended estimates are excessively smooth thus they may impair the usefulness of the NIPA for tracking business cycles.**

IMPUTATION ITEMIZATION (3)

Imputations by Sector and Type in Relation to Gross National Product				
	A. Billions of dollars			B. Percentage of GNP
	1929	1948	1966	
GNP, official	103.4	259.1	753.0	
Additional imputed values				
Personal sector, total	45.7	117.7	349.5	
Unpaid household work	27.1	73.6	180.1	
Volunteer labor	0.6	2.9	15.4	
School work	5.1	15.7	60.9	
Frictional unemployment	2.1	4.5	12.3	
Imputed rentals				
Household capital	10.4	20.5	76.5	
Institutional capital	0.3	0.5	4.3	
Business sector, total	5.8	14.7	46.0	
Investments expensed				
Tangible	0.3	0.9	1.8	
Intangible	2.2	6.9	27.0	
Consumption expensed				
Employee	2.6	5.2	11.9	
Public	0.7	1.6	6.1	
Government sector				
Imputed rentals	3.8	21.0	49.9	
Total imputed values	55.3	152.8	446.3	

Tangible investments: small tools, etc.

Intangible investments: financed Research and Development, employee education and training, health, safety, and selected mobility costs.

Employee consumption: business travel and entertainment expenses.

Public consumption: business advertising expenses.

Rental values: sum of imputed net interest on the property (land, structures, equipment and inventory stock), plus depreciation charges for the fixed reproducibles.

Figure by MIT OpenCourseWare.

CRITIQUE

- 1. Some of the items are intermediate products (for example: tangible investments). It is not appropriate to include these values in the GNP.**
- 2. The inclusion of too many untaxable items reduces the correlation between measured income and taxable income, thus making the National Income and Product Accounts (NIPA) less useful for forecasting tax revenues.**

IMPUTATION TABLES

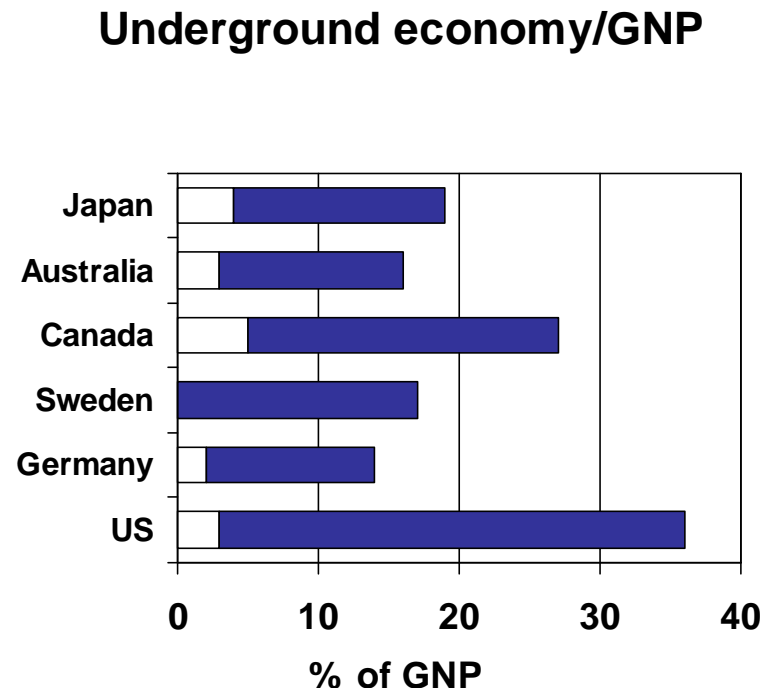
Imputations by Sector and Type in Relation to Gross National Product								
	A. Billions of dollars				B. Percentage of GNP			
	1929	1948	1966	1973	1929	1948	1966	1973
GNP, official	103.4	259.1	753.0					
Additional imputed values								
Personal sector, total	45.7	117.7	349.5					
Unpaid household work	27.1	73.6	180.1					
Volunteer labor	0.6	2.9	15.4					
School work	5.1	15.7	60.9					
Frictional unemployment	2.1	4.5	12.3					
Imputed rentals								
Household capital	10.4	20.5	76.5					
Institutional capital	0.3	0.5	4.3					
Business sector, total	5.8	14.7	46.9					
Investments expensed								
Tangible	0.3	0.9	1.8					
Intangible	2.2	6.9	27.0					
Consumption expensed								
Employee	2.6	5.2	11.9					
Public	0.7	1.6	6.1					
Government sector								
Imputed rentals	3.8	21.0	49.9					
Total imputed values	55.3	152.8	446.3					

Imputations in Relation to Official Gross National Income and Product Estimates, by Sector				
	1929	1948	1966	1973
A. Billions of current dollars, and ratios as indicated				
Personal sector				
Gross product, official	2.9	5.6	21.1	40.4
Imputations	45.7	117.7	349.5	663.4
Adjusted gross product	48.6	123.3	370.6	703.8
Ratio to official	16.8	22.0	17.6	17.4
Business sector, official				
Gross product	95.4	234.9	651.1	1,107.8
Imputations	5.8	14.7	46.9	75.5
Adjusted gross product	101.2	249.6	698.0	1,183.3
Ratio to official	1.06	1.07	1.07	1.07
Government sector				
Gross product, official	4.3	17.4	76.5	149.1
Imputations	3.8	21.0	49.9	91.2
Adjusted gross product	8.1	38.4	126.4	240.3
Ratio to official	1.88	2.21	1.65	1.61
Rest-of-the-World, gross product	0.8	1.2	4.2	9.0
Total GNP, official	103.4	259.1	753.0	1,306.3
Imputations	55.3	152.8	446.3	830.1
Adjusted gross product	158.7	411.9	1,199.3	2,136.4
Ratio to official	1.535	1.590	1.593	1.635

Figures by MIT OpenCourseWare.

SIZE OF THE UNDERGROUND ECONOMY

- Estimates (% of GNP):
 - Japan: 4%-15%
 - Australia: 3%-13%
 - Canada: 5%-22%
 - Sweden: 0%-17%
 - Germany: 2%-12%
 - US: 3%-33%



Source: Carson, 1984. Chart 3. Estimates of the Size of Underground Economy in Selected Countries.

GROWTH OF U.S. UNDERGROUND ECONOMY

Estimator	Period	Average growth
Gutmann(1977)	1974-1980	20%
Feige (1979)	1976-1978	38-55%
Tanzi (1983)	1974-1980	14%
IRS (1983)	1976-1981	14%
Simon (1982)	1974-1980	10%

Source: Carson, 1984. Table 4. Estimates of the Underground Economy in the United States

MAJOR FINDINGS

- **In 1973, adjusted GNP was 63.5% higher than the official figure.**
- **Imputation grew at a faster rate than GNP since 1929.**
- **If imputation is included, the personal sector accounted for 1/3 of the national economy, the largest single share.**
- **Government final demand is 60% higher if imputation is included.**
- **Imputed property income has risen much faster than monetized property income.**

POLICY IMPLICATIONS

Measurement of underground economies plays a vital role in the development process:

- Improves the information system on which policy makers rely.
- Redirects policy attention toward the restructuring of indigenous institutions.

GENERAL CRITIQUE

- **Lack of historical context**
- **Inclusion of intermediate products**
- **Difficulty of distinguishing economic and noneconomic activities**
- **No adjustment for economic distortions**
- **Unclear deflator definition**
- **Heavy reliance on assumptions**
- **Applicability in today's economy**
- **Unclear definition of “informal” versus “underground” economy.**
- **Overlap between categories of underground economy.**
- **Categorization is useful for telling us what we can measure and what we cannot measure, but provides little guidance on measuring the informal or illegal economies.**