

SURVEY OF CURRENT BUSINESS



UNITED STATES DEPARTMENT OF COMMERCE / BUREAU OF ECONOMIC ANALYSIS

SURVEY OF CURRENT BUSINESS

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the BUSINESS SITUATION

REVISED estimates show that real GNP increased at an annual rate of one-half of 1 percent, the same as the 15-day estimate (table 1). A downward revision in personal consumption expenditures was about offset by an upward revision in net exports. GNP prices as measured by the fixed-weighted price index increased 9½ percent, also the same as the 15-day estimate.

Corporate profits

Corporate profits from current production—before-tax book profits with inventory valuation and capital consumption adjustments—at an annual rate decreased \$10½ billion in the first quarter, following a \$11½ billion increase in the fourth quarter of 1978. The swing was largely in trade and in manufacturing.

Domestic profits of nonfinancial corporations more than accounted for the first-quarter decline. These profits, at an annual rate, declined \$12 billion following an increase of \$10 billion in the fourth quarter. An increase in real corporate product was not large enough to offset a decline in profits per unit of real product (chart 1). Unit profits reflected a faster increase in costs incurred by corporations than in the prices they charged. The first-quarter decline in profits was largely in trade. In manufacturing, an increase in motor vehicles partly offset declines in other durable goods industries, and a decline in food partly offset increases in other nondurable goods industries.

Before-tax book profits at an annual rate increased \$2 billion in the first quarter, following a \$19½ billion in-

crease in the fourth. These profits exclude the two valuation adjustments, which are designed to value inventories and fixed capital used up in production

Table 1.—Revisions in Selected Component Series of the NIPA's, First Quarter of 1979

	Seasonally adjusted at annual rates			Percent change from preceding quarter at annual rates		
	15-day estimate	45-day estimate	Revision	15-day estimate	45-day estimate	Revision
Billions of current dollars						
GNP	2,265.6	2,264.8	-0.8	9.5	9.3	-0.2
Personal consumption expenditures.....	1,444.7	1,440.4	-4.3	12.1	10.8	-1.3
Nonresidential fixed investment.....	242.6	244.1	1.5	9.6	12.4	2.8
Residential investment.....	110.9	110.4	-0.5	-8.4	-10.3	-1.9
Change in business inventories.....	18.1	16.6	-1.5			
Net exports.....	-10.3	-5.3	5.0			
Government purchases.....	459.4	458.5	-0.9	4.4	3.6	-0.8
Federal.....	164.7	164.5	-0.2	5.4	5.1	-0.3
State and local.....	294.8	294.0	-0.8	3.8	2.8	-1.0
National income		1,835.4			9.3	
Compensation of employees.....	1,405.9	1,406.8	.9	14.3	14.5	.2
Corporate profits with inventory valuation and capital consumption adjustments.....		166.0			-22.5	
Other.....	262.6	262.7	.1	5.9	6.2	.3
Personal income	1,834.1	1,836.0	1.9	10.5	10.9	.4
Billions of constant (1972) dollars						
GNP	1,417.3	1,416.3	-1.0	.7	.4	-.3
Personal consumption expenditures.....	915.7	912.4	-3.3	1.7	.3	-1.4
Nonresidential fixed investment.....	145.9	146.8	.9	2.6	5.4	2.8
Residential investment.....	58.1	57.7	-.4	-13.8	-16.2	-2.4
Change in business inventories.....	11.8	11.2	-.6			
Net exports.....	8.9	11.7	2.8			
Government purchases.....	277.0	276.4	-.6	-3.4	-4.2	-.8
Federal.....	102.1	102.0	-.1	-1.8	-2.2	-.4
State and local.....	174.9	174.5	-.4	-4.4	-5.3	-.9
Index numbers, 1972=100 ¹						
GNP implicit price deflator.....	159.85	159.91	.06	8.7	8.8	.1
GNP fixed-weighted price index.....	162.6	162.6	0	9.5	9.6	.1
GNP chain price index.....				9.2	9.3	.1

1. Not at annual rates.

NOTE.—For the first quarter of 1979, the following revised or additional major source data became available: For *personal consumption expenditures*, revised retail sales for February and March, and sales and inventories of used cars of franchised automobile dealers for February; for *nonresidential fixed investment*, manufacturers' shipments of equipment for February (revised) and March, construction put in place for February (revised) and March, and a partial tabulation of business expenditures for plant and equipment for the quarter; for *residential investment*, construction put in place for February (revised) and March; for *change in business inventories*, book values for manufacturing and trade for February (revised) and March; for *net exports of goods*

and *services*, merchandise trade for February (revised) and March, and revised net investment income and other services receipts for the quarter; for *government purchases of goods and services*, Federal unified budget outlays for March, and State and local construction put in place for February (revised) and March; for *wages and salaries*, revised employment, average hourly earnings, and average weekly hours for February and March; for *net interest*, revised net interest received from abroad for the quarter; for *corporate profits*, domestic book profits for the quarter, and dividends from abroad and branch profits (net) for the quarter; for *GNP prices*, the Consumer Price Index for March, unit value indexes for exports and imports for March, and residential housing and nonresidential buildings prices for the quarter.

at replacement cost, the valuation concept underlying national income and product accounting, rather than at historical cost, the valuation concept generally underlying business accounting.

If, as in the first quarter, the historical cost of inventories used up is less than their replacement cost, profits as measured by business exceed profits as measured in the national income and product

accounts by an amount that is called inventory profits. Inventory profits increased \$12 billion in the first quarter, following an increase of \$7½ billion in the fourth. The first-quarter increase resulted from an acceleration in prices of inventories in almost all industries.

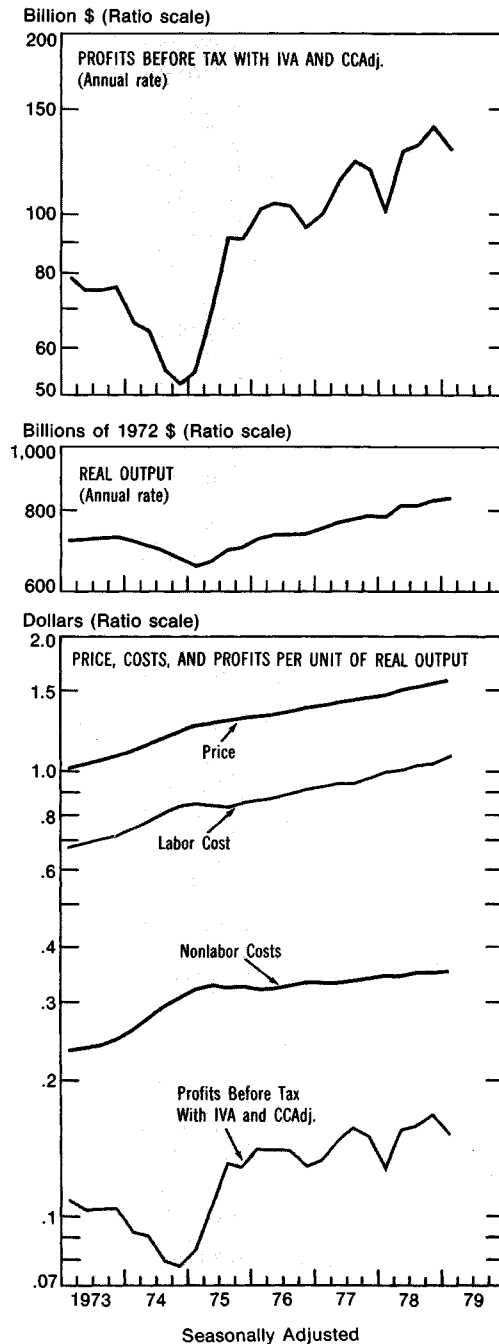
Corporate profits taxes at an annual rate decreased \$5½ billion, following an increase of \$8 billion in the fourth quarter. The decrease resulted from the reduction in Federal corporate income tax rates and other changes provided by the Revenue Act of 1978. Primarily as a result of these changes, after-tax profits increased \$7 billion, following an increase of \$11 billion in the fourth quarter.

The Federal sector

The Federal Government deficit at an annual rate, as measured in the national income and product accounts, declined \$2½ billion in the first quarter of 1979, as receipts—despite large tax reductions—increased more than expenditures. The deficit was \$18½ billion, compared with \$21 billion in the fourth quarter of 1978.

Receipts at an annual rate increased \$7 billion in the first quarter; the increase was held down by tax reductions—about \$19 billion—under provisions of the Revenue Act of 1978 and the Energy Tax Act of 1978. Personal tax and nontax receipts declined \$1½ billion; tax reductions under the Revenue Act and the Energy Tax Act—\$13 billion—were largely offset by rising incomes and large final settlements on 1978 liabilities. Corporate profits tax accruals declined \$5½ billion, reflecting a \$6 billion tax reduction under provisions of the Revenue Act. Indirect business tax and nontax accruals increased slightly; a reduction in the telephone excise tax rate was more than offset by increases in other indirect business taxes. Contributions for social insurance increased \$13 billion, including \$9 billion due to changes in the social security tax. In January, the taxable wage base increased from \$17,700 to \$22,900 (\$7.5 billion of the tax increase) and the tax rate increased from 12.1 percent to 12.26 percent (\$1.5 billion).

CHART 1
Nonfinancial Corporations: Profits; Real Output; and Price, Costs, and Profits Per Unit of Real Output



NOTE.—Real output is constant dollar gross domestic corporate product (GDCP). Price per unit is current dollar GDCP divided by constant dollar GDCP. Costs and profits per unit are respective components of current dollar GDCP divided by constant dollar GDCP.

U.S. Department of Commerce, Bureau of Economic Analysis

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Expenditures at an annual rate increased \$4½ billion; the increase was held down by large declines in grants-in-aid to State and local governments and in subsidies less the current surplus of government enterprises. Grants declined \$3½ billion; the fourth quarter had included a one-time payment of retroactive social services claims, and local public works grants declined. The decline in subsidies less the current surplus of government enterprises—\$2 billion—was traceable to government payments to farmers. Other expenditures increased \$10 billion; transfer payments accounted for about one-half of the increase.

Special reconciliation tables

The reconciliations of changes in compensation per hour and average hourly earnings and of changes in the implicit price deflator for personal consumption expenditures (PCE) and the Consumer Price Index (CPI) are shown in table 2 and 3, respectively. Compensation per hour of all persons in the business economy other than farm and housing increased 10.2 percent (annual rate) in the first quarter, virtually the same as 10.1 percent for average hourly earnings of production and nonsupervisory workers in the private nonfarm economy. The contribution of supplements, resulting from increases in the social security tax rate and wage base, added 1.1 percentage points to the increase in hourly compensation, but was offset by the contributions of other reconciliation items.

The implicit price deflator for PCE increased 10.5 percent (annual rate) in the first quarter, compared with 10.2 percent for the chain price index and 11.1 percent for the CPI for All Urban Consumers. Major factors in the larger increase in the CPI were the PCE expenditure component for owner-occupied dwellings, which has no comparable CPI component, and the CPI expenditures component for homeownership, which has no comparable PCE component.

Table 2.—Reconciliation of Changes in Compensation Per Hour in the Business Economy Other Than Farm and Housing and Average Hourly Earnings in the Private Nonfarm Economy, Seasonally Adjusted

	1978				1979
	I	II	III	IV ^r	I ^p
1. Compensation per hour of all persons in the business economy other than farm and housing (percent change at annual rate) ¹	11.7	8.5	9.3	8.9	10.2
2. Less: Contribution of supplements.....	1.8	-.2	.7	-.3	1.1
3. Plus: Contribution of employees of housing and of nonprofit institutions.....	.1	0	0	-.3	0
4. Less: Contribution of employees of government enterprises and self-employed and unpaid family workers.....	-.1	-.3	.3	.4	-.3
5. Equals: Wages and salaries per hour of employees in the private nonfarm economy (percent change at annual rate).....	10.1	9.0	8.3	8.5	9.4
6. Less: Contribution of nonproduction workers in manufacturing.....	-.2	-.5	0	-.1	-.2
7. Less: Contribution of non-BLS data, detailed weighting, and seasonal adjustment.....	1.9	-.6	.5	-.8	-.5
Commodity-producing industries.....	.1	-1.4	-.5	-1.0	-.8
Manufacturing.....	-.2	-.3	-.2	-.9	-.6
Distributive industries.....	.6	.7	.5	-.3	.2
Service industries.....	1.2	.1	.5	.5	.1
8. Equals: Average hourly earnings, production and nonsupervisory workers in the private nonfarm economy (percent change at annual rate).....	8.4	10.1	7.8	9.4	10.1

^r Revised. ^p Preliminary.

1. BLS estimates of changes in hourly compensation in the nonfarm business sector for the five quarters are 12.2, 8.3, 9.4, 8.9, and 10.2 percent.

Table 3.—Reconciliation of Changes in the Implicit Price Deflator for Personal Consumption Expenditures and the Consumer Price Index for all Urban Consumers, Seasonally Adjusted

	1978			1979
	II ^r	III ^r	IV ^r	I ^p
1. Implicit price deflator for personal consumption expenditures (percent change at annual rate).....	8.7	6.4	6.5	10.5
2. Less: Contribution of shifting weights in PCE.....	-1.2	-.4	-.5	.2
New autos.....	1.7	-1.8	0	1.1
Gasoline and oil.....	0	-.3	-.3	.1
Electricity, gas, fuel oil, and coal.....	-1.9	-.2	-.2	-.7
Furniture and household equipment.....	.7	-.2	-.5	-.6
Food purchased for off-premise consumption.....	-2.1	-.6	-.4	-.6
Purchased meals and beverages.....	.3	-.2	-.2	0
Clothing and shoes.....	.7	.6	.8	-.7
Housing.....	-.3	0	-.4	-.7
Other.....	-.3	1.3	-.8	-.5
3. Equals: PCE chain price index (percent change at annual rate).....	10.0	6.7	5.9	10.2
4. Less: Contribution of differences in weights of comparable CPI and PCE expenditure components.....	.2	0	-.6	-.1
Gasoline and oil.....	0	-.1	-.2	-.3
Electricity, gas, fuel oil, and coal.....	-.1	-.1	0	-.1
Furniture, appliances, floor coverings, other household furnishings.....	0	.1	0	.1
Food at home.....	.3	0	0	0
Food away from home.....	-.4	-.2	-.1	-.3
Apparel commodities.....	.2	0	0	.1
Rent.....	-.3	-.3	-.3	-.1
Other.....	.5	.7	.2	.5
5. Less: Contributions of PCE expenditure components not comparable with CPI components.....	-.5	.4	.3	-.8
New autos.....	-.1	.1	-.2	0
Net purchases of used autos.....	0	.1	.1	.1
Owner-occupied nonfarm and farm dwellings-space rent.....	-.3	.2	.3	-.8
Services furnished without payment by financial intermediaries except life insurance carriers.....	-.1	0	0	-.1
Current expenditures by nonprofit institutions.....	0	-.1	.2	0
Other.....	0	-.1	0	-.1
6. Plus: Contribution of CPI expenditure components not comparable with PCE components ¹.....	.5	2.0	1.2	.6
New autos.....	-.1	0	-.3	0
Used autos.....	-.1	.2	.2	.2
Homeownership.....	.9	1.7	1.6	.6
Other.....	-.2	0	-.2	-.1
7. Less: Contribution of differences in seasonal adjustment ².....	.6	-.5	-.7	.8
8. Equals: Consumer Price Index, all items ¹ (percent change at annual rate).....	10.2	8.8	9.1	11.1

^r Revised. ^p Preliminary.

1. Data have been revised by BLS to reflect new seasonal factors incorporating data for 1978.

2. These differences arise because component price indexes that are used in the BEA measures and in the CPI are seasonally adjusted at different levels of detail.

Summaries of BEA Staff Papers

The average number of pages in the SURVEY OF CURRENT BUSINESS has tended to increase in recent years, because the scope of BEA's work has broadened and because computers have made it possible to prepare more detailed estimates, which are often of particular interest to specialists. Also, inflation has increased the costs of printing and distributing the SURVEY. Accordingly, in the future the BEA staff paper series will present more of BEA's work. These staff papers will be summarized in the SURVEY.

Updated Input-Output Table of the U.S. Economy: 1972

(Derived From the 1967 Input-Output Table)

By Paula C. Young and Philip M. Ritz

THIS paper presents the fifth in a series of summary updates of the detailed benchmark input-output table for 1967. It may be used, along with previous update tables (for 1961 and 1966) and previous benchmark tables (for 1958 and 1963), to analyze changes in the input structure of the U.S. economy. (The recently released benchmark input-output study for 1972 differs from earlier studies because it is based on the 1972 Standard In-

dustrial Classification and incorporates a new treatment of secondary products along with other changes. Forthcoming annual input-output update tables will be based on this study.)

The updated tables are at the 85-industry order of detail. Current-dollar estimates of transactions, direct requirements per dollar of output, and total requirements per dollar of delivery to final demand, and constant (1967) dollar estimates of transactions and direct requirements are provided.

Single copies of this paper are available on request from the Bureau of Economic Analysis, Interindustry Economics Division (BE-51), U.S. Department of Commerce, Washington, D.C. 20230. Additional copies may be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161. The price is \$5.25 for paper copy and \$3.00 for microfiche. Ask for BEA-SP 79-032.

Sources and Uses of Funds of Majority-Owned Foreign Affiliates of U.S. Companies, 1973-76

By Ida May Mantel

THIS paper analyzes sources and uses of funds of a sample of majority-owned foreign affiliates of U.S. companies in 1973-76. The sample accounts for a substantial portion of the data for all such affiliates.

Sources of funds consist of internal funds generated by affiliate operations, external funds loaned to or invested in affiliates by U.S. and foreign residents, and "other" sources of funds. External funds are classified as coming from the multinational company (MNC)—the U.S. parent and foreign affiliates of the U.S. parent—or from U.S. and foreign residents outside the MNC. Uses of funds consist of investment in physical, financial, and other assets. Physical asset investment consists of capital expenditures and the change in inventories. Financial asset investment consists of the change in current receivables, the change in cash and other short-term assets, and a substantial portion of "other" uses of funds. The latter consists of the change in long-term financial assets, together with changes in intangible assets and adjustment items.

The analysis centers on affiliates in non-

financial industries—petroleum, manufacturing, and "other"; these affiliates accounted for almost all physical asset investment by the sample. Sources and uses of funds of affiliates in financial industries are discussed briefly.

The major findings of the paper are:

- In the 1973-76 period, sources and uses of funds exhibited unusually volatile changes, largely reflecting abrupt changes in economic activity, particularly in major industrial countries, and in prices.

- The quadrupling of petroleum prices during 1973-74 resulted in particularly large changes in the sources and uses of funds of affiliates in the petroleum industry and in certain nonpetroleum industries, such as chemicals and transportation-equipment manufacturing.

- In 1973-76, for nonfinancial affiliates, changes in external funds from sources outside the MNC were in the same direction as changes in the gap between physical asset investment and funds controlled by the MNC. The gap was unusually large in 1973-74; to fill the gap, affiliates relied primarily on short-

term funds from foreign creditors other than financial institutions.

- By the end of 1976, the distribution of sources of funds of nonfinancial affiliates was similar to the average distribution in 1966-72, but the distribution of uses of funds differed significantly. In 1976, physical asset investment, particularly the capital expenditures component, was a smaller percentage, and financial asset investment a larger percentage of total uses of funds than in 1966-72.

The paper includes tables that show sources and uses of funds data for 1966-76. The data for 1966-72, initially published in the July 1975 *Survey of Current Business*, are revised. Manufacturing and "other" industry detail are published for the first time.

Single copies of this paper are available on request from the Bureau of Economic Analysis, BE-50 (RB), U.S. Department of Commerce, Washington, D.C. 20230. Additional copies may be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161. The price is \$5.25 for paper copy and \$3.00 for microfiche. Ask for BEA-SP 79-033.

	1977	1978	1977					1978					1979
			IV	I	II	III	IV	I	II	III	IV		
												Seasonally adjusted at annual rates	
Billions of dollars													

Table 4.—Relation of Gross National Product, Net National Product, National Income, and Personal Income (1.9)

Gross national product.....	1,887.2	2,107.6	1,958.1	1,992.0	2,087.5	2,136.1	2,214.8	2,264.8
Less: Capital consumption allowances with capital consumption adjustment.....	195.2	216.9	202.6	207.3	213.3	220.8	226.3	231.7
Capital consumption allowances without capital consumption adjustment.....	153.6	165.4	157.8	161.0	163.9	166.9	169.9	172.7
Less: Capital consumption adjustment.....	-41.6	-51.5	-44.7	-46.3	-49.4	-53.8	-56.4	-59.0
Equals: Net national product.....	1,692.0	1,890.7	1,755.5	1,784.7	1,874.2	1,915.3	1,988.5	2,033.1
Less: Indirect business tax and nontax liability.....	165.1	178.3	170.1	173.3	179.4	177.7	182.7	186.2
Business transfer payments.....	9.6	10.7	10.0	10.2	10.5	10.9	11.3	11.7
Statistical discrepancy.....	4.7	1.8	4.8	2.2	.5	.4	4.3	2.1
Plus: Subsidies less current surplus of government enterprises.....	2.8	3.9	6.3	4.1	4.3	2.1	5.0	2.3
Equals: National income.....	1,515.3	1,703.7	1,576.9	1,603.1	1,688.1	1,728.4	1,795.2	1,835.4
Less: Corporate profits with inventory valuation and capital consumption adjustments.....	144.2	159.5	148.2	132.6	163.4	165.2	176.6	166.0
Net interest.....	95.4	106.3	99.0	101.7	104.6	107.4	111.4	114.5
Contributions for social insurance.....	140.3	164.3	145.0	157.4	162.7	166.2	170.7	184.5
Wage accruals less disbursements.....	0	0	0	0	0	.2	0	- .2
Plus: Government transfer payments to persons.....	199.2	215.3	205.9	208.9	210.1	219.6	222.7	227.3
Personal interest income.....	141.2	159.0	146.0	151.4	156.3	161.7	166.6	172.4
Net interest.....	95.4	106.3	99.0	101.7	104.6	107.4	111.4	114.5
Interest paid by government to persons and business.....	43.0	49.3	44.5	46.7	48.4	50.6	51.4	54.6
Less: Interest received by government.....	25.8	30.3	27.3	28.5	29.7	30.9	32.3	33.6
Interest paid by consumers to business.....	28.6	33.8	29.8	31.5	33.0	34.6	36.0	36.9
Dividends.....	43.7	49.3	46.3	47.0	48.1	50.1	51.9	54.0
Business transfer payments.....	9.6	10.7	10.0	10.2	10.5	10.9	11.3	11.7
Equals: Personal income.....	1,529.0	1,708.0	1,593.0	1,628.9	1,682.4	1,731.7	1,789.0	1,836.0

Table 5.—Relation of Gross National Product, Net National Product, and National Income in Constant Dollars (1.10)

[Billions of 1972 dollars]								
Gross national product.....	1,332.7	1,385.7	1,354.5	1,354.2	1,382.6	1,391.4	1,414.7	1,416.3
Less: Capital consumption allowances with capital consumption adjustment.....	128.9	131.9	130.2	130.9	131.6	132.3	133.0	133.8
Equals: Net national product.....	1,203.8	1,253.8	1,224.4	1,223.3	1,251.1	1,259.2	1,281.7	1,282.4
Less: Indirect business tax and nontax liability plus business transfer payments less subsidies plus current surplus of government enterprise.....	131.4	138.0	134.0	135.0	137.4	139.1	140.7	141.4
Residual ¹	7.3	5.2	7.4	5.5	4.3	4.3	6.8	5.3
Equals: National income.....	1,065.1	1,110.5	1,083.0	1,082.8	1,094.1	1,115.8	1,134.2	1,135.7

	1977	1978	1977					1978					1979
			IV	I	II	III	IV	I	II	III	IV		
												Seasonally adjusted at annual rates	
Billions of dollars													

Table 6.—Net National Product and National Income by Sector in Current and Constant Dollars (1.11, 1.12)

Net national product.....	1,692.0	1,890.7	1,755.5	1,784.7	1,874.2	1,915.3	1,988.5	2,033.1
Net domestic product.....	1,674.7	1,871.2	1,739.6	1,766.5	1,853.2	1,896.5	1,968.7	2,011.4
Business.....	1,404.1	1,573.3	1,457.8	1,476.8	1,558.5	1,596.7	1,661.0	1,697.3
Nonfarm.....	1,363.2	1,529.2	1,413.9	1,436.7	1,517.0	1,553.5	1,609.6	1,644.7
Farm.....	36.1	42.2	39.1	37.9	41.0	42.9	47.1	50.5
Statistical discrepancy.....	4.7	1.8	4.8	2.2	.5	.4	4.3	2.1
Households and institutions.....	62.7	71.5	65.9	68.8	70.5	72.3	74.4	76.9
Government.....	208.0	226.5	215.9	221.0	224.1	227.5	233.4	237.2
Rest of the world.....	17.3	19.4	15.9	18.2	21.1	18.8	19.8	21.7
National income.....	1,515.3	1,703.7	1,576.9	1,603.1	1,688.1	1,728.4	1,795.2	1,835.4
Domestic income.....	1,498.0	1,684.3	1,560.9	1,584.9	1,667.1	1,709.7	1,775.5	1,813.8
Business.....	1,227.4	1,386.3	1,279.1	1,295.2	1,372.4	1,409.9	1,467.8	1,499.7
Nonfarm.....	1,192.6	1,344.8	1,238.7	1,257.7	1,332.4	1,368.5	1,420.4	1,451.4
Farm.....	34.8	41.5	40.5	37.4	40.0	41.3	47.3	48.3
Households and institutions.....	62.7	71.5	65.9	68.8	70.5	72.3	74.4	76.9
Government.....	208.0	226.5	215.9	221.0	224.1	227.5	233.4	237.2
Rest of the world.....	17.3	19.4	15.9	18.2	21.1	18.8	19.8	21.7
Billions of 1972 dollars								
Net national product.....	1,203.8	1,253.8	1,224.4	1,223.3	1,251.1	1,259.2	1,281.7	1,282.4
Net domestic product.....	1,196.4	1,246.0	1,217.7	1,215.8	1,242.3	1,251.7	1,274.0	1,274.3
Business.....	1,007.0	1,051.8	1,025.7	1,022.6	1,048.5	1,057.0	1,079.1	1,079.1
Nonfarm.....	974.5	1,023.3	991.5	993.8	1,022.8	1,028.8	1,047.8	1,051.2
Farm.....	25.2	23.2	26.9	23.3	21.3	23.9	24.5	22.6
Residual ¹	7.3	5.2	7.4	5.5	4.3	4.3	6.8	5.3
Households and institutions.....	42.2	44.5	43.6	43.8	44.3	44.9	45.2	45.4
Government.....	147.2	149.6	148.4	149.4	149.6	149.8	149.8	149.7
Rest of the world.....	7.3	7.9	6.6	7.5	8.8	7.5	7.7	8.1
National income.....	1,065.1	1,110.5	1,083.0	1,082.8	1,094.1	1,115.8	1,134.2	1,135.7
Domestic income.....	1,057.7	1,102.7	1,076.4	1,075.3	1,100.6	1,108.3	1,126.5	1,127.6
Business.....	868.3	908.5	884.3	882.1	906.8	913.6	931.6	932.4
Nonfarm.....	841.4	883.8	855.7	857.3	884.1	888.3	905.6	908.3
Farm.....	26.9	24.7	28.7	24.8	22.7	25.3	26.0	24.1
Households and institutions.....	42.2	44.5	43.6	43.8	44.3	44.9	45.2	45.4
Government.....	147.2	149.6	148.4	149.4	149.6	149.8	149.8	149.7
Rest of the world.....	7.3	7.9	6.6	7.5	8.8	7.5	7.7	8.1

¹ Revised

1. Equals GNP in constant dollars measured as the sum of final products less GNP in constant dollars measured as the sum of gross product by industry. The quarterly estimates are obtained by interpolating the annual estimates with the statistical discrepancy deflated by the implicit price deflator for gross domestic business product.

NOTE.—Table 6: The industry classification within the business sector is on an establishment basis and is based on the 1972 Standard Industrial Classification.

Footnotes for tables 2 and 3.

1. Equals GNP in constant dollars measured as the sum of final products less GNP in constant dollars measured as the sum of gross product by industry. The quarterly estimates are obtained by interpolating the annual estimates with the statistical discrepancy deflated by the implicit price deflator for gross domestic business product.

NOTE.—Table 2: "Final sales" is classified as durable or nondurable by type of product. "Change in business inventories" is classified as follows: For manufacturing, by the type of product produced by the establishment holding the inventory; for trade, by the type of product sold by the establishment holding the inventory; for construction, durable; and for other industries, nondurable.

Table 3: The industry classification within the business sector is on an establishment basis and is based on the 1972 Standard Industrial Classification.

	1977	1978	1978					1979
			IV	I	II	III	IV	
			Seasonally adjusted at annual rates					
Billions of dollars								

Table 9.—Auto Output in Current and Constant Dollars (1.16, 1.17)

Auto output.....	72.3	77.5	74.5	73.8	79.5	75.8	81.0	87.6
Final sales.....	70.9	76.7	72.0	71.3	80.8	77.4	77.5	85.4
Personal consumption expenditures.....	61.8	67.8	63.2	63.1	70.5	67.9	69.6	73.6
New autos.....	46.3	50.6	47.3	47.3	54.1	49.9	51.1	56.0
Net purchases of used autos.....	15.5	17.2	15.9	15.8	16.5	18.0	18.5	17.6
Producers' durable equipment.....	12.2	14.7	13.0	13.4	15.0	15.5	14.9	16.0
New autos.....	19.0	22.3	19.7	20.3	22.7	23.4	22.6	24.3
Net purchases of used autos.....	-6.8	-7.6	-6.7	-6.9	-7.8	-7.9	-7.7	-8.4
Net exports.....	-3.6	-6.2	-4.8	-5.8	-5.2	-6.5	-7.5	-4.7
Exports.....	7.0	7.5	6.9	6.9	7.9	7.8	7.4	9.0
Imports.....	10.7	13.7	11.8	12.7	13.1	14.3	14.9	13.7
Government purchases of goods and services.....	.6	.5	.6	.6	.5	.5	.5	.5
Change in business inventories of new and used autos.....	1.4	.8	2.5	2.5	-1.3	-1.6	3.6	2.3
New.....	1.6	.9	3.4	2.7	-2.2	-1.4	4.5	1.7
Used.....	-2	-1	-9	-2	.9	-2	-1.0	.6
Addenda:								
Domestic output of new autos ¹	59.4	63.9	60.2	60.5	65.3	63.6	66.7	72.3
Sales of imported new autos ²	15.3	16.7	15.5	15.7	17.0	16.9	17.3	20.4
Billions of 1972 dollars								
Auto output.....	55.2	55.3	55.4	54.1	57.0	53.5	56.5	60.0
Final sales.....	54.0	54.9	53.8	52.4	58.3	54.5	54.2	58.1
Personal consumption expenditures.....	44.4	45.3	44.7	43.4	47.8	44.6	45.3	46.9
New autos.....	36.0	36.5	35.8	35.0	39.3	35.6	36.2	38.7
Net purchases of used autos.....	8.5	8.7	9.0	8.4	8.4	9.0	9.1	8.2
Producers' durable equipment.....	10.6	11.5	10.6	10.8	11.8	12.0	11.6	12.1
New autos.....	14.8	16.1	14.9	15.1	16.5	16.7	16.0	16.8
Net purchases of used autos.....	-4.2	-4.6	-4.3	-4.3	-4.7	-4.7	-4.5	-4.6
Net exports.....	-1.5	-2.3	-2.0	-2.2	-1.7	-2.4	-3.0	-1.3
Exports.....	5.4	5.4	5.2	5.2	5.8	5.5	5.3	6.2
Imports.....	6.9	7.7	7.2	7.3	7.5	7.9	8.3	7.5
Government purchases of goods and services.....	.5	.4	.4	.4	.4	.4	.4	.3
Change in business inventories of new and used autos.....	1.2	.4	1.6	1.6	-1.3	-1.1	2.3	1.9
New.....	1.3	.4	2.2	1.8	-1.8	-1.0	2.8	1.6
Used.....	-2	-1	-6	-1	.5	-1	-5	.3
Addenda:								
Domestic output of new autos ¹	46.1	46.2	45.5	44.9	47.5	45.3	47.3	49.9
Sales of imported new autos ²	11.9	12.1	11.8	11.6	12.3	12.0	12.2	14.1

* Revised

1. Consists of final sales and change in business inventories of new autos produced in the United States.

2. Consists of personal consumption expenditures, producers' durable equipment, and government purchases.

3. Consists of agriculture, forestry, and fisheries; mining; construction; and manufacturing.

4. Consists of transportation; communication; electric, gas, and sanitary services; and trade.

5. Consists of finance, insurance, and real estate; services; and rest of the world.

NOTE.—Table 10: The industry classification of wage and salary disbursements and proprietors' income is on an establishment basis and is based on the 1972 Standard Industrial Classification.

	1977	1978	1978					1979
			IV	I	II	III	IV	
			Seasonally adjusted at annual rates					
Billions of dollars								

Table 10.—Personal Income and Its Disposition (2.1)

Personal income.....	1,529.0	1,708.0	1,593.0	1,628.9	1,682.4	1,731.7	1,789.0	1,836.0
Wage and salary disbursements.....	983.6	1,100.9	1,021.2	1,050.8	1,090.2	1,113.2	1,149.4	1,185.4
Commodity-producing industries ³	343.7	390.2	357.1	365.9	387.0	396.4	411.3	426.8
Manufacturing.....	266.3	299.9	277.3	286.9	296.1	302.0	314.4	327.1
Distributive industries ⁴	239.1	268.9	247.5	257.0	266.4	271.6	280.4	290.5
Service industries ⁵	200.1	225.8	208.5	216.5	222.8	228.5	235.4	242.8
Government and government enterprises.....	200.8	216.1	208.1	211.4	213.9	216.7	222.3	225.3
Other labor income.....	90.4	105.9	96.1	100.0	104.0	107.9	111.8	115.9
Proprietors' income with inventory valuation and capital consumption adjustments.....	99.8	113.2	107.3	105.0	110.1	114.5	123.0	123.6
Farm.....	20.2	25.3	25.1	21.9	24.0	25.0	30.4	30.6
Nonfarm.....	79.5	87.8	82.3	83.1	86.1	89.6	92.6	93.0
Rental income of persons with capital consumption adjustment.....	22.5	23.4	22.7	22.8	22.2	24.3	24.4	24.7
Dividends.....	43.7	49.3	46.3	47.0	48.1	50.1	51.9	54.0
Personal interest income.....	141.2	159.0	146.0	151.4	156.3	161.7	166.6	172.4
Transfer payments.....	208.8	226.0	215.9	219.2	220.6	230.4	233.9	239.0
Old-age, survivors, disability, and health insurance benefits.....	105.0	117.4	110.1	112.1	113.7	121.1	122.7	124.8
Government unemployment insurance benefits.....	12.5	8.9	11.5	10.4	8.5	8.7	8.1	8.3
Veterans benefits.....	13.8	13.6	13.7	13.8	13.5	13.3	13.7	14.3
Government employees retirement benefits.....	28.8	32.8	30.5	31.3	32.5	33.2	34.4	34.9
Aid to families with dependent children.....	10.6	10.8	10.7	10.7	10.8	10.9	10.8	10.7
Other.....	38.1	42.5	39.4	40.9	41.6	43.3	44.2	45.9
Less: Personal contributions for social insurance.....	61.0	69.7	62.6	67.2	69.2	70.5	72.1	78.8
Less: Personal tax and nontax payments.....	226.0	256.2	233.3	237.3	249.1	263.2	275.1	272.9
Equals: Disposable personal income.....	1,303.0	1,451.8	1,359.6	1,391.6	1,433.3	1,468.4	1,513.9	1,563.2
Less: Personal outlays.....	1,236.1	1,374.9	1,285.9	1,309.2	1,357.0	1,392.5	1,440.9	1,478.3
Personal consumption expenditures.....	1,206.5	1,340.1	1,255.2	1,276.7	1,322.9	1,356.9	1,403.9	1,440.4
Interest paid by consumers to business.....	28.6	33.8	29.8	31.5	33.0	34.6	36.0	36.9
Personal transfer payments to foreigners (net).....	1.0	1.0	.9	1.0	1.1	.9	.9	1.0
Equals: Personal saving.....	66.9	76.9	73.7	82.4	76.3	76.0	73.0	84.9
Addenda:								
Disposable personal income: Total, billions of 1972 dollars.....	926.3	966.1	949.6	952.1	960.3	968.7	983.2	990.2
Per capita:								
Current dollars.....	6,009	6,643	6,250	6,387	6,566	6,712	6,906	7,117
1972 dollars.....	4,271	4,421	4,365	4,370	4,399	4,428	4,485	4,508
Population (millions).....	216.9	218.5	217.5	217.9	218.3	218.8	219.2	219.6
Personal saving as percentage of disposable personal income.....	5.1	5.3	5.4	5.9	5.3	5.2	4.8	5.4

	1977	1978	1977	1978				1979
			IV	I	II	III	IV	I*
			Seasonally adjusted at annual rates					
Billions of dollars								

Table 14.—Foreign Transactions in the National Income and Product Accounts (4.1)

Receipts from foreigners.....	175.5	204.8	172.1	181.7	205.4	210.1	221.9	234.9
Exports of goods and services...	175.5	204.8	172.1	181.7	205.4	210.1	221.9	233.8
Merchandise.....	120.6	141.7	117.8	122.7	140.3	147.7	156.3	163.7
Other.....	54.9	63.0	54.2	59.0	65.1	62.4	65.6	70.1
Capital grants received by the United States (net).....	0	0	0	0	0	0	0	1.1
Payments to foreigners.....	175.5	204.8	172.1	181.7	205.4	210.1	221.9	234.9
Imports of goods and services...	186.6	216.8	195.2	205.8	210.9	220.8	229.5	239.0
Merchandise.....	151.6	176.3	158.5	167.5	171.5	179.9	186.2	193.1
Other.....	35.0	40.5	36.7	38.3	39.4	40.9	43.3	46.0
Transfer payments (net).....	4.2	4.5	4.3	4.3	4.8	4.3	4.6	4.9
From persons (net).....	1.0	1.0	.9	1.0	1.1	.9	.9	1.0
From government (net).....	3.2	3.5	3.4	3.3	3.7	3.4	3.6	3.9
Interest paid by government to foreigners.....	5.5	8.7	6.6	7.9	8.5	8.4	9.8	10.8
Net foreign investment.....	-20.9	-25.2	-34.1	-36.3	-18.9	-23.5	-22.1	-19.8

Table 15.—Gross Saving and Investment (5.1)

Gross saving.....	272.2	318.5	274.7	284.2	326.1	326.2	337.6	349.3
Gross private saving.....	290.8	320.1	304.3	305.4	319.9	325.7	329.6	339.5
Personal saving.....	66.9	76.9	73.7	82.4	76.3	76.0	73.0	84.9
Undistributed corporate profits with inventory valuation and capital consumption adjustments.....	28.7	26.3	28.0	15.6	30.3	29.0	30.3	22.9
Undistributed profits.....	58.4	68.8	58.1	55.1	72.4	69.2	78.6	83.9
Inventory valuation adjustment.....	-14.8	-24.4	-14.8	-23.5	-24.9	-20.9	-28.4	-40.2
Capital consumption adjustment.....	-14.9	-18.1	-15.3	-16.1	-17.2	-19.3	-19.9	-20.7
Corporate capital consumption allowances with capital consumption adjustment.....	120.9	132.5	124.6	127.4	130.5	134.7	137.4	140.3
Noncorporate capital consumption allowances with capital consumption adjustment.....	74.3	84.4	77.9	79.9	82.8	86.1	89.0	91.4
Wage accruals less disbursements.....	0	0	0	0	0	0	0	0
Government surplus or deficit (-), national income and product accounts.....	-18.6	-1.6	-29.6	-21.1	6.2	.6	8.0	8.7
Federal.....	-48.1	-29.9	-58.6	-52.6	-23.6	-22.8	-20.8	-18.4
State and local.....	29.6	28.3	29.0	31.5	29.8	23.4	28.8	27.1
Capital grants received by the United States (net).....	0	0	0	0	0	0	0	1.1
Gross investment.....	276.9	320.4	279.5	286.4	326.6	326.6	342.0	351.3
Gross private domestic investment.....	297.8	345.6	313.5	322.7	345.4	350.1	364.0	371.1
Net foreign investment.....	-20.9	-25.2	-34.1	-36.3	-18.9	-23.5	-22.1	-19.8
Statistical discrepancy.....	4.7	1.8	4.8	2.2	.5	.4	4.3	2.1

* Revised.
1. Inventories are as of the end of the quarter. The quarter-to-quarter change in inventories calculated from current-dollar inventories shown in this table is not the current-dollar change in business inventories (CBI) components of GNP. The former is the difference between two inventory stocks, each valued at end-of-quarter prices. The latter is the change in the physical volume of inventories valued at average prices of the quarter. In addition, changes calculated from this table are at quarterly rates, whereas CBI is stated at annual rates.

2. Quarterly totals at annual rates.
3. Equals ratio of nonfarm inventories to final sales of business. These sales include a small amount of final sales by farms.

NOTE.—Table 16: Inventories are classified as durable or nondurable as follows: For manufacturing, by the type of product produced by the establishment holding the inventory; for trade, by the type of product sold by the establishment holding the inventory; for construction, durable; and for other nonfarm industries, nondurable. The industry classification is based on the 1972 Standard Industrial Classification.

Table 17: The industry classification of compensation of employees, proprietors' income, and rental income is on an establishment basis; the industry classification of corporate profits and net interest is on a company basis. The industry classification of these items is based on the 1972 Standard Industrial Classification.

	1977	1978	1977	1978				1979
			IV	I	II	III	IV	I*
			Seasonally adjusted at annual rates					
Billions of dollars								

Table 16.—Inventories and Final Sales of Business in Current and Constant Dollars (5.9, 5.10)

Inventories ¹	498.6	520.7	536.5	548.5	574.5	603.3
Farm.....	60.3	66.3	68.0	68.1	73.8	78.3
Nonfarm.....	438.3	454.4	468.5	480.4	500.7	524.9
Durable goods.....	251.8	263.2	271.2	280.3	291.9	307.1
Nondurable goods.....	186.5	191.1	197.3	200.1	208.7	217.8
Manufacturing.....	219.2	225.9	232.0	239.0	248.3	262.3
Durable goods.....	140.9	146.5	150.7	156.7	162.4	172.6
Nondurable goods.....	78.3	79.4	81.2	82.4	85.8	89.8
Wholesale trade.....	85.9	90.9	94.2	96.4	101.6	107.4
Durable goods.....	56.1	59.6	61.9	64.3	67.5	70.5
Nondurable goods.....	29.8	31.4	32.3	32.1	34.1	36.9
Retail trade.....	89.9	94.3	97.5	99.0	103.4	105.9
Durable goods.....	41.1	42.9	43.9	44.3	46.4	47.9
Nondurable goods.....	48.8	51.3	53.6	54.8	57.0	58.0
Other.....	43.3	43.3	44.8	45.9	47.4	49.3
Final sales ²	1,647.3	1,667.3	1,751.7	1,803.9	1,873.9	1,912.4
Ratio of inventories to final sales.....	.303	.312	.306	.304	.307	.315
Nonfarm ³.....	.266	.273	.267	.266	.267	.274

Billions of 1972 dollars

Inventories ¹	307.6	310.7	313.9	316.1	318.1	321.0
Farm.....	40.6	40.5	40.2	40.1	40.1	40.0
Nonfarm.....	267.0	270.2	273.6	276.0	278.0	281.0
Durable goods.....	155.4	157.8	159.4	160.9	162.6	165.6
Nondurable goods.....	111.7	112.4	114.3	115.1	115.4	115.4
Manufacturing.....	128.8	129.9	131.5	132.9	133.2	135.2
Durable goods.....	83.9	84.9	86.1	87.2	87.6	89.7
Nondurable goods.....	44.9	45.0	45.4	45.7	45.6	45.5
Wholesale trade.....	53.7	55.7	56.6	56.8	58.2	59.4
Durable goods.....	36.0	37.1	37.8	38.5	39.2	39.8
Nondurable goods.....	17.7	18.6	18.8	18.4	18.9	19.6
Retail trade.....	60.6	61.1	61.7	62.2	62.6	62.1
Durable goods.....	27.5	27.6	27.3	27.0	27.6	27.9
Nondurable goods.....	33.2	33.5	34.4	35.2	35.0	34.3
Other.....	23.9	23.4	23.9	24.1	24.1	24.2
Final sales ²	1,148.4	1,141.1	1,167.3	1,180.3	1,203.9	1,201.9
Ratio of inventories to final sales.....	.268	.272	.269	.268	.264	.267
Nonfarm ³.....	.233	.237	.234	.234	.231	.234

Table 17.—National Income Without Capital Consumption Adjustment by Industry (6.4)

National income without capital consumption adjustment.....	1,554.8	1,752.8	1,619.3	1,647.2	1,735.2	1,779.8	1,849.1	1,891.7
Domestic income.....	1,537.5	1,733.4	1,603.4	1,629.0	1,714.1	1,761.1	1,829.3	1,870.0
Agriculture, forestry, and fisheries.....	44.6	52.3	50.6	47.9	50.7	52.2	58.3	-----
Mining and construction.....	100.4	118.0	104.2	101.6	118.9	123.3	128.0	-----
Manufacturing.....	408.9	464.2	428.7	432.5	461.9	469.4	492.9	-----
Nondurable goods.....	161.7	176.7	166.6	167.6	176.0	178.3	184.9	-----
Durable goods.....	247.2	287.5	262.1	265.0	285.9	291.1	308.0	-----
Transportation.....	58.4	65.9	61.3	61.3	66.5	66.7	69.1	-----
Communication.....	35.0	40.1	36.6	38.6	39.3	41.1	41.4	-----
Electric, gas, and sanitary services.....	29.5	33.5	30.0	33.3	32.7	33.1	34.9	-----
Wholesale and retail trade.....	237.0	263.7	242.9	245.7	260.0	270.5	278.6	-----
Wholesale.....	96.5	106.9	96.8	98.2	105.5	110.4	113.7	-----
Retail.....	140.5	156.8	146.1	147.5	154.5	160.1	164.9	-----
Finance, insurance, and real estate.....	177.9	202.0	185.5	189.9	196.6	207.2	214.5	-----
Services.....	213.1	240.3	222.0	231.0	236.8	243.0	250.3	-----
Government and government enterprises.....	232.7	253.4	241.5	247.2	250.7	254.6	261.3	-----
Rest of the world.....	17.3	19.4	15.9	18.2	21.1	18.8	19.8	21.7

Table 21: Implicit Price Deflators for Gross National Product by Major Type of Product (7.3). Columns: 1977, 1978, 1977, 1978 (I-IV), 1979. Rows: Gross national product, Final sales, Goods, Durable goods, Nondurable goods, Services, Structures.

Table 21.—Implicit Price Deflators for Gross National Product by Major Type of Product (7.3)

Table 22: Implicit Price Deflators for Gross National Product by Sector (7.5). Columns: 1977, 1978, 1977, 1978, 1979. Rows: Gross national product, Gross domestic product, Business, Nonfarm, Farm, Residual, Households and institutions, Government.

Table 22.—Implicit Price Deflators for Gross National Product by Sector (7.5)

Table 23: Implicit Price Deflators for the Relation of Gross National Product, Net National Product, and National Income (7.6). Columns: 1977, 1978, 1977, 1978, 1979. Rows: Gross national product, Less: Capital consumption allowances, Equals: Net national product, Less: Indirect business tax, Equals: National income.

Table 23.—Implicit Price Deflators for the Relation of Gross National Product, Net National Product, and National Income (7.6)

Table 24: Implicit Price Deflators for Net National Product and National Income by Sector (7.7). Columns: 1977, 1978, 1977, 1978, 1979. Rows: Net national product, Net domestic product, Business, Nonfarm, Farm, Residual, Households and institutions, Government, Rest of the world, National income, Domestic income.

Table 24.—Implicit Price Deflators for Net National Product and National Income by Sector (7.7)

Table 25: Implicit Price Deflators for Auto Output (7.9). Columns: 1977, 1978, 1977, 1978, 1979. Rows: Auto output, Final sales, Personal consumption expenditures, Net purchases of used autos, Producers' durable equipment, Net purchases of used autos, Net exports, Exports, Imports, Government purchases, Change in business inventories, Addenda.

Table 25.—Implicit Price Deflators for Auto Output (7.9)

Table 26: Implicit Price Deflators for Personal Consumption Expenditures by Major Type of Product (7.11). Columns: 1977, 1978, 1977, 1978, 1979. Rows: Personal consumption expenditures, Durable goods, Motor vehicles and parts, Furniture and household equipment, Other, Nondurable goods, Food, Clothing and shoes, Gasoline and oil, Fuel oil and coal, Other, Services, Housing, Household operation, Electricity and gas, Other, Transportation.

Table 26.—Implicit Price Deflators for Personal Consumption Expenditures by Major Type of Product (7.11)

Footnote 1: Revised. 1. Consists of final sales and change in business inventories of new autos produced in the United States. 2. Consists of personal consumption expenditures, producers' durable equipment, and government purchases. NOTE.—Table 21: "Final sales" is classified as durable or nondurable by type of product. "Change in business inventories" is classified as follows: For manufacturing, by the type of product produced by the establishment holding the inventory; for trade, by the type of product sold by the establishment holding the inventory; for construction, durable; and for other industries, nondurable. Tables 22 and 24: The industry classification within the business sector is on an establishment basis and is based on the 1972 Standard Industrial Classification.

Cyclical Fluctuations in the Difference Between the Payroll and Household Measures of Employment

FOREWORD

UNEXPLAINED differences in the cyclical behavior of the two principal measures of employment—the payroll and household measures—have long troubled labor market and other economists. This article concludes that these differences can be traced, first, to cyclical fluctuations in multiple jobholding and job changing and, second, to the inadequate representation in the household survey of certain groups—men, particularly black men, and workers who are poor—for which cyclical employment declines are larger than for groups that are more adequately represented.

The author's research is impressive because he has sifted and integrated a vast amount of evidence using simple statistical tools. His procedure has the further advantage of supplying the reader with information on the crucial assumptions he made when adequate data were lacking, thus enabling the reader to modify these assumptions. The author's conclusions are necessarily controversial, because research cannot compensate for the lack of firm data. Nevertheless, on occasion he states his conclusions as though they were not subject to qualification, so as not to overburden the exposition.

As noted in the acknowledgments, staff of the Bureau of Labor Statistics and the Census Bureau—the agencies that prepare the payroll and household measures—have been most helpful to the author. The agencies have been invited to comment on the article, and their comments will be published in the *SURVEY* if they wish. Others are invited to comment, and their comments will be considered for publication.

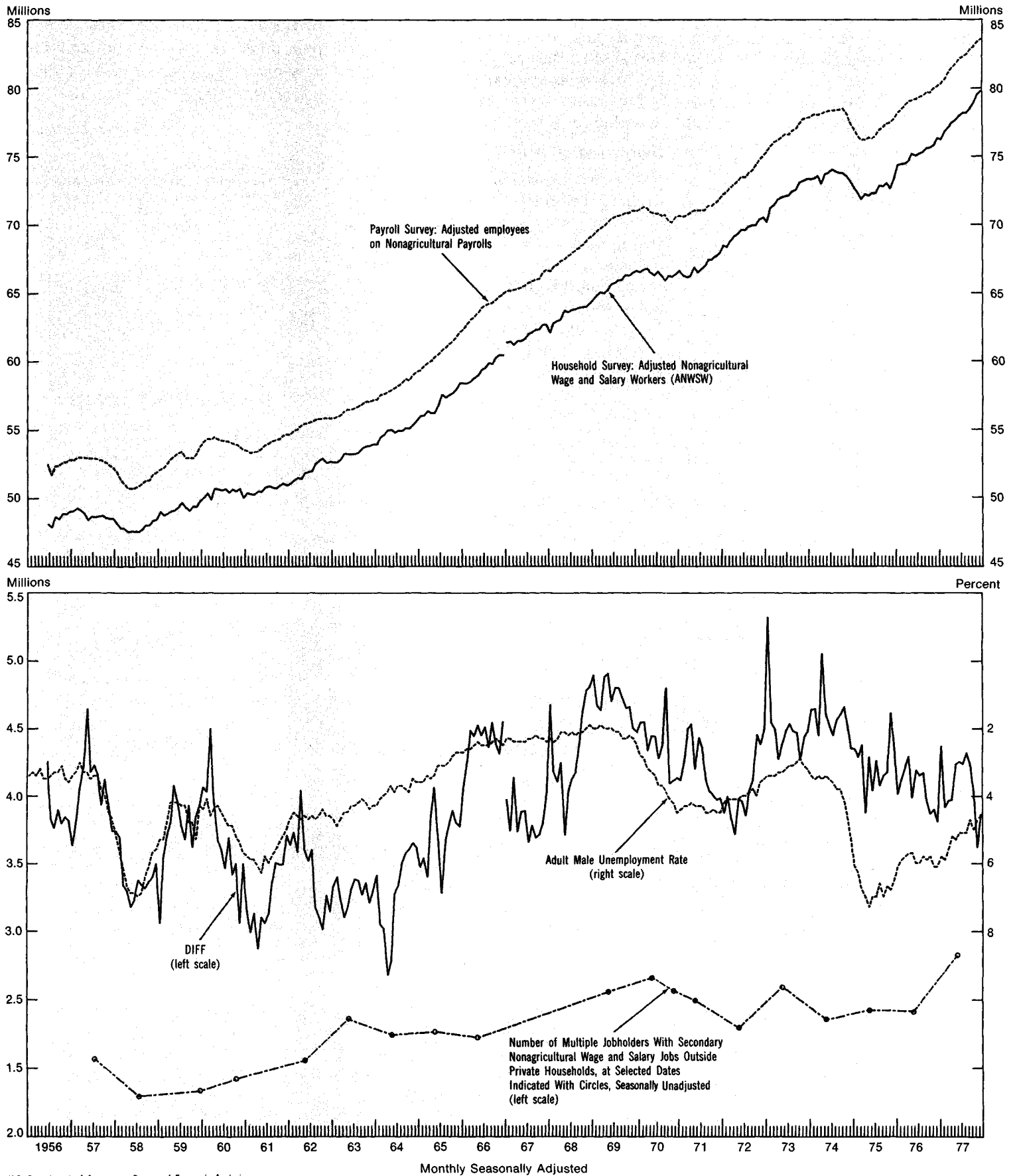
The Editor-in-Chief

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Adjusted Employment Measures and DIFF



U.S. Department of Commerce, Bureau of Economic Analysis

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In describing the *difference in the behavior* over time of the two adjusted employment measures, it is most convenient to examine the *behavior of the difference* between the two measures. I define DIFF as the seasonally adjusted difference between the adjusted payroll and the adjusted household measures of nonagricultural wage and salary employment (chart 2, lower panel; and table 2).

Two factors account for the fact that DIFF has always been positive, averaging about 4 million in the period 1956-77. First, the payroll survey counts jobs, and therefore counts all the jobs of multiple jobholders, whereas the household survey counts workers, and therefore counts each multiple jobholder only once. Second, the household survey understates employment, because it is based on population estimates that are too low. Other, minor, factors that affect DIFF's level are

mentioned *passim* throughout this article.³

Cyclical behavior of DIFF

For comparison with DIFF, the adult male unemployment rate—widely regarded as an indicator of labor market conditions—is plotted on an inverted scale (chart 2, lower panel). The comparison shows that, in general, DIFF behaved cyclically throughout the period 1956-77. The cyclical behavior of DIFF reflected divergent cyclical movements in the two adjusted employment measures.

1. DIFF declined in periods when the adult male unemployment rate rose sharply—i.e., in labor market contractions—because the adjusted payroll measure declined more than did the adjusted household employment measure. When DIFF is smoothed somewhat

to eliminate short-term irregularities in the series, the declines in DIFF in the four contractions in the period 1956-77 were between 400,000 and 1 million; the two earlier declines were larger than the two most recent ones.

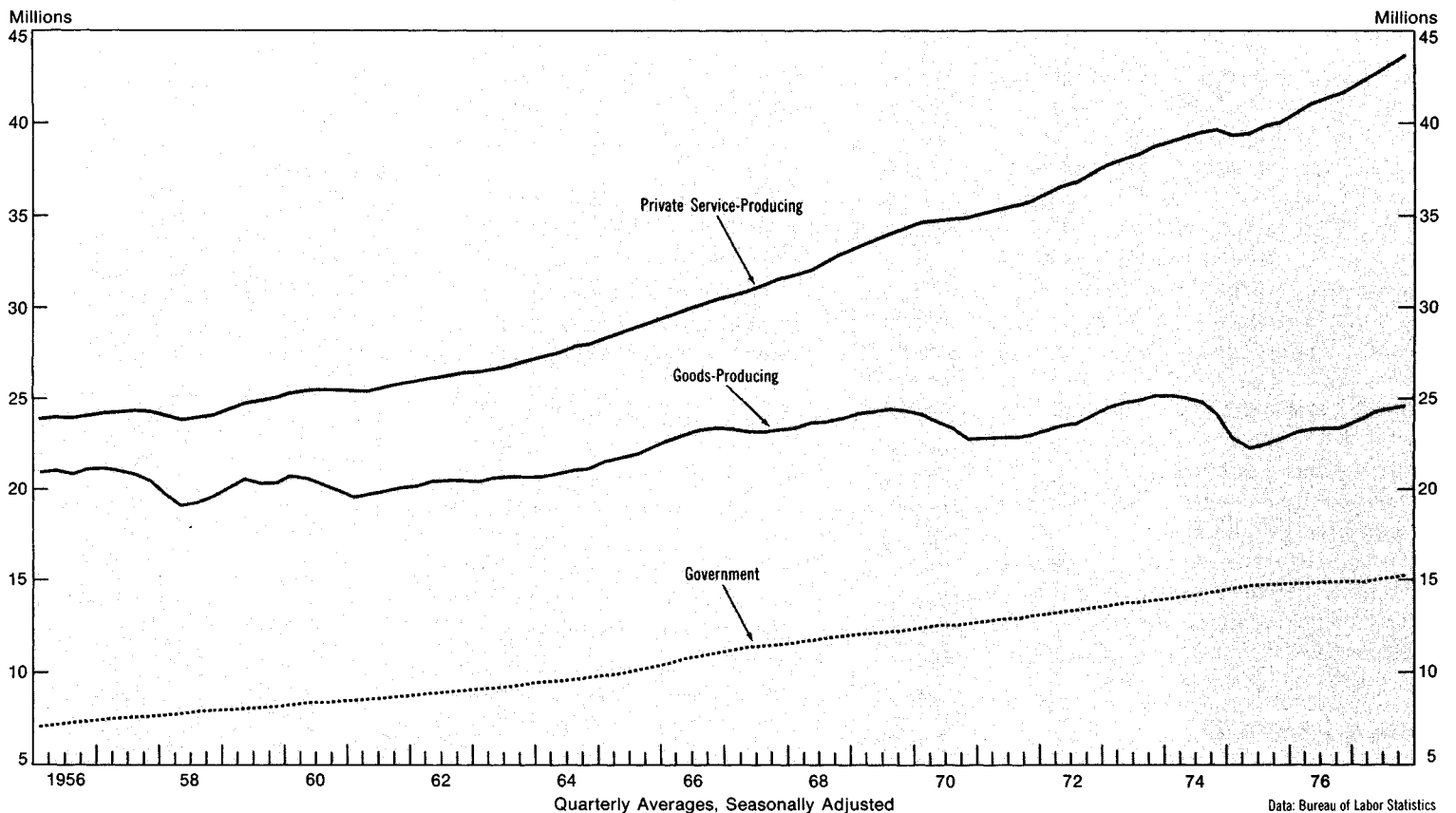
2. DIFF generally increased in periods when the adult male unemployment rate fell—i.e., in labor market recoveries and expansions—because the adjusted payroll employment measure increased more than did the adjusted household employment measure.⁴ The smoothed DIFF increased about 600,000-700,000 in the 1958-59, 1961-62, and 1972-73 recoveries, but did not increase in the 1975-77 recovery. In the long expansion from 1962 to 1969, DIFF declined somewhat in 1962-64 and then increased the

3. See also Gloria P. Green, "Comparing Employment Estimates from Household and Payroll Surveys," *Monthly Labor Review*, December 1969, pp. 9-20.

4. In 1971 and early 1972 the labor market remained loose—as indicated by the fact that the adult male unemployment rate remained high. In this period, DIFF continued to decline, and the adjusted payroll employment measure increased less than did the adjusted household employment measure.

CHART 3

Employees on Nonagricultural Payrolls, by Industry Group



U.S. Department of Commerce, Bureau of Economic Analysis

Data: Bureau of Labor Statistics

79-53

record amount of 2.2 million in 1964-69.⁵

In principle, the cyclical behavior of DIFF could be due to any of three causes, or to a combination of them.

1. Conceptual differences in the coverage of the two adjusted employment measures could be responsible.

2. Statistical error in the payroll survey might cause the adjusted payroll measure to exaggerate cyclical fluctuations—specifically, to exaggerate employment declines and those employment increases that occur in recoveries and expansions.

3. Statistical error in the household survey might cause the adjusted house-

5. The measure of the 1964-69 increase in DIFF is based on annual averages and is adjusted for a break in the adjusted household measure in January 1967, when the household survey reclassified about 750,000 operators of small nonfarm incorporated enterprises from self-employed to wage and salary workers. The measures of the change in the smoothed DIFF in contractions and recoveries are based on monthly trend-cycle values, as estimated by the Census Bureau's X-11 seasonal adjustment program.

Section 2: Conceptual Differences Between the Payroll and Household Employment Measures

THE major conceptual difference between the two adjusted employment measures is that the payroll survey counts jobs, whereas the household survey counts workers. Accordingly, the adjusted payroll measure is larger than the adjusted household measure, because some workers hold two or more jobs simultaneously, and because some workers change jobs under circumstances that cause both jobs to be counted by the payroll survey. In this section, I will show that this conceptual difference has contributed to, but by no means fully accounted for, the cyclical behavior of DIFF.

There are other, minor, conceptual differences between the two adjusted employment measures, but there is no evidence that they have contributed to the cyclical behavior of DIFF.⁶

Multiple jobholding

A multiple jobholder is a worker who holds two or more jobs simultaneously.

6. For discussion of these differences, see the article by Green, and footnote 20.

hold measure to dampen cyclical fluctuations—specifically, to dampen employment declines and those employment increases that occur in recoveries and expansions.

Preview of findings.—This article examines each of the three possible causes. Section 2 shows that conceptual differences in the coverage of the two adjusted employment measures have contributed somewhat to the cyclical behavior of DIFF. Section 3 concludes that statistical error in the payroll survey probably did not contribute substantially. Section 4 presents another major finding of this article—that two statistical errors have substantially dampened cyclical declines in the adjusted household employment measure, and one of them has somewhat dampened cyclical increases. Section 5 summarizes my findings and broadly relates these findings, in an integrated way, to the observed cyclical behavior of DIFF.

It is convenient to distinguish two groups of multiple jobholders—civilians, and members of the Armed Forces.

Civilian multiple jobholders.—Analysts of multiple jobholding distinguish two types of jobs. The “primary” job is the one at which a multiple jobholder works the largest number of hours per week. “Secondary” jobs are his or her other jobs.

The adjusted payroll employment measure counts both primary and secondary nonagricultural wage and salary jobs outside private households, whereas the adjusted household measure counts those workers whose primary job is a nonagricultural wage and salary job outside private households. Therefore, the adjusted payroll measure exceeds the adjusted household measure by the number of secondary nonagricultural wage and salary jobs outside private households (“secondary jobs,” for short).

The available evidence indicates that cyclical declines and pre-1962 cyclical

increases in secondary jobs, both of which were small, contributed little to the cyclical declines and increases in DIFF, and that post-1962 cyclical increases in secondary jobs, which were large, contributed substantially to cyclical increases in DIFF. I will first discuss the evidence and its limitations, then present the conclusions I draw from the evidence, and, finally, show that the behavior of multiple jobholding seems reasonable in light of the industrial composition of secondary jobs.

A series for the number of workers with secondary nonagricultural wage and salary jobs outside private households (“workers with secondary jobs,” for short) is available from 19 intermittent household surveys over the period 1957-77 (chart 2, lower panel). The series is an indicator of the number of secondary jobs.⁷ However, it is not a very precise indicator of short-term changes in that number, because statistical error in the series has been quite large relative to the size of the fluctuations that I think may have occurred.⁸ For instance, the large increase in the number of workers with secondary jobs in 1962-63, and the decline in 1963-64, during a period

7. The household survey estimate of workers with secondary jobs differs conceptually from the number of secondary jobs counted by the payroll survey for two reasons. First, some workers hold three or more nonagricultural wage and salary jobs outside private households, and the third and subsequent jobs are omitted from the number of workers with secondary jobs. In July 1958, the household survey found that 7 percent of all multiple jobholders held three or more jobs (Census Bureau, *Current Population Reports Series P-50*, No. 88, “Multiple Jobholding: July 1958,” 1959.) Second, some workers with secondary jobs are absent without pay from their secondary job or jobs during the survey period; the payroll survey does not count such jobs. The July 1957 household survey indicated that about 13 percent of multiple jobholders were absent without pay from their secondary job or jobs. (Census Bureau, *Current Population Reports, Series P-50*, No. 80, “Multiple Jobholding: July 1957,” 1958.)

8. The standard error was about 60-80,000 for each of the estimates in the series. Response error may have been substantial: Whether, in a sample household, the survey counted a multiple jobholder, and whether the multiple jobholder's main secondary job was correctly identified as a nonagricultural wage and salary job may have depended in some cases on which household member responded to the questions of the interviewer, and whether the interview was conducted in person or over the telephone. For discussion of response error in the household survey, see Alfred Tella, “Cyclical Behavior of Bias-Adjusted Unemployment,” *Methods for Manpower Analysis No. 11*, W. E. Upjohn Institute for Employment Research, 1976; and Census Bureau, *The Current Population Survey Reinterview Program, January 1961 Through December 1966*, Technical Paper No. 19, 1968. Of course, the statistical errors discussed in section 4 of this article also affected to some extent the household survey estimate of workers with secondary jobs.

when the labor market was relatively stable, may reflect error in the series rather than a real change in the number of secondary jobs.

On the basis of the intermittent household series, I draw the following conclusion with regard to the cyclical behavior of the number of secondary jobs and of DIFF, in contractions and in recoveries and expansions.

1. Perhaps because of statistical error, the series does not show a consistent pattern for the four contractions; on average, however, it declined 1.5 percent, or about 40,000.⁹ Declines of this magnitude in the number of secondary jobs would have contributed relatively little to cyclical declines in DIFF.

2. The series consistently increased in periods of recovery and expansion. It appears that multiple jobholding contributed relatively little to the increases in DIFF in the 1958-59 and 1961-62 recoveries, but contributed substantially to the increases in DIFF in the 1964-69 expansion and the 1972-73 recovery, and even raised DIFF substantially in the 1962-64 expansion and the 1975-77 recovery—periods when DIFF showed no increase.

The series increased only 2 percent, or about 40,000, from July 1958 to December 1959, and it increased only 6 percent, or about 120,000, from December 1960 to May 1962.¹⁰ However, it increased 9 percent, or about 190,000, from May 1962 to May 1964; 14 percent, or about 310,000 from May 1964 to May 1969; 13 percent, or 300,000, from May 1972 to May 1973; and 17 percent, or 400,000, from May 1975 to May 1977.

The behavior of the intermittent household series seems reasonable in light of the industrial makeup of secondary jobs. Few such jobs are in goods-producing industries, where employ-

ment has declined sharply in contractions and increased sharply in recoveries (chart 3). In May 1977 the household survey found that only 14 percent of workers with secondary jobs held their main secondary job in goods-producing industries; according to the payroll survey, 29 percent of all employees on nonagricultural payrolls worked in such industries. Most secondary jobs are in private service-producing industries, where employment generally remained flat in contractions, increased somewhat in the 1958-60 and 1961-62 recoveries, and increased substantially in recoveries and expansions after 1962 (chart 3).¹¹

Military multiple jobholders.—Because the household survey does not cover Armed Forces members, civilian jobs held by them in off-duty hours are not covered by the intermittent household surveys of multiple jobholding.

Armed Forces members stationed on shore in the United States probably held about 200,000 civilian jobs in August 1975.¹² Most of them were probably nonagricultural wage and salary jobs outside private households. Both the number of Armed Forces members stationed on shore in the United States and the proportion of them who held civilian jobs have a bearing on the cyclicity of DIFF.

1. The proportion of Armed Forces members stationed on shore in the United States who held civilian jobs—13 percent in August 1975—may have fluctuated cyclically. In the absence of data, my guess is that fluctuations in this proportion are unlikely to have accounted for cyclical fluctuations of

11. Service-producing industries include government, and it is not possible to state the exact percentage of workers who held their main secondary job in government, because the household survey data do not identify government workers. However, on the basis of data on workers with secondary jobs in two industries that are entirely or largely governmental—i.e., public administration and educational services—it appears that the percentage of workers with secondary jobs who held their main secondary job in government was no larger in May 1977 than the percentage of employees on non-agricultural payrolls who worked in government. Bureau of Labor Statistics, *Special Labor Force Report* #11, "Multiple Jobholders in May 1977," 1978.

12. This estimate is based on a mail survey of Air Force members taken by the Air Force in August 1975. Among respondents stationed in the United States, 17 percent of the enlisted men and 5 percent of the officers held "a second job." I assume that the same proportions of all Armed Forces members stationed on shore in the United States in August 1975 held second jobs. Majors G. C. Saul Young and Charles M. McNichols, United States Air Force, personal communication to author.

more than 20,000 in the number of civilian jobs held by Armed Forces members, and, consequently, in DIFF.

2. The number of Armed Forces members stationed on shore in the United States has not fluctuated cyclically, except in the period 1964-72. In connection with the Vietnam war, the number increased about 230,000 from 1964 to 1969, and declined about 400,000 from 1969 to 1972. Assuming that the proportion who held civilian jobs was a constant 13 percent, the 1964-69 increase would have contributed about 30,000 to the increase in DIFF, and the 1969-72 decline would have contributed about 50,000 to the decline in DIFF.

Job changing

In analyzing the treatment of job changers in the payroll and household surveys, it is necessary to understand that the two surveys refer to different periods. The household survey counts workers who were employed at any time during the survey *week*—the calendar week that includes the 12th of the month. The payroll survey counts workers who were on the payroll at any time during the *pay period* that includes the 12th of the month.¹³

I will first show that job changing causes the adjusted payroll employment measure to exceed the adjusted household employment measure, and then discuss the cyclical behavior of this difference.

Treatment of job changers in the two surveys.—Data from several sources indicate that the length of pay periods varies by industry and occupation.¹⁴ The pay period is 1 week for a little more than one-half the workers covered by the payroll survey. Weekly periods predominate for production workers and for other nonsupervisory workers in the private sector except office

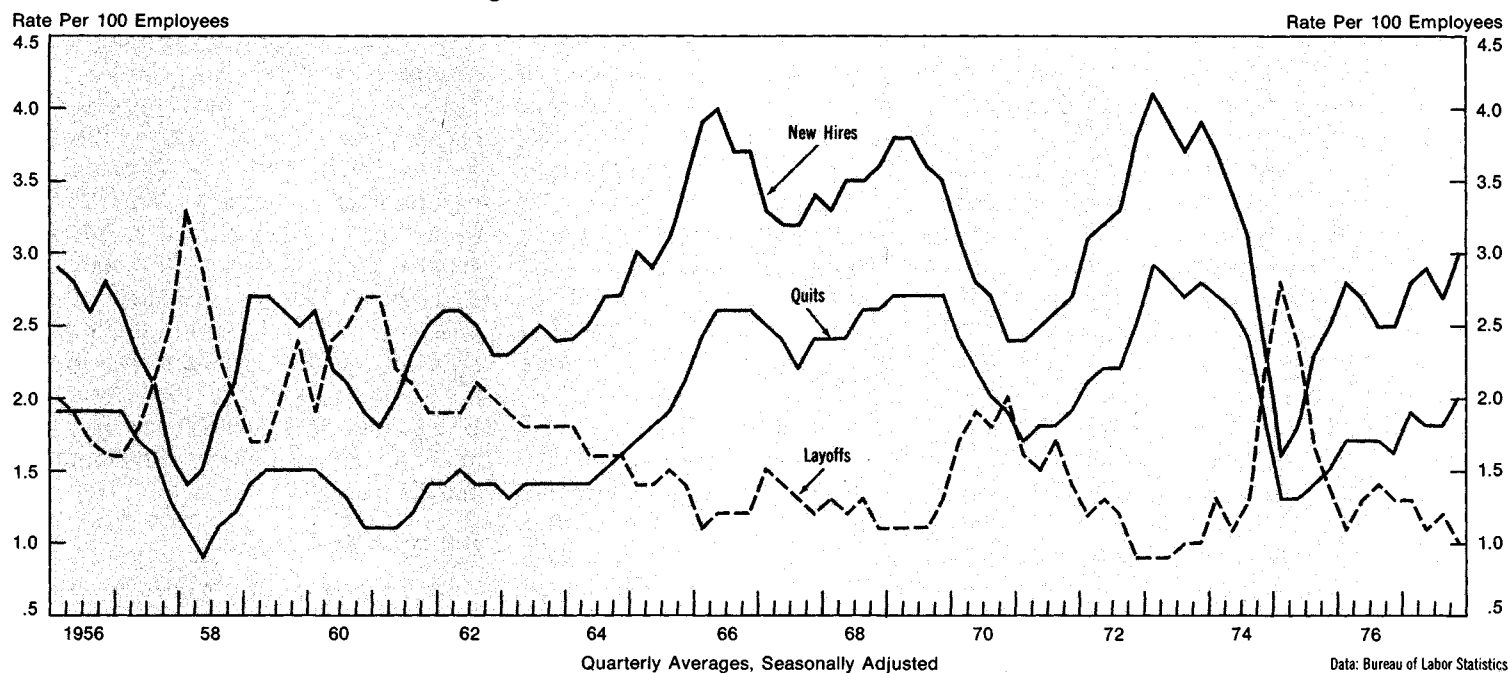
13. There is one exception; For Federal employees, the payroll survey uses the Civil Service Commission count, which includes all regular employees who were on the payroll on the last day of the month, plus a small number of intermittent employees who were on the payroll at any time during the month.

14. Bureau of Labor Statistics, *Pay Period Practices of American Industry, 1954*, and *Area Wage Surveys: Metropolitan Areas, United States and Regional Summaries, 1969-70*, Bulletin 1660-92, 1972, and data from the American Management Association and Census Bureau.

9. The series declined 13 percent, or about 270,000, from July 1957 to July 1958, increased 6 percent, or about 100,000, from December 1959 to December 1960, declined 2 percent, or about 60,000, from May 1969 to May 1971, and increased 3 percent, or about 70,000, from May 1974 to 1975.

10. The irregular timing of the surveys before 1962 and possible seasonal variation in the number of secondary jobs may affect the observed changes in the number of workers with secondary jobs. Beginning with 1962, surveys were taken in May of every year except 1967-68, when no survey was taken. In 1970, a second survey was taken in November.

Labor Turnover Rates in Manufacturing



U.S. Department of Commerce, Bureau of Economic Analysis

Data: Bureau of Labor Statistics
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workers; they are also used for a large number of office workers. The pay period is 2 weeks, one-half a month, or 1 month, for a little less than one-half of the workers covered by the payroll survey. The first two periods predominate for office and supervisory workers in the private sector and for government workers; the last is used for a minority of supervisory workers in the private sector and for a minority of State and local government workers.

The difference in the treatment of job changers in the two employment surveys depends on the length of the pay periods at the old and the new jobs, on the day of the week on which the pay periods end, and on the dates on which the worker leaves the old job and starts the new job. I will discuss three cases. Two of the cases concern jobs with weekly pay periods; these are of particular interest, because there is evidence that workers in these jobs change jobs more frequently than do workers in jobs with longer pay periods.¹⁵

15. Job tenure data indicate that the percentage of workers who have held their jobs for 6 months or less is smaller for workers in State and local government and for office and supervisory workers in the private sector—for whom bi-weekly and longer pay periods predominate—than for other nonagricultural wage and salary workers. Bureau of Labor Statistics, *Special Labor Force Report 172, "Job Tenure of Workers, January 1973,"* 1975.

1. Suppose the pay periods at both jobs are 1 week and that they end on a Saturday or Sunday, as do most weekly pay periods.¹⁶ If the worker leaves the old job to begin the new job the following Monday, there is typically no difference between the two surveys: The payroll survey counts one job and the household survey counts one worker.¹⁷ If the worker changes jobs between Monday and Saturday, say from Tuesday to Wednesday, the payroll survey counts two jobs and the household survey counts one worker. However, the intermittent household surveys of multiple jobholding identify that worker as a multiple jobholder.¹⁸ Therefore, for

16. *Pay Period Practices.*

17. There are two minor exceptions to this rule, if the 12th of the month is a Sunday. The two exceptions occur with roughly equal frequency, and offset each other. If the worker leaves a job with a pay period that ends on Sunday the 12th, to begin a job with a pay period that ends on Saturday the 13th, the payroll survey counts two jobs and the household survey counts one worker. If the worker leaves a job with a pay period that ends on Saturday the 11th, to begin a job with a pay period that ends on Sunday the 19th, the payroll survey counts no jobs and the household survey counts one worker.

18. The number of "multiple jobholders" who left one nonagricultural wage and salary job and began another one in the survey week was estimated on one occasion, in December 1960, to be 45,000. The number of "multiple jobholders" who left any job and began another one in the survey week was estimated to be 80,000 in December 1960, 43,000 in May 1969, 29,000 in May 1974, 18,000 in May 1975, 35,000 in May 1976, and 58,000 in May 1977. The standard error of these

weekly pay periods that end on Saturday or Sunday, there is no discrepancy in the treatment of job changers that has not already been discussed as part of "multiple jobholding."

2. Suppose the pay periods at both jobs are 1 week, and that one or both of them end on a day other than Saturday or Sunday. Suppose further that the worker leaves the old job to begin the new job the following Monday. If the pay periods at the two jobs end on the same day, and if the leaving date and the following Monday both fall in the pay period that includes the 12th of the month, the payroll survey counts two jobs and the household survey counts one worker. If the pay periods at the two jobs end on different days, the payroll survey often counts two jobs and the household survey one worker; less frequently, the payroll survey counts no job, and the household survey one worker.

3. Suppose the pay period at one or both jobs is longer than 1 week. If the worker leaves the old job in a pay

estimates is relatively high, because they are based on few sample cases; for example, the standard error on the May 1969 estimate was almost 10,000. Also, there may have been response error. Data from unpublished BLS tabulations.

period that includes the 12th to begin the new job in a pay period that includes the 12th of the same month, the payroll survey counts two jobs. Depending on the length and juxtaposition of the pay periods at the two jobs, the payroll survey could count two jobs even if the worker is out of work a week or more between jobs. The household survey normally counts the job changer once.¹⁹ The intermittent surveys do not identify him as a multiple jobholder unless he changes jobs during the week of the 12th.

I will refer to the group of job changers for whom the payroll survey counts two jobs, and whom the intermittent household surveys do not identify as multiple jobholders, as "excess job changers." Excess job changers is to be understood as net of all job changing cases for which the payroll survey counts no job and the household survey counts one worker, as well as cases for which the payroll survey counts no or one job and the intermittent household surveys identify the worker as a multiple jobholder.²⁰

Cyclical fluctuations in excess job changing.—Excess job changing probably increases when the labor market is becoming tight and jobs are becoming

easier to find, for two reasons: There is more job changing, and job changers lose less time looking for work between jobs. Conversely, excess job changing probably declines when the labor market is becoming slack and jobs are getting harder to find.

Evidence from two sources indicates that job changing fluctuates cyclically.

1. Monthly data on labor turnover rates in manufacturing show that quits and new hires rise sharply when the labor market tightens, and fall sharply when it slackens (chart 4). Presumably, these movements reflect fluctuations in job changing.

2. The Social Security Administration's Continuous Work History Sample (CWHHS), a 1-percent sample of social security records, provides a measure of the number of separate jobs held by each worker during the calendar year, for 1957-75 (table 3). The jobs-per-worker is a good indicator of job changing.²¹ It rose when the labor market tightened and fell when it slackened.

21. The CWHHS counts wage and salary jobs covered by Social Security, which are largely but not entirely the same as those covered by the payroll survey. Thus, the CWHHS includes some agricultural and private household jobs, and excludes all railroad jobs, most Federal Government jobs, and some State and local government and nonprofit organization jobs.

As a measure of job changing in covered employment, the CWHHS series on jobs per worker has three limitations; none of these limitations, however, significantly impair the use-

There are two reasons for believing that the time lost between jobs fluctuates cyclically.

1. The proportion of job changers who were laid off their old job falls when the labor market tightens and rises when it slackens; workers who are laid off are less likely than workers who quit to have lined up a new job beforehand at which they can start work immediately.²²

2. The length of time it takes to find

fulness of the CWHHS as an indicator of cyclical fluctuations in job changing.

1. Employers often change their tax identification numbers because of transfer of ownership, merger, change of name, or change of legal form of organization, and these changes cause spurious job changes for workers in the CWHHS. There is no evidence that such spurious changes fluctuate cyclically, and there is some evidence that the changes involve less than 5 percent of workers each year.

2. Tips became subject to Social Security tax in 1966. Because reports of tips are filed separately from reports of wages, the CWHHS treats tips as wages from a second employer. In this way, about 2.3 million spurious "jobs" were added to the CWHHS in 1966.

3. The CWHHS counts jobs held both sequentially and simultaneously. However, intermittent household surveys indicate that jobs held simultaneously—i.e., multiple jobholding—have accounted for only 3-5 percent of nonagricultural wage and salary jobs outside private households in any week. Furthermore, the surveys indicate that cyclical fluctuations in multiple jobholding are not large enough to account for very much of the cyclical pattern in the CWHHS series on jobs per worker.

22. A household survey of persons who began new jobs in 1972 found that 66 percent of workers who quit previous jobs had begun looking for work before they quit, and 44 percent found their new jobs before quitting the old one. By contrast, only 23 percent of workers who were laid off or otherwise lost their job had begun looking for work prior to separation. Bureau of Labor Statistics, *Jobseeking Methods Used by American Workers*, Bulletin 1886, 1975, p. 12.

19. In unusual circumstances, the household survey does not count the job changer. Suppose the pay period at the first job is March 1-14, and at the second job, March 8-21; and suppose the calendar week including March 12 is March 8-14. If a worker leaves the first job on March 5 and starts the second job on March 15, the payroll survey counts two jobs but the household survey does not count even one worker.

20. A further factor that explains level differences between the two adjusted employment measures is that the adjusted payroll measure counts the jobs of two groups of workers who are omitted from the adjusted household measure, for reasons that are related to the use of pay periods longer than 1 week. There is no evidence that the size of these groups fluctuates cyclically.

1. When workers are absent without pay, the adjusted payroll measure counts one job and the adjusted household measure counts one worker if the worker was paid during part of the survey period. Because workers paid biweekly or monthly are less likely to be absent without pay during the entire pay period than during 1 calendar week within that period, the payroll measure includes the jobs of some absentees whom the household measure does not cover.

2. There is at all times a large two-way flow of persons into and out of nonagricultural wage and salary employment. Suppose one worker leaves a job with a 1-week pay period on Tuesday and is not employed for the remainder of the week, and another worker who was previously not employed takes the same job on Wednesday. The adjusted payroll measure counts two jobs and the adjusted household measure counts two workers. But for jobs with pay periods that exceed 1 week, the payroll survey period exceeds the household survey period, and the payroll survey therefore covers more leavers and entrants than does the household survey.

Table 3.—Number of Covered Wage and Salary Jobs Held During Year by Workers Covered by Social Security, 1957-75

	Workers			Jobs	Jobs per worker
	Total	With 1 job	With 2 or more jobs		
	Millions				
1957.....	62.91	44.84	18.07	95.43	1.517
1958.....	62.37	45.84	16.53	90.79	1.456
1959.....	64.48	45.73	18.75	97.64	1.514
1960.....	66.01	47.13	18.88	99.05	1.501
1961.....	66.43	47.89	18.55	98.27	1.479
1962.....	68.05	48.59	19.46	101.97	1.498
1963.....	69.49	49.70	19.80	104.16	1.499
1964.....	71.47	50.63	20.84	108.30	1.514
1965.....	74.54	51.80	22.72	115.30	1.547
1966.....	78.49	52.87	25.62	127.02	1.618
1967.....	80.55	55.07	25.48	126.58	1.571
1968.....	83.34	57.37	25.97	132.10	1.585
1969.....	86.31	57.82	28.49	137.83	1.597
1970.....	87.05	60.45	26.60	133.34	1.532
1971.....	87.13	61.88	25.25	129.78	1.489
1972.....	89.78	62.65	27.14	136.81	1.524
1973.....	93.02	63.54	29.48	145.32	1.562
1974.....	94.81	65.71	29.10	144.98	1.529
1975.....	93.98	68.54	25.44	135.31	1.440

Source: Continuous Work History Sample, 1-Percent Annual Employee-Employer File, Social Security Administration. For description of the sample, see Bureau of Economic Analysis, *Regional Work Force Characteristics and Migration Data: A Handbook on the Social Security Continuous Work History Sample and its Application*, 1976.

a new job falls when the labor market tightens and rises when it slackens.²³

Effect on DIFF.—Data are not available for making reliable estimates of cyclical fluctuations in excess job changing. However, an illustrative calculation indicates that the fluctuations are too small to explain the cyclical behavior of DIFF. It is appropriate to make the calculation for the period 1973–75, when job changing declined more than at any other time in the period 1957–75, and to present the calculation in two steps.

First, I estimate that there were an average of about 250,000 excess job changers each month in 1973. To arrive at this figure, I first estimated (on the basis of CWHS data adjusted for spurious job changing, tip reporting, and multiple jobholding) that about 800,000 wage and salary workers left jobs each week in 1973 to start new jobs sometime before yearend. I then made somewhat arbitrary assumptions as to how many of the job changers left jobs with 1-week, 2-week, and 1-month pay periods; and as to what proportions of each group started new jobs soon enough for both jobs to be counted in the payroll survey.

Second, I estimate that excess job changing declined in 1975 to at most 68 percent, and perhaps to as little as 45 percent of its 1973 level. This estimate is based on two considerations.

1. The CWHS series on jobs per worker indicates that in 1975 about 75 percent as many workers as in 1973, or about 600,000 per week, left a job to start another job before yearend.

2. I assume that, among workers who did leave a job to start another job before yearend, the proportion who began new jobs soon enough to be counted twice in the payroll survey declined in 1975 to at most 90 percent, and perhaps to as little as 60 percent,

23. When the length of time it takes to find a new job falls, the number of job changers who leave one job to start another one in the same calendar week may increase. Such persons are not excess job changers, because the intermittent household surveys identify them as multiple jobholders. However, the intermittent surveys indicate that few workers change jobs during the calendar week (see footnote 18), and I assume that cyclical changes in the number of such persons are too small to significantly affect the analysis presented in the text.

of the 1973 proportion of 25 percent, that is, to 22½–15 percent.

It follows that excess job changing declined at least 80,000, and, perhaps as much as 137,000, from 1973 to 1975. Although the assumptions underlying the illustrative calculation are somewhat arbitrary, it is difficult to posit plausible circumstances under which the true decline in excess job changing could have been more than twice as large or less than half as large as in the illustrative calculation.

Because the annual CWHS data show that job changing declined more in 1973–75 than at any other time in the period 1957–75, and because the quarterly labor turnover data show that the quit and new hire rates in manufacturing declined more in 1973–

75 than at any other time in the period 1956–77, I conclude that excess job changing probably declined more in 1973–75 than at any other time in the period 1956–77. (The labor turnover data also indicate that excess job changing declined less in the 1960–61 contraction than in any other contraction in the period.)

On the basis of the CWHS and the labor turnover data, I conclude that cyclical increases in excess job changing in the period 1956–77 were no larger than the 1973–75 decline in excess job changing, with the sharpest of these increases occurring in 1964–66 and in 1971–73. It appears, therefore, that excess job changing has contributed to, but by no means fully explained, the cyclical behavior of DIFF.

Section 3: Cyclical Accuracy of the Payroll Survey

IN this section, I will show that statistical error probably did not cause the payroll survey to substantially exaggerate cyclical fluctuations of nonagricultural employment during the period 1956–77. The conclusions of this section also apply to the adjusted payroll measure, which differs little from the published payroll survey measure (table 1). However, the limited data that are available are insufficient to rule out the possibility of cyclical error in the payroll survey.

The payroll survey measures the number of nonagricultural wage and salary jobs at which workers either worked, or were absent with pay, during the pay period that includes the 12th of the month. Underlying the payroll survey estimate prepared by the Bureau of Labor Statistics (BLS) are two data sources.²⁴

1. The survey is benchmarked, for March of almost every year, to universe counts of employment, based on unemployment insurance (UI) tax data and other data sources for groups of workers not covered by UI.²⁵

24. For a description of the survey methodology, see Seymour Wolfbein, *Establishment Reporting in the United States*, Background Paper No. 2, National Commission on Employment and Unemployment Statistics, 1978; and Bureau of Labor Statistics, *BLS Handbook of Methods for Surveys and Studies*, Bulletin 1910, 1976.

25. There were no benchmarks in 1958, 1960, and 1972. The payroll series used in this article is benchmarked for

2. Estimates for inter-benchmark and post-benchmark months are based on reports from a panel of about 160,000 establishments.

In principle, one could take two approaches to the evaluation of the cyclical accuracy of the payroll series. One could discuss the methodology that underlies the payroll series and whether flaws in that methodology may have led to an exaggeration of cyclical fluctuations in nonagricultural employment. Alternatively, one could compare cyclical fluctuations in the payroll series with those in another series that is conceptually similar, and draw inferences from the comparison.

For two reasons, the latter approach is appropriate for private employment (the major topic of discussion in this section). First, the payroll survey methodology is extremely complex and little evidence is available on the accuracy of the underlying data. Second, another series that is conceptually similar to the payroll series is available; it is based on a much simpler methodology, which is easier to evaluate than is the

March 1977. See Michael Buso and William C. Bennett, Jr., "BLS Estimates Revised to Reflect New Benchmark Levels and 1972 SIC," *Employment and Earnings*, October 1978.

methodology of the payroll series. As will be seen, the cyclical fluctuations in that series confirm those in the payroll series.

For the Federal Government also, the latter approach is appropriate, because there exists another series that is conceptually similar to the payroll series and that is believed to be cyclically accurate. For State and local government, neither approach is appropriate, for reasons that will be discussed below.

Private employment

The number of workers covered by UI is a series that is conceptually close to the payroll series for private employment. I will first describe this alternative series, then evaluate its cyclical accuracy, and, finally, compare it with the payroll series.

ES-202 employment.—Employers covered by UI must submit quarterly tax returns, known as ES-202 reports, to State employment security agencies. In the reports, employers state the number of workers who either worked, or were absent with pay, during the pay period that included the 12th of each month. The State agencies tabulate the number of workers, and BLS edits, compiles, and publishes the tabulations.

In the period under discussion, UI coverage has grown from 86 percent of the payroll measure of private non-agricultural employment in 1956 to 97 percent in 1977. From 1956 to 1971, Federal law required that private employers of four or more workers participate in the UI programs, but exempted railroads, hospitals, educational institutions, religious organizations, and other nonprofit organizations. State laws covered some workers not covered under Federal law. From January 1972 until the end of the period under discussion, Federal law covered private employers of one or more workers. Hospitals, institutions of higher education, and some other nonprofit organizations were covered, but railroads, primary and secondary schools, and religious organizations remained exempt. Again, State laws covered some workers not covered under Federal law.

Conceptually, the ES-202 series for private employment is the same as the

payroll series for private employment, except for two differences. First, the ES-202 series excludes uncovered employment. Second, the ES-202 series includes some employment in agriculture, in private households, and in U.S. territories.

Cyclical accuracy of the ES-202 series.—The principal source of statistical error in the ES-202 series is the attempt by some employers to evade UI taxes either by omitting some workers from returns or by not filing returns.²⁶ Only very small firms can evade UI taxes with a low risk of detection, because: First, in order to evade UI taxes a firm must enjoy the collusion of workers, who might otherwise file UI claims that would expose the firm's evasion, or simply denounce the firm to tax authorities; and second, in order not to file ES-202 returns a firm must have few dealings with official agencies, so that its name rarely appears on official lists that investigators match with tax returns.

To minimize the risk of detection, most firms that evade UI taxes probably do so continuously at rates that do not fluctuate sharply, rather than episodically, or at sharply fluctuating rates, for two reasons. First, firms that omit some workers from ES-202 returns must pay these workers "off the books," and must therefore "skim" (fail to record) some of their income as well, in order that their books balance. Because the share of income that such firms can skim is limited by the need to maintain accounting proportions that would appear reasonable to an Internal Revenue Service (IRS) investigator, the share of income that they do skim probably does not fluctu-

26. Evidence of some UI tax evasion came to light in the period following the 1972 extension of UI coverage to employers of fewer than four workers, when BLS found that some small firms that were previously covered by UI laws but had not filed ES-202 returns began reporting many hundreds of thousands of workers. BLS attributes the increase to the fact that the new UI law was more nearly self-policing than the old one. A UI claim now triggers an investigation if State officials cannot find the worker's former employer in their records: before 1972 this was not the case, because the State officials could not be sure whether the employer was covered by the UI law.

UI tax evasion would, of course, have no effect on DIFF if respondents systematically lied to household survey interviewers, telling them that such workers in their households are not employed. However, it is implausible that respondents thus conceal all, or even most, workers on whom employers do not pay UI taxes.

ate sharply.²⁷ Second, the IRS or the State agency usually investigates when a firm stops filing ES-202 returns, unless the firm files a "final return" showing that it has gone out of business. Continuous evasion at constant rates by a fixed group of employers would not normally cause the ES-202 series to exaggerate cyclical fluctuations in covered employment.

However, there may be a cyclical pattern to tax evasion, due to efforts by some small firms to cut costs by evading taxes during recessions. First, in contractions some firms may increase off-the-books employment, temporarily accepting an increased risk of an IRS investigation. Some of the additional off-the-books workers may be persons receiving unemployment compensation, who would prefer to work off the books and not report their income to the State employment security agency. During recoveries and expansions, such workers may become reemployed elsewhere in higher paying, on-the-books, jobs, and such firms may begin reporting previously unreported workers in order to reduce the risk of an IRS investigation. Second, during contractions some firms may lay off workers, pretend to go out of business, and operate clandestinely with a core group of trusted workers. Later, during recoveries and expansions, if the tax-evading firms hire additional, less trusted, workers, or if they expand into operations that bring their names to the attention of official agencies, they may resume paying taxes. Such behavior would cause the ES-202 series to exaggerate cyclical fluctuations in covered employment. For the most recent recession, there is circumstantial evidence that no substantial increase in UI tax evasion occurred.²⁸ For earlier

27. Irwin Ross, "Why the Underground Economy is Booming," *Fortune*, October 9, 1978, pp. 92-98.

28. An analysis of ES-202 returns indicates that, from March 1974 to March 1975, the increase in the number of jobs concealed by tax-evading firms cannot have been very large. In goods-producing industries, which accounted for the entire employment decline, total ES-202 employment declined 10.4 percent, or 2,559,000, but establishments with fewer than 20 workers—for which one would expect the rate of tax evasion to be much higher than for larger establishments—reported an employment decline of only 4.8 percent, or 135,000. In private service-producing industries, where small firms account for a larger share of employment, total ES-202 employment increased 0.5 percent, or 193,000, but establishments with fewer than 20 workers reported an employment increase of 1.5 percent, or 166,000. (*Employment and*

years, there is no evidence on cyclical fluctuations in tax evasion. I conclude that cyclical fluctuations in tax evasion were probably small or did not occur, but I cannot rule out the possibility that they were substantial.

There are other causes of inaccuracy in the ES-202 series but none appear to affect the cyclical accuracy of the series.²⁹

Comparison of payroll and ES-202 series.—When employment in agriculture (including agricultural services) and private households, and in U.S. territories, is subtracted from the published ES-202 series for private employment, the resulting adjusted ES-202 series is conceptually the same as the adjusted payroll series for private employment minus uncovered employment. Accordingly, the difference between the adjusted payroll series for private employment and the adjusted ES-202 series is conceptually the same as uncovered employment.

As previously mentioned, the ES-202 tabulations for March are the principal source for the benchmarking of the payroll survey, which is done almost every year. The issue, then, is whether reports by establishments in the payroll survey panel have somehow introduced cyclical error between benchmarks. If this had been the case, the adjusted payroll series would have fluctuated more, cyclically, than the adjusted ES-202 series—which, I concluded above is probably cyclically accurate.³⁰ Accordingly, the difference between the adjusted payroll series for private employment and the adjusted ES-202 series would have fluctuated cyclically—

Wages: First Quarter 1974, and Employment and Wages: First Quarter 1975 (Based on the 1967 S.I.C.). The smaller decline and the larger increase in the small establishments indicates that the increase in tax evasion there cannot have been very large. Of course, the true employment decline in the small goods-producing establishments could have been less than 4.3 percent, and the true employment increase in the small service-producing establishments could have been more than 1.5 percent, but I know of no evidence or line of reasoning that would suggest that this was the case.

29. For example, a few employers apparently misunderstand the instructions in the ES-202 report, and state the number of workers who worked or were absent with pay at any time during the quarter, or include workers who were absent without pay. Error may also arise in the processing of the collected data, or in imputations that State agencies make for late reporters.

30. This analysis assumes that cyclical exaggeration between benchmarks has not been masked by countercyclical fluctuations in uncovered employment.

Table 4.—Adjusted Payroll Employment Minus Adjusted ES-202 Employment, Private Nonagricultural Establishments, 1956-77

[Thousands of employees, seasonally adjusted]

	Goods-producing industries	Service-producing industries	Total		Goods-producing industries	Service-producing industries	Total
1956: I ¹	926	6,033	6,959	1967: I.....	266	5,746	6,012
II.....	950	5,425	6,375	II.....	242	5,811	6,053
III.....	887	5,253	6,140	III.....	225	5,867	6,092
IV.....	825	5,195	6,020	IV.....	229	5,924	6,153
1957: I ²	803	4,948	5,751	1968: I.....	208	5,921	6,129
II.....	818	4,956	5,774	II ⁵	189	5,931	6,120
III.....	785	4,996	5,781	III.....	149	5,998	6,147
IV.....	788	4,919	5,707	IV.....	215	6,087	6,302
1958: I ³	481	5,154	5,635	1969: I ⁶	190	6,105	6,295
II.....	364	5,138	5,502	II.....	205	6,080	6,285
III.....	342	5,189	5,531	III.....	253	6,093	6,346
IV.....	403	5,273	5,676	IV.....	272	6,100	6,372
1959: I.....	451	5,258	5,709	1970: I.....	319	6,213	6,532
II.....	452	5,331	5,783	II.....	351	6,291	6,642
III.....	430	5,302	5,732	III.....	364	6,249	6,619
IV.....	421	5,277	5,698	IV.....	392	6,397	6,783
1960: I.....	457	5,289	5,746	1971: I ⁷	428	6,050	6,478
II.....	430	5,327	5,757	II.....	473	6,055	6,528
III.....	417	5,321	5,738	III.....	504	5,942	6,446
IV.....	394	5,313	5,707	IV.....	576	5,981	6,557
1961: I.....	387	5,278	5,665	1972: I ⁸	272	2,447	2,719
II.....	378	5,272	5,650	II.....	282	2,212	2,494
III.....	370	5,319	5,689	III.....	251	2,129	2,380
IV.....	343	5,348	5,691	IV.....	232	1,996	2,228
1962: I.....	355	5,332	5,687	1973: I.....	130	1,747	1,877
II.....	379	5,364	5,743	II.....	105	1,646	1,751
III.....	379	5,378	5,757	III.....	139	1,624	1,763
IV.....	362	5,389	5,751	IV.....	153	1,635	1,788
1963: I.....	371	5,393	5,764	1974: I ⁹	127	1,707	1,834
II.....	385	5,369	5,754	II.....	82	1,687	1,769
III.....	379	5,406	5,785	III.....	14	1,659	1,673
IV.....	343	5,432	5,775	IV.....	30	1,755	1,785
1964: I.....	317	5,506	5,823	1975: I ¹⁰	11-30	1,819	1,789
II.....	331	5,522	5,853	II.....	-37	1,891	1,854
III.....	335	5,548	5,883	III.....	-42	1,939	1,897
IV.....	336	5,564	5,900	IV.....	-41	1,875	1,834
1965: I.....	328	5,605	5,933	1976: I.....	-15	1,860	1,845
II.....	310	5,688	5,998	II.....	-41	1,964	1,923
III.....	322	5,707	6,029	III.....	-60	1,929	1,869
IV.....	328	5,664	5,992	IV.....	-83	1,942	1,859
1966: I ⁴	298	5,593	5,891	1977: I.....	-70	1,960	1,890
II.....	255	5,613	5,868	II ¹²	-61	1,845	1,784
III.....	235	5,625	5,860	III.....	-50	1,884	1,834
IV.....	237	5,646	5,883	IV.....	-164	1,842	1,678

1. Federal legislation effective January 1, 1956 extended mandatory unemployment insurance coverage to employers of four or more workers who had paid wages for 20 or more weeks. Previously, the Federal minimum had been eight workers. Some of the increase in ES-202 employment during subsequent quarters of 1956 was due to late compliance with the new law.

2. In 1957:I, New York extended coverage to employers of two workers; previously, the minimum had been three workers. As a result, about 100,000 additional workers were covered.

3. Approximately 300,000 workers in fluid-milk and ready-mixed concrete plants were shifted from trade to manufacturing in ES-202 reports in 1958:I, due to a revision of the Standard Industrial Classification (SIC). In the payroll series, BLS made the shift retroactive.

4. In 1968:I, Michigan extended coverage to employers of one worker; previously, the minimum had been four workers. As a result, about 100,000 additional workers were covered.

5. In 1968:II, Connecticut extended coverage to employers of one worker; previously, the minimum had been four workers. As a result, about 20,000 additional workers were covered.

6. In 1969:I, New Jersey extended coverage to employers of one worker; previously, the minimum had been four workers. As a result, about 100,000 additional workers were covered.

7. In 1971:I, both New York and Connecticut extended coverage to nonprofit organizations. As a result, about 400,000 additional workers were covered.

8. Federal legislation effective January 1, 1972 extended mandatory unemployment insurance coverage to employers of one or more workers who had paid wages for 20 weeks or more or paid \$1,500 in wages in the current or previous quarter. This legislation also sharply curtailed the list of exempted industries. Some of the increase in ES-202 employment during subsequent quarters of 1972 was due to delayed compliance with the new law. Also, it appears that some previously nonreporting employers who were covered prior to January 1972 began reporting for the first time.

9. Although BLS published a March 1974 benchmark in October 1975, it discarded the March 1974 benchmark when it revised the payroll series for 1970-78 in connection with the March 1977 benchmark. For March 1973-February 1975, accordingly, the payroll survey probably measures the change in employment less accurately than it did before this latest revision. This fact explains part of the instability of the difference series for goods-producing industries in 1973-74. When I computed the difference on the basis of the unrevised payroll series, it fluctuated over a range of about 50,000, compared with 140,000 in the table.

10. Approximately 100,000 employees of operative builders and of various manufacturing plants were shifted from service-producing to goods-producing industries in the ES-202 series in 1975:I, due to a revision of the SIC and to recoding of the ES-202 returns. In the payroll series, BLS made the shift retroactive.

11. The negative difference for goods-producing industries in 1975-77 is due to a recurring tendency for the (seasonally unadjusted) ES-202 series to increase more than the (seasonally unadjusted) payroll series in the second and third quarters of the year. In the first quarter, which includes the benchmark month, the seasonally unadjusted difference was positive in 1975-77, but in the second and third quarters it was strongly negative. Accordingly, the seasonally adjusted difference was negative throughout the year.

12. Pending their revision to a March 1978 benchmark, the payroll series for the last three quarters of 1977 may not accurately measure employment in new firms.

Sources: Payroll data are from *Employment and Earnings*. ES-202 data for 1956-74 are from *Employment and Wages*; for 1975-77, the estimates were prepared by BEA from State reports (the 1977 estimates are preliminary).

NOTE.—Agriculture services employment is excluded from both the payroll series and the adjusted ES-202 series. Employment in Puerto Rico and the Virgin Islands, and in commercial farms and private households, is excluded from the adjusted ES-202 series. Employment in Alaska and Hawaii is excluded from the adjusted ES-202 series for 1956-58.

declining in contractions and increasing in recoveries and expansions.

In table 4, the seasonally adjusted difference between the payroll series and the adjusted ES-202 series is shown for 1956-77 for all private employment, and separately for goods-producing and service-producing industries.³¹ In examining the table, it is important to bear in mind that extensions of UI coverage under Federal or State law (documented in the footnotes to table 4) have intermittently reduced the difference series; that some workers were shifted from the service-producing to the goods-producing difference series in 1958 and in 1975; and that the goods-producing difference increased in 1969-71 because BLS wedged about 200,000 previously unreported construction workers into the payroll series at the time of the 1973 benchmark revision.³²

The table shows that there was no persistent cyclical pattern in the difference for all private industries, although it declined about 250,000 during the 1957-58 contraction, due mostly to a decline in uncovered railroad employment, and it increased a similar amount in the 1958-59 recovery, due at least in part to growth in employment in hospitals and other uncovered sectors of the services industry. Similarly, there was no persistent cyclical pattern in the difference for goods-producing industries (which contained few uncovered workers and in which cyclical employment fluctuations were sharp), or for service-producing industries (which contained many uncovered workers and in which cyclical employment fluctuations were mild).

In summary, because the ES-202 series probably did not substantially exaggerate cyclical fluctuations in covered private employment, and because there was no persistent cyclical pattern in the difference between the payroll series and the adjusted ES-202 series, I conclude that the payroll series

31. The seasonally unadjusted differences are low in the second and third quarter. This seasonal pattern may reflect, at least in part, a tendency for the payroll survey panel to miss recreational and resort establishments that only exist, or are only active, in summer.

32. Carol Utter, "BLS Establishment Estimates Revised to March 1973 Benchmark Levels," *Employment and Earnings*, December 1974.

probably did not substantially exaggerate cyclical fluctuations in private employment during the period 1956-77.

Government employment

For Federal employment, BLS uses the monthly Civil Service Commission (CSC) series. The number of workers covered by Unemployment Compensation for Federal Employees (UCFE) is a series that is conceptually similar to the CSC series.³³

The UCFE series has been consistently higher than the CSC series, in recent years by about 170,000, because the latter excludes Federal employees paid with nonappropriated funds.³⁴ The difference between the UCFE and the CSC series has fluctuated seasonally, and even the seasonally adjusted difference has fluctuated somewhat. However, because there was no cyclical pattern to the difference between the two series in the period 1957-74, and because Federal supervisors would have little motive or opportunity to file inaccurate UI reports, it appears that the CSC series has been cyclically accurate.

33. Both the CSC and the UCFE series exclude employees of the Central Intelligence Agency and the National Security Agency.

34. Workers at canteens and other facilities on military bases, many of whom are military moonlighters and are therefore not in the adjusted household employment measure (section 2 of this article), account for a large share of Federal employees paid with nonappropriated funds.

The methodology of the payroll series for State and local government is complex, and there is no alternative series that is suitable for comparison with it. As a result of deficiencies in the underlying data, the payroll series has apparently been less accurate for State and local government than for most industries in the private sector.

According to the payroll series, State and local government employment has grown steadily in all phases of the business cycle in the period since 1959 (chart 3). Accordingly, error in the payroll series for State and local government could not have exaggerated cyclical fluctuations in total payroll employment unless true employment in State and local government increased even more than the payroll measure of State and local government employment in contractions, and increased less in recoveries and expansions. There is no evidence that this kind of error has occurred, and it is difficult to understand how it could have occurred, except in the most recent contraction—when BLS found it difficult to measure the increase in State and local government employment under the Comprehensive Employment and Training Act (CETA). In earlier contractions, there was no counterpart to CETA, and State and local governments lacked the funds to launch countercyclical employment programs on their own.

Section 4: Cyclical Accuracy of the Household Survey

In this section, I will show that two statistical errors have substantially dampened cyclical declines in the adjusted household employment measure—that is, the household measure of adjusted nonagricultural wage and salary workers (ANWSW)—and that one of the errors has somewhat dampened cyclical increases in ANWSW. The conclusions of this section also apply to the household measure of total employment.

Much of my analysis will be in terms of ANWSW ratios. The aggregate ANWSW ratio is the percentage of the civilian noninstitutional population age 14 and above (CNIP) that either worked at, or was on paid leave from, a

nonagricultural wage and salary job outside private households during the calendar week that included the 12th of the month. Similarly, for any sex-race-age group, the ANWSW ratio is the corresponding percentage of the CNIP in the group.

Underlying the "official" monthly ANWSW estimate, which is based on employment estimates prepared by the Census Bureau (table 1), are data from two independent sources.³⁵ (1) From the most recent decennial census, the Census Bureau extrapolates population

35. As used in this section, the term "official" refers to household survey employment and population estimates that are either published or that are unpublished but consistent with published estimates.

for 84 separate sex-race-age groups in the CNIP to obtain current population control totals. (2) From a sample of 56,000 households, the Census Bureau ascertains ANWSW ratios for each of the 84 sex-race-age groups.³⁶ To estimate ANWSW, the Census Bureau multiplies the sample ANWSW ratios by the population control totals. I will discuss two statistical errors underlying this procedure.

1. Control total error: Because of undercount in the decennial census, the population control totals for the 84 sex-race-age groups are understated, by varying percentages. It is convenient to distinguish two elements in control total error. The scale element is the error in aggregate CNIP; the nonscale element is the differential percentage error for the sex-race-age groups.

2. Undercoverage: The sample from which the Census Bureau ascertains ANWSW ratios for the sex-race-age groups misses some of the persons it is designed to cover.

Although ANWSW is derived by multiplying ANWSW ratios for 84 sex-race-age groups by corresponding population control totals, it can be thought of as the product of an aggregate ANWSW ratio times an aggregate population control total. In this section, I will examine the effect of control total error and undercoverage on each term of this product, to determine the implications of these errors for the cyclical accuracy of ANWSW.

Cyclical error in the ANWSW ratio

In the first part of this section, I will examine the effect of control total error and undercoverage on cyclical declines in the ANWSW ratio in two steps. (1) Provisionally disregarding undercoverage, I will show that the nonscale element of control total error dampens cyclical declines in the ANWSW ratio. (2) After correcting for the nonscale element of control total error, I will show that undercoverage further dampens cyclical declines in the ANWSW ratio. In passing, I will briefly discuss the accuracy of cyclical increases in

36. More specifically, the Census Bureau ascertains the ratios, to CNIP, of nonagricultural wage and salary employment and of each of the adjustment items that I use to compute ANWSW.

SURVEY OF CURRENT BUSINESS

Table 5.—Household Survey Undercoverage, 1975

Line	Total	Men			Women			
		Total	White	Black and other	Total	White	Black and other	
Millions of persons								
1	Official civilian noninstitutional population (CNIP), age 14 and over	159.71	75.70	67.03	8.67	84.02	73.62	10.40
2	Plus: Undercount group	4.09	2.73	1.82	.91	1.36	.95	.41
3	Equals: Corrected CNIP	163.80	78.43	68.85	9.58	85.37	74.56	10.81
4	Less: Population covered by household survey	154.13	72.24	64.58	7.66	81.89	72.09	9.80
5	Equals: Uncovered population	9.67	6.18	4.27	1.91	3.48	2.47	1.01
6	Less: Population in uncovered housing units	2.80	1.84	1.15	.19	1.46	1.26	.20
7	Equals: Residual uncovered population	6.87	4.84	3.12	1.73	2.03	1.22	.81
Percentage								
8	Uncovered population as a percentage of corrected CNIP	5.90	7.89	6.20	19.98	4.06	3.31	9.38
9	Population in uncovered housing units as a percentage of corrected CNIP	1.71	1.71	1.67	1.96	1.71	1.68	1.89
10	Residual uncovered population as a percentage of corrected CNIP	4.19	6.18	4.53	18.02	2.37	1.63	7.49
11	Undercount group as a percentage of corrected CNIP	2.55	3.48	2.71	10.52	1.59	1.29	3.94

¹ Annual average.

Source: Census Bureau. Line 2 is consistent with Census Bureau, *Current Population Reports*, Series P-25, No. 614, "Estimates of the Population of the United States, by Age, Sex, and Race: 1970 to 1975," 1975. Line 6 is estimated by BEA.

the ANWSW ratio. The conclusions of this part also apply to the employment ratio, which is the ratio of total employment to CNIP.

In the second part of this section, I will show that the scale element in control total error has dampened most cyclical fluctuations in ANWSW. I will then analyze the combined effect of control total error and undercoverage on cyclical fluctuations in ANWSW and present an illustrative calculation of their effect on the ANWSW decline in one contraction. To facilitate understanding of the entire section, I present an arithmetic example in appendix A that shows the interrelation of control total error and undercoverage.³⁷

Control total error and its effect.—The Census Bureau derives "official" population control totals for 84 sex-race-age groups of the CNIP age 14 and over by "aging" the most recent decennial

census and adding estimates of net immigration minus mortality.³⁸

Jacob S. Siegel used birth registrations and other data to estimate independently the 1970 population and concluded that the 1970 census undercounted the population by 2.5 percent.³⁹ On the basis of this work, the Census Bureau has developed for internal use a series of annual population estimates corrected for census undercount. In this section, I will assume that these estimates accurately measure the population.⁴⁰ Official and "corrected" CNIP for 1975 are shown at the top of table 5. I define the "undercount group" (table 5, line 2) as the difference between the corrected and official CNIP.

The "corrected" ANWSW ratio is the ratio that the Census Bureau would obtain if it multiplied the sample ANWSW ratios by corrected popula-

38. It should be noted that the official control totals are never revised. Accordingly, official CNIP, as the term is used in this article, is not consistent with revised population estimates that the Census Bureau publishes when more accurate mortality and net immigration become available, or when the next decennial census is taken.

39. Census Bureau, *Estimates of Coverage of Population by Sex, Race, and Age: Demographic Analysis*, PHC(E)-4, 1974; Census Bureau, *Current Population Reports*, Series P-23, No. 56, "Coverage of Population in the 1970 Census and Some Implications for Public Programs," 1975. In a detailed review of Siegel's estimates, Fay concluded that for whites the undercount was 800,000 larger than Siegel estimated, but that the confidence interval around his own estimate encompassed Siegel's estimate. Robert E. Fay III, *Statistical Considerations in Estimating the Current Population of the United States*, unpublished Ph.D. dissertation, University of Chicago, 1974.

40. Migration is the principal factor that the Census Bureau cannot reliably quantify. See appendix D of this article.

37. The implications of the two errors for the accuracy of the household survey employment and unemployment estimates (but not for changes in these estimates) were examined by Robert Yuscavage, David Hirschberg, and Fritz Scheuren in "The Impact on Personal and Family Income of Adjusting the Current Population Survey for Undercoverage," *Proceedings of the Social Statistics Section, 1977*, American Statistical Association, pp. 70-80; and by Denis F. Johnston and James R. Wetzel in "Effect of the Census Undercount on Labor Force Estimates," *Monthly Labor Review*, March 1969, pp. 3-13. Unlike the present article, the study by Johnston and Wetzel implicitly assumed that undercoverage is quantitatively equal to control total error and that the characteristics of persons missed by the sample are precisely the same as those of persons missed by the census.

tion control totals, and divided the resulting ANWSW estimate by corrected CNIP.⁴¹ I will show that, in contractions, the nonscale element in control total error causes the corrected ANWSW ratio to decline more than the official ratio. I draw this conclusion on the basis of evidence that the sex-race groups with the largest census undercount rates experience the largest cyclical declines in their ANWSW ratios.⁴² Table 6 shows census undercount rates for persons of working age (18-64). Chart 5 shows employment ratios for periods of contraction and recovery; because ANWSW accounted for about 76 to 86 percent of employment during 1956-77, employment ratios can serve as indicators of the cyclical behavior of ANWSW ratios.⁴³

1. Declines in the employment ratio have been much larger for men than for women, and the census undercount rate for men was 1.9 times that for women in 1960 and 2.7 times that for women in 1970.

2. Declines in the employment ratio for black and other men have been much larger than for white men, and the census undercount rate for black and other men was 5.3 times that for

41. It is technically feasible for the Census Bureau to compute and publish corrected employment data. To date, the Census Bureau has decided not to do this, for two reasons. First, the estimates of census undercount are subject to error. Second, the Census Bureau has not been able to develop a reliable method for estimating census undercount for States and localities. Consequently, the best available estimates of national population are inconsistent with the best available estimates of State and local populations. For a report on attempts to estimate undercount by States, see Census Bureau, *Current Population Reports*, Series P-23, No. 65, "Developmental Estimates of the Coverage of the Population of States in the 1970 Census: Demographic Analysis," 1977.

If the Census Bureau were to compute corrected employment data, it would have to utilize the corrected control totals that would be available at the time of the household survey, just as it now uses the official control totals that are available at the time of the survey. The Census Bureau could not revise corrected control totals—just as it cannot revise official control totals—to incorporate mortality, net immigration, and other demographic data that subsequently become available. However, the corrected control totals used in the present article to analyze statistical error in 1956-77 do incorporate such revisions.

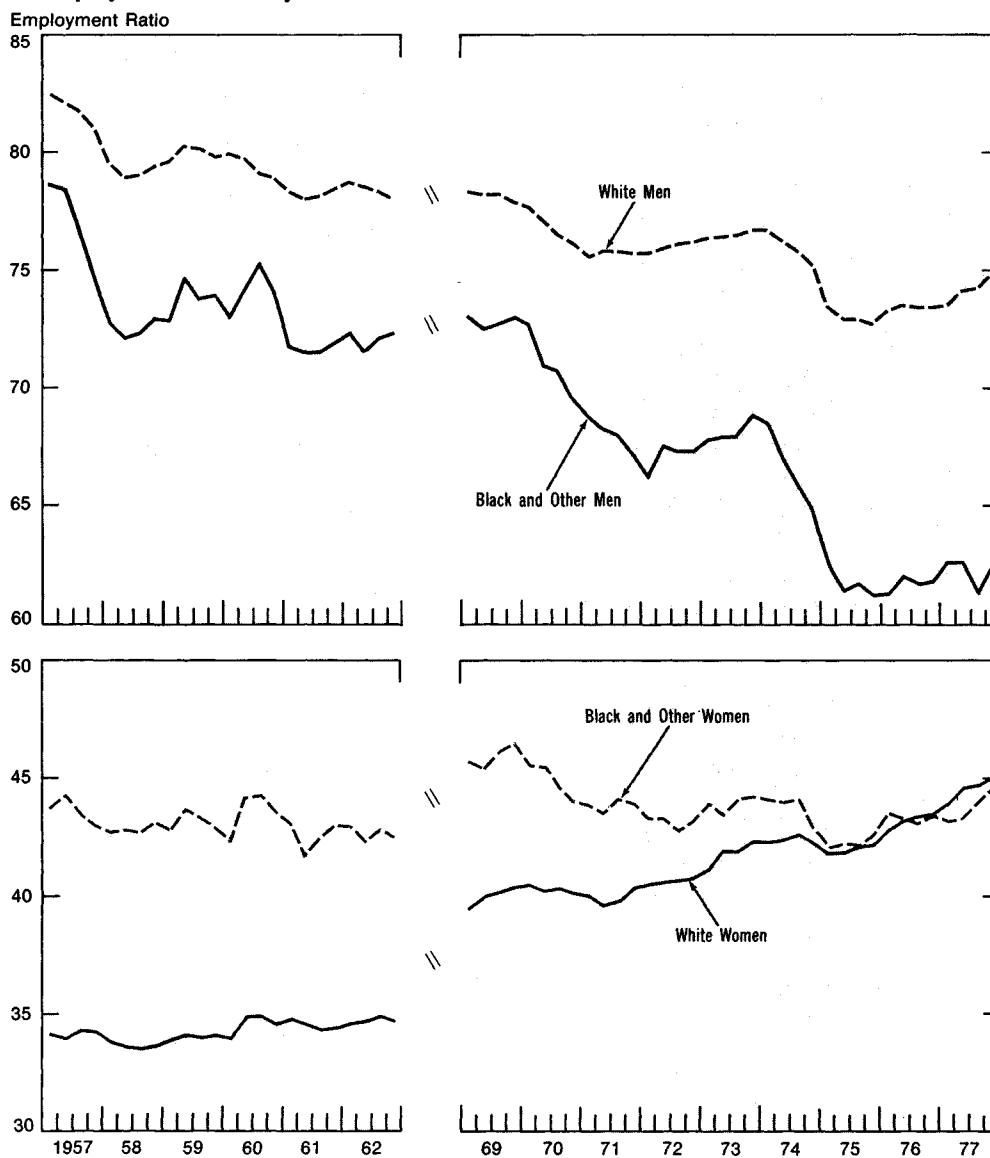
42. In this analysis, I ignore variations in the undercount rate among age groups. For a discussion of the effect of such variations in 1974-75, see the illustrative calculation at the end of this section, and footnote 47.

The scale element in control total error has no effect on the ANWSW ratio, because it has the same effect on the numerator that it has on the denominator of that ratio.

43. Because self-employment and employment in agriculture and private households are not cyclically sensitive, it is unlikely that these non-ANWSW types of employment accounted for any of the sex-race differentials in the cyclical behavior of the employment ratio that are depicted in chart 5.

CHART 5

Employment Ratios by Sex and Race



U.S. Department of Commerce, Bureau of Economic Analysis

Data: Bureau of Labor Statistics
79-55

white men in 1960 and 4.0 times that for white men in 1970.

3. Declines in the employment ratio for black and other women have been larger than for white women, and the census undercount rate for black and other women was 5.8 times that for white women in 1960 and 4.1 times that for white women in 1970. However, this factor does not contribute very much to the difference between cyclical declines in the corrected and official ANWSW ratios, because the employment ratio for black and other women has not declined much more than that for white women, and because women

account for a disproportionately small share of census undercount.

With respect to cyclical increases in the ANWSW ratio, I conclude that, after 1959, the corrected ANWSW ratio showed no larger increases than the official ratio in recoveries and expansions, because the sex-race groups with the largest census undercount rates did not experience above-average employment ratio increases during such periods. During the 1958-59 recovery, however, the corrected ANWSW ratio increased more than the official ratio, because employment ratio increases were larger for men than for women, and were

also larger for black and other men than for white men.

Undercoverage and its effect.—The household survey sample is designed to cover a certain proportion of noninstitutional housing units in the Nation.⁴⁴ At units designated for the sample, interviewers inquire about the employment activities of all household members age 14 and over, except Armed Forces members. To estimate the population actually covered by the sample, the Census Bureau multiplies the population in each sample household by the household's weight (the inverse of its probability of selection) and adds the products.⁴⁵ For example, in 1975, the survey, on average, covered 154.13 million persons (table 5). The population missed by the sample, i.e., the "uncovered population," equals corrected CNIP, 163.80 million in 1975, minus the covered population.⁴⁶ In 1975, the uncovered population averaged 9.67 million persons.

The undercoverage rate, the uncovered population as a percentage of corrected CNIP, was 5.90 percent in 1975 (line 8). The undercoverage rate varies greatly by sex, race, and age, and has always been largest for black and other men and smallest for white women (chart 6).

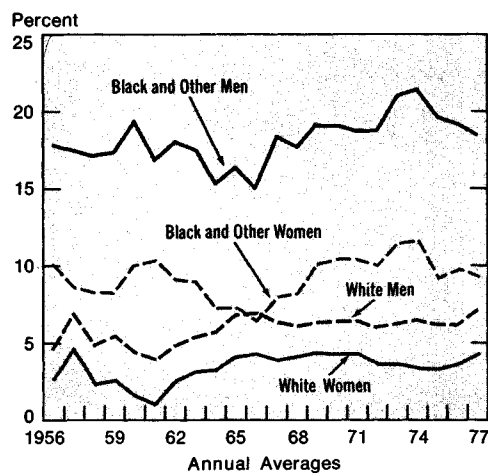
I define the "full-coverage" ANWSW ratio as the ratio that the Census Bureau would estimate if it could eliminate both errors under consideration in this

44. The sample is designed, in principle, to include units enumerated in the decennial census, units overlooked in the census, and units constructed after the census. For a brief discussion of design flaws that cause the sample, in practice, to miss some of these housing units, see appendix B. For descriptions of the sample design, see Marvin M. Thompson and Gary Shapiro, "The Current Population Survey: An Overview," *Annals of Economic and Social Measurement*, April 1973; Census Bureau, *The Current Population Survey: Design and Methodology*, by Robert H. Hanson, Technical Paper No. 40, 1978; and Margaret E. Schooley, "Revisions in the Current Population Survey in January 1978," *Employment and Earnings*, February 1978.

45. Occupied housing units at which the interviewer was unable to conduct an interview ("noninterviews") are implicitly included in the covered population, because the Census Bureau redistributes their selection probabilities among respondent households (see footnote 81). The Census Bureau also adjusts the selection probabilities to compensate for differences—in regard to race, residence, and region—between areas covered by the sample and areas not covered by the sample.

46. This measure of the uncovered population is conceptually the same as that proposed by Siegel in "Completeness of Coverage of the Nonwhite Population in the 1960 Census and Current Estimates, and Some Implications," *Social Statistics and the City*, David M. Heer, Editor, Report of a Conference Held in Washington, D.C., June 22-23, 1967, Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University, 1968.

CHART 6
Household Survey Undercoverage of the Corrected Civilian Noninstitutional Population Age 14 and Over, by Sex and Race



U.S. Department of Commerce, Bureau of Economic Analysis Data: Census Bureau 79-5-6

section—i.e., if the population control totals were corrected for census undercount and if the sample fully covered the population.⁴⁷ Unlike the corrected ANWSW ratio, the full-coverage ANWSW ratio is not calculable, because data on the ANWSW ratios of uncovered persons are not available.

In appendix A, I show that the question of whether the full-coverage ANWSW ratio declines more, in contractions, than the corrected ANWSW ratio depends on whether the ANWSW ratios of uncovered persons decline more than do the ANWSW ratios of their covered counterparts of the same sex, race, and age. I will now try to establish that the ANWSW ratios of uncovered persons probably decline more than do the ANWSW ratios of their covered counterparts. I will present the argument, which is somewhat complex, in three steps.

First, the evidence presented in the appendixes clearly indicates that un-

47. The full-coverage ANWSW ratio would be the true ANWSW ratio if the two errors under consideration were the only statistical errors in the household survey that affect the ANWSW estimate. In fact, there are other statistical errors. The effect of uncounted migration is discussed in appendix D. There is also response error; see Alfred Tella (see footnote 8). For an extensive review of other statistical errors in the household survey, see Camilla A. Brooks and Barbara A. Bailar, "An Error Profile: Employment as Measured by the Current Population Survey," *Statistical Policy Working Paper No. 3*, Office of Federal Statistical Policy and Standards, 1978.

covered persons are poorer than their covered counterparts of the same sex, race, and age.⁴⁸ In appendix B, I show that persons who live in housing units that are not covered by the sample—and who accounted for an estimated 29 percent of uncovered persons in 1975 (table 5, line 6)—are not less poor and perhaps are poorer than their covered counterparts. In appendix C, I draw on evidence from a wide variety of sources to show that persons in the residual uncovered population (line 7), which consists mainly of persons omitted from rosters of residents given by respondents to interviewers, are considerably poorer than their covered counterparts.

Second, on the basis of what is known about the functioning of the labor market and the limited evidence available, I conclude that the ANWSW ratios of poor persons probably decline more in contractions than do those of more affluent persons of the same sex, race, and age. It is generally agreed that poor persons experience disproportionate employment losses in contractions, because they are less skilled on average than more affluent persons and therefore—for a variety of reasons—are fired first by employers. The limited evidence is as follows.

1. Analyzing longitudinal data for 2,600 families in the period 1967-72, Edward M. Gramlich found that cyclical fluctuations in the time spent unemployed were larger for poor male family heads than for more affluent ones. Gramlich's regressions showed that, when the national unemployment rate changed 1 percentage point, white and black male heads of families with average incomes at the poverty line experienced changes of 1.31 and 2.14 percentage points in weeks of unemployment, respectively, and those with average incomes at five times the poverty level experienced changes of only 0.65 and 1.31 percentage points.⁴⁹ Provided—as seems reasonable—that there is some correlation between increases in unemployment and declines

48. The possibility that uncovered persons differ systematically from their covered counterparts, and that the household survey sample is therefore biased, was recognized by Siegel in 1967. "Completeness of Coverage," p. 28n.

49. "The Distributional Effects of Higher Unemployment," *Brookings Papers on Economic Activity*, 2:1974, p. 312.

in ANWSW ratios, Gramlich's study supports my conclusion.

2. Household survey data show that in the 1974-75 contraction the non-agricultural employment ratio declined more in metropolitan poverty areas than outside these areas for each sex-race group except black and other women (table 7). Although the interarea differences in the declines are small relative to the standard errors of these differences, the fact that the ratios did decline more in the metropolitan poverty areas than outside these areas for three of the four sex-race groups, and did not decline less for the fourth group, lends some support to my conclusion.

3. Each March since 1964, the household survey has gathered data on the educational attainment of the population. In chart 7, standardized employment ratios for 1964-77 are shown for selected educational attainment strata within eight sex-race-age groups. In those periods when the adult male unemployment rate was increasing (March 1969-March 1971 and March 1974-March 1975), the employment ratios of persons with less than 12 years of education declined more—for most sex-race-age groups—than did those of better-educated persons. The differentials were largest for men—a fact that is important for my argument, because the undercoverage rates for men have been about double those for women. Because persons with low educational attainment are more likely to be poor than persons with high educational attainment, the data support my conclusion.⁵⁰

Third, I assume that cyclical declines in the ANWSW ratio of uncovered poor persons are not very different from those of covered poor persons of the same sex, race, and age; if this were not the case, the circumstantial evidence just cited, which relates to persons covered by the household survey and by another survey, would have no bearing on the conclusion that I am trying to establish. In opposition to my assumption, one could argue that cyclical

50. Correlation between low educational attainment and poverty is suggested, for example, by the following: Among men age 35-44 with less than 12 years of education, 9.2 percent of whites and 22.3 percent of blacks had 1975 incomes below the poverty level. Among those with 12 or more years of education, only 4.2 percent of whites and 7.5 percent of blacks had 1975 incomes below the poverty level. Census Bureau, *Current Population Reports*, Series P-60, No. 106, "Characteristics of the Population Below Poverty Level: 1975," 1977.

Table 6.—Undercount Rates for the Population Age 18-64 in the 1960 and 1970 Censuses

	[Percent]	
	1960	1970
Total.....	3.0	2.8
Men.....	3.9	4.1
White.....	2.6	3.0
Black and other.....	13.8	12.1
Women.....	2.1	1.5
White.....	1.4	1.1
Black and other.....	8.1	4.5

Source: Census Bureau, *Current Population Reports*, Series P-25, No. 519, "Estimates of the Population of the United States, by Age, Sex, and Race: April 1, 1960 to July 1, 1973," 1974.

Table 7.—Nonagricultural Employment Ratios for Persons Age 18-64, 1974: I-III and 1975: I-III

Sex, race, and area of residence	[Percent]			Addendum: 1975 population age 18-64 (millions)
	1974: I-III	1975: I-III	Change ¹	
White men:				
Metropolitan poverty.....	74.0	70.0	-4.0	2.2
Other residence.....	82.9	79.6	-3.3	49.7
Black and other men:				
Metropolitan poverty.....	69.0	61.5	-7.5	1.9
Other residence.....	76.5	71.0	-5.5	4.6
White women:				
Metropolitan poverty.....	45.0	43.5	-1.5	2.4
Other residence.....	48.9	48.5	-.4	52.8
Black and other women:				
Metropolitan poverty.....	43.8	41.4	-2.4	2.6
Other residence.....	53.6	51.2	-2.4	5.4

1. For persons in metropolitan poverty areas, the standard errors on the change in the nonagricultural employment ratio are in the range of 1.4-1.6 percent. For persons who reside elsewhere, the standard error is 0.2 percent for whites and 0.7-0.9 for black and other races.

Source: Unpublished BLS tabulations from the household survey.

declines in the ANWSW ratios of uncovered poor persons cannot be very large, because few uncovered poor persons ever work. I do not accept this objection, because, although some poor persons of working age never work, I know of no reason why nonworkers should be more heavily represented among poor persons omitted from rosters and among poor residents of "false vacancies"—the two groups that together account for the overwhelming majority of residual uncovered poor persons—than among covered poor persons.⁵¹

In sum, because uncovered persons

51. For a discussion of the characteristics of each of the component groups of the residual uncovered population, see appendix C.

In support of my view, a small-scale study in a poor New York neighborhood in 1967 found that most of the men of working age were working at the time of the study, and there was no significant difference in the proportion of men working between those whose presence had been reported and those who had been omitted from rosters in an earlier survey. For a description of the study, see appendix C. Alan Harwood, personal communication to the author.

are poorer than their covered counterparts of the same sex, race, and age, and because poor persons probably experience larger cyclical declines in their ANWSW ratios than do more affluent persons of the same sex, race, and age, I conclude that uncovered persons probably experience larger cyclical declines in their ANWSW ratios than do their covered counterparts. Accordingly, the full-coverage ANWSW ratio probably declines more, in contractions, than does the corrected ANWSW ratio.

Although many labor market analysts believe that poor persons experience disproportionate employment gains when the labor market is relatively tight, because only then are they hired or rehired, the three pieces of evidence cited above do not either support or clearly rule out the conclusion that the ANWSW ratios of poor persons increase more in such periods than do those of more affluent persons of the same sex, race, and age.⁵² Accordingly, I can neither confirm nor rule out the possibility that the full-coverage ANWSW ratio increases more than does the corrected ANWSW ratio in such periods.

Cyclical error in ANWSW

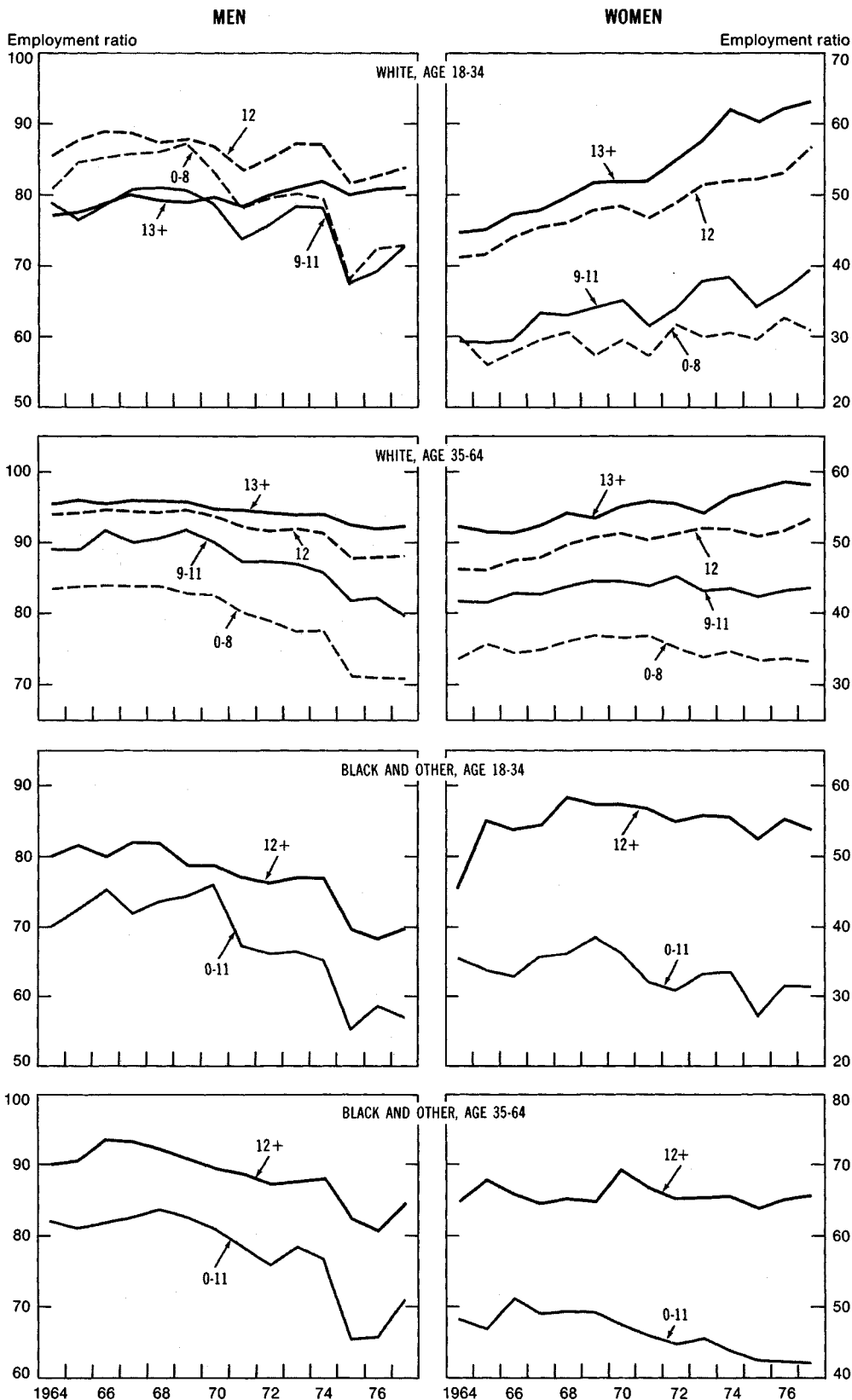
Having considered cyclical error in the ANWSW ratio, I will now discuss cyclical error in ANWSW, which can be thought of as the product of the ANWSW ratio and aggregate CNIP. I will first show that understatement of the aggregate CNIP, i.e., the scale element in control total error, has dampened most cyclical fluctuations in ANWSW, and then analyze the combined effects of control total error and undercoverage on the change in ANWSW in contractions and in recoveries and expansions.

The scale element in control total error reduces ANWSW by the product of the ANWSW ratio and the size of the undercount group. Accordingly,

52. One piece of evidence suggests that the ANWSW ratios of poor persons do not increase more than do those of more affluent persons of the same sex, race, and age. Persons with less than 12 years of education—who are more likely to be poor than persons with high educational attainment—did not experience larger employment ratio increases than did better-educated persons in periods when the adult male unemployment rate was declining to a relatively low level (March 1964-March 1969 and March 1972-March 1973). However, the Gramlich study did not distinguish between periods of increasing and decreasing unemployment, and employment data by residence in metropolitan poverty areas are not available for any period under analysis in which the labor market became relatively tight, because these data from the household survey were first tabulated in 1973.

CHART 7

Standardized Employment Ratio, by Years of School Completed



Note.—Based on unpublished BLS tabulations from the March household survey. Original data for six age groups (18-19, 20-24, 25-34, 35-44, 45-54, and 55-64) were combined. To standardize for secular shifts in the age distribution within each educational group, the average March population for the 14-year period was used as a fixed weight for each sex-race-age-education group. For whites, the standard error of the employment ratio ranges from about 0.3 to about 1.6 percent. For black and other races, it ranges from about 1.2 to about 2.0 percent.

U.S. Department of Commerce, Bureau of Economic Analysis

the scale element in control total error reduces the change in ANWSW between any two periods by the difference between the products, for the first and second periods respectively, of the ANWSW ratio and the size of the undercount group. In periods when the size of the undercount group is constant, the scale element of control total error reduces the change in ANWSW by the product of the change in the ANWSW ratio and the size of the undercount group.

For 1956-62 and 1972-77, I regard the size of the undercount group, which then averaged about 4 million, as constant, because its year-to-year variations, which did not exceed about 150,000, are not necessarily indicative of changes in the understatement of CNIP.⁵³ From 1962 to 1971, however, the size of the undercount group increased almost 800,000. The size of the undercount group then abruptly declined about 700,000 in January 1972, when the Census Bureau switched to the 1970 census in estimating official population control totals. These changes are so large that they can be taken as indicative of substantial changes in the understatement of CNIP.

In those periods when the size of the undercount group was constant, 1956-62 and 1972-77, the scale element in control total error dampened changes in ANWSW by the product of the change in the ANWSW ratio (chart 8) and the size of the undercount group, 4 million. In 1962-72, when the size of the undercount group was changing, the scale element in control total error sometimes dampened cyclical changes in ANWSW, but did not always do so. I will discuss this period in the course of analyzing the effect of control total error and undercoverage on ANWSW in contractions, and in recoveries and expansions.

Contractions: illustrative calculation.—Control total error and undercoverage have generally dampened cyclical de-

53. Year-to-year variations in the size of the undercount group reflect, in addition to the aging of the population and the fact that the corrected CNIP series incorporates mortality and migration data that were not available at the time the Census Bureau estimated official CNIP, minor methodological differences between the corrected and official CNIP series, and intermittent administrative decisions to revise the methodology or data used in estimating one or the other of the series.

clines in ANWSW, because undercoverage and the nonscale element in control total error have dampened cyclical declines in the ANWSW ratio, and because the scale element in control total error has generally dampened declines in ANWSW. I will present an illustrative calculation of the error in the most recent contraction; reference to appendix A will facilitate understanding of the calculation. I will then discuss briefly the error in other contractions.

Because of data limitations, it is convenient to discuss error in the cyclical decline of nonagricultural wage and salary workers excluding private household workers (NWSW), a close approximation to ANWSW. NWSW differs from ANWSW only in that it includes unpaid absentees, whose numbers have averaged about 2.1 million in recent years. I will assume that findings with regard to NWSW apply to ANWSW.

The illustrative calculation relates to the change in NWSW from the first three quarters of 1974, when the adult male unemployment rate was 3.6 percent, to the first three quarters of 1975, when it was 6.9 percent. I will deal first with the effect of control total error (and its scale and nonscale elements separately), and then with the effect of undercoverage. In calculating the effects of both errors, I use readily available NWSW ratios for 40 sex-race-age groups; the effect of distinguishing only 40, instead of 84, sex-race-age groups cannot be substantial.

1. The effect of control total error, i.e., the difference between the changes in corrected and official NWSW, can be found by multiplying the changes in NWSW ratios of covered persons by the size of the undercount group, by sex, race, and age (as shown in appendix A).⁵⁴ The changes in the official NWSW ratio for the four major sex-race groups are shown in line 2 of table 8; these changes are weighted averages of the changes in the underlying NWSW ratios for the various sex-race-age groups. In 1974-75, there were an average of 4,070 thousand persons in the undercount group (line 1), and I assume that the size of the group was constant in 1974-75.

54. The formula is based on the assumption that the size of the undercount group remains constant.

Table 8.—An Illustrative Calculation of the Difference Between the Declines in Full-Coverage and Official NWSW, from 1974:I-III to 1975:I-III

[Thousands except where noted]

Line	Total	Men		Women		
		White	Black and other	White	Black and other	
Effect of control total error:						
1	Undercount group.....	4,070	1,828	897	933	412
2	NWSW ratios from household survey (percent):					
	a. 1974:I-III.....	48.2	62.4	56.4	36.2	34.6
	b. 1975:I-III.....	46.6	59.8	51.9	35.8	33.8
	c. Change.....	-1.6	-2.6	-4.5	-.4	-.8
3	Difference between changes in corrected and official NWSW (1 x 2c, for 40 sex-race-age groups).....	-105.0	1 -53.9	1 -48.2	1.2	1 -3.1
Effect of undercoverage:						
4	Uncovered population.....	10,104	4,397	1,999	2,561	1,147
5	Change in NWSW for uncovered persons:					
	a. Imputed (4 x 2c, for 40 sex-race-groups).....	-267.0	² -139.6	² -110.3	² -4.2	² -12.9
	b. Assumed true (1.71 x 5a).....	-456.6	(²)	(²)	(²)	(²)
	c. Difference between changes in full-coverage and corrected NWSW (5b-5a).....	-189.6				
Combined effect:						
6	Difference between changes in full-coverage and official NWSW (3+5c).....	-294.6				

1. Line 3 is not equal to line 1 times line 2c because the components of the figures on line 3 are calculated separately for 10 age groups within each of the sex-race groups.
 2. Line 5a is not equal to line 4 times line 2c because the components of the figures on line 5a are calculated separately for 10 age groups within each of the sex-race groups.
 3. No figures are shown on line 5b for the sex-race groups, because they would be subject to a very large margin of error.
 Line 1: Average for July 1, 1974 and July 1, 1975, for persons age 14 and over. Consistent with *Current Population Reports*, Series P-25, No. 614. Census Bureau.
 Line 2: BLS.
 Line 3: Based on data from Census Bureau and BLS.
 Line 4: Average for first 9 months of 1974 and 1975, for

persons age 14 and over. Consistent with *Current Population Reports*, Series P-25, No. 614. Census Bureau.
 Line 5a: Based on data from Census Bureau and BLS.
 Line 5b: Based on the assumption that residual uncovered persons experience NWSW ratio declines twice the size of those for covered persons of the same sex, race, and age. This calculation is subject to an especially large margin of error (see text). The text presents an alternative calculation based on the assumption that NWSW ratios for residual uncovered persons decline 1.5 times as much as those for covered persons.
 NOTE.—NWSW is nonagricultural wage and salary workers age 14 and over, excluding private household workers. The NWSW ratio is the ratio of NWSW to civilian noninstitutional population age 14 and over.

Corrected NWSW declined 105 thousand more than official NWSW (line 3). Men accounted for virtually the entire difference between the corrected and the official NWSW declines, because their NWSW ratios declined substantially and those of women declined only slightly, and because men accounted for a disproportionate share (74 percent) of the undercount group in the working ages 18-64. Black and other men accounted for nearly half the entire difference, because their NWSW ratios declined most, and because they accounted for a disproportionate share (26 percent) of the undercount group in the working ages.

The difference between the corrected and the official NWSW declines equals the sum of the effects of the scale and the nonscale elements of control total error. The effect of the scale element, 65 thousand (the product of the decline in the official ratio, 1.6 percentage points, and the size of the undercount group), is the extra decline in NWSW that would have been found if the corrected NWSW ratio had declined the same amount as the official NWSW ratio. The effect of the nonscale element, 40,000 (the remainder of the 105

thousand), is the extra decline in NWSW that is due to the fact that the corrected NWSW ratio declined more than the published NWSW ratio, because sex-race-age groups that experienced above-average NWSW ratio declines accounted for disproportionately large share of the undercount group.

The effect of the nonscale element is, in turn, the sum of two parts. First, 30,000 is due to the disproportionately large shares of men, and of black and other races, in the undercount group. Second, the other 10,000 is due to the disproportionately large share of persons of working age (18-64), who experienced larger NWSW ratio declines than did younger and older persons of the same sex and race.⁵⁵

55. The effect of shifts in age weights is estimated as follows. Suppose that, within each sex-race group of the undercount group, the age distribution was the same as in the corresponding sex-race group of the official CNIP. To compute the change in NWSW for the undercount group under this hypothetical assumption, I multiply the change in the official NWSW ratio for each sex-race group (line 2c) by the size of the corresponding undercount group (line 1), and add the products. NWSW for the undercount group would have declined only 95 thousand, instead of 105,000. Consequently, the age distribution of the undercount group accounted for 10,000 of the NWSW decline for that group. This occurred because of the interaction of two factors: First, men of working age accounted for a larger share of the male undercount group than of the official male CNIP age 14 and over; and second, the decline in the NWSW ratio was larger for men of working age than for men age 14 and over.

2. The effect of undercoverage, i.e., the difference between the changes in full-coverage and corrected NWSW, equals the true NWSW change for the uncovered population, minus the change imputed to it by multiplying the changes in NWSW ratios of covered persons by the size of the uncovered population, by sex, race, and age (as shown in appendix A).⁵⁶

The calculation of this difference is subject to a large margin of error, because data on the true employment experience of the uncovered population are lacking. I estimate that the NWSW ratio declines for uncovered persons were 71 percent larger on average than for their covered counterparts of the same sex, race, and age. My estimate is based on two assumptions.

First, for residual uncovered persons (71 percent of uncovered persons), I assume that the NWSW ratio declines were about twice those for their covered counterparts. This is an arbitrary assumption.⁵⁷ Evidence presented above indicates that uncovered persons experience substantially larger employment ratio declines than do their covered counterparts, but does not indicate how much larger.

Second, for residents of uncovered housing units (29 percent of uncovered persons), I assume that the NWSW ratio declines were the same as those for their covered counterparts. There is no reason to believe that their NWSW ratio declines differed from those of covered persons.

In the six quarters under consideration, there were an average of 10,104 thousand uncovered persons (line 4).⁵⁸ The imputed NWSW decline for uncovered persons is 267,000 (line 5a); this is the amount that NWSW would have declined for uncovered persons if the NWSW ratios for uncovered persons declined the same amount as NWSW ratios for their covered counterparts, by sex, race, and age. According

to my assumption, true NWSW among uncovered persons declined 71 percent more than this, or 456,600 (line 5b). The difference between the two estimates, 189,600 (line 5c), is the difference between the full-coverage and corrected NWSW declines.

The difference between the full-coverage and the official NWSW declines, 294,600 (line 6), is the combined effect of control total error and undercoverage. This difference is 23 percent of the official NWSW decline for that period, 1,280,000, and 69 percent of the decline in DIFF, 425,000.⁵⁹

As I noted earlier, it was arbitrary to assume that the NWSW ratio declines for residual uncovered persons were twice those for their covered counterparts. If, instead, I assume NWSW ratio declines for residual uncovered persons of one and one-half times those for their covered counterparts, lines 5b, 5c, and 6 of table 8 become -361,800, -94,800, and -199,800 respectively.⁶⁰ The difference of 199,800 between the full-coverage and the official NWSW declines is about 16 percent of the official NWSW decline, and 47 percent of the decline in DIFF.

When I try now to generalize the results of my illustrative calculation to other contractions, I conclude that control total error and undercoverage dampened the 1960-61 and the 1970 ANWSW declines less than they dampened the 1974-75 decline, and probably did not dampen the 1957-58 decline substantially more than they dampened the 1974-75 decline. Comparing these dampening effects with the declines in DIFF in those contractions, I further conclude that the two statistical errors have contributed to, but by no means fully accounted for, the declines in DIFF.

Reasoning within the framework of the formula that ANWSW equals the product of the ANWSW ratio and CNIP, I base my assessment of the effect of control total error and undercoverage on pre-1974 declines in ANWSW on the following arguments.

1. The nonscale element of control

59. The NWSW decline of 1,280,000 reflects a decline of 1,190,000 in ANWSW, and a decline of 90,000 in unpaid absences of nonagricultural wage and salary workers.

60. These figures are based on the estimate in footnote 57.

total error, and undercoverage, probably did not dampen the ANWSW decline in earlier contractions substantially more than in 1974-75, for two reasons. First, as explained in the next two paragraphs, they probably did not dampen the ANWSW ratio decline substantially more in the earlier contractions than in 1974-75. Second, for every tenth of a percentage point that they did dampen the ANWSW ratio decline in earlier contractions, they dampened the absolute ANWSW decline less than in 1974-75, simply because CNIP was smaller in the earlier contractions than in 1974-75.

I argue that the nonscale element of control total error probably dampened the ANWSW ratio decline in earlier contractions no more than it did in 1974-75, for two reasons. First, the employment ratio declines for men relative to women, and for black and other men relative to white men, were no larger in the earlier contractions than in 1974-75 (chart 5). Second, the control totals understated the male CNIP relative to the female CNIP no more in the earlier contractions than in 1974-75, and did not understate the black and other male CNIP relative to the white male CNIP very much more than in 1974-75.

I suspect that undercoverage did not dampen the ANWSW ratio decline in earlier contractions substantially more than in 1974-75, for three reasons. First, the overall undercoverage rate in the earlier contractions was no larger than in 1974-75, and the undercoverage rates for the sex-race groups were not substantially different, relative to one another, from what they were in 1974-75 (chart 5). Second, the earlier contractions were either less severe or not substantially more severe than the 1974-75 contraction, as indicated by the fact that the decline in the aggregate ANWSW ratio was larger only in 1957-58, and even then was not substantially larger. Third, there is no reason to believe that the ANWSW ratio decline in the earlier contractions was concentrated more heavily among uncovered persons relative to their covered counterparts of the same sex, race, and age, than it was in 1974-75.

2. The scale element in control total error dampened the 1974-75 ANWSW decline more than the 1960-61 decline

56. The formula is based on the assumption that the size of the uncovered population remains constant.

57. If I assume that the NWSW ratio declines for residual uncovered persons were only 1.5 times those for their covered counterparts, the estimated NWSW ratio declines for uncovered persons would have been 35.5 percent larger on average than for their covered counterparts.

58. Undercoverage varies from month to month, due to sampling error, changes in the number of uncovered housing units, and changes in interviewer and respondent behavior.

and less than the 1957-58 decline, because the ANWSW ratio declined more in 1974-75 than in 1960-61 and less than in 1957-58 (chart 8), and the size of the undercount group was constant within all of these periods (at about 4 million). In 1970, when, as previously mentioned, the size of the undercount group was increasing, the scale element in control total error may not have dampened the ANWSW decline at all. The increase that occurred in the size of the undercount group while the ANWSW ratio was declining caused an overstatement of the ANWSW decline, and this overstatement may have more than offset the dampening effect of the understatement of CNIP.

Recoveries and expansions.—As I showed in the first part of this section, the nonscale element in control total error did not dampen cyclical increases in the ANWSW ratio after 1959, and there is no evidence that undercoverage dampened cyclical increases in the ANWSW ratio at any time.⁶¹ Accordingly, the scale element in control total error is the only factor that has clearly and generally dampened cyclical increases in ANWSW. However, the limited data available are insufficient to rule out the possibility that undercoverage has also dampened cyclical increases in ANWSW. I will first discuss recoveries, then the 1962-69 expansion.

As shown below, the scale element in control total error never dampened increases in ANWSW in recoveries by more than about 100,000. The nonscale element in control total error dampened the ANWSW increase only in the 1958-59 recovery, and then only by a small amount. Comparing these dampening effects with the increases in DIFF in recoveries, I conclude that control total error has accounted for only a small share of the increase in DIFF.

In each of the recovery periods 1958-60, 1961-62, 1972-73, and 1975-77, the size of the undercount group was about 4 million and the ANWSW ratio increased. Therefore, the scale element in control total error dampened the ANWSW increases in these periods by the product of 4 million and the increase in the ANWSW ratio (chart 8).

61. See p. 30.

In 1975-77, the scale element in control total error dampened the ANWSW increase by 104,000, more than in the earlier periods, because the ANWSW ratio increased 2.6 percentage points, more than in the earlier periods.⁶² In 1961-62, the scale element in control total error dampened the ANWSW increase by 28,000, less than in the other periods, because the ANWSW ratio increased only 0.7 percentage point, less than in the other periods.

In 1962-69, a period of expansion in which the size of the undercount group was increasing, the scale element of control total error dampened the ANWSW increase by about 460,000. The calculation is based on the convenient formula that the change in a product equals the change in the first term times the average value of the second term, plus the change in the second term times the average value of the first term.⁶³ The first element in the sum, 200,000, is the product of the ANWSW ratio increase, 4.8 percentage points, and the average size of the undercount group, 4.2 million.⁶⁴ The second element in the sum, 260,000, is the product of the average ANWSW ratio during the period, 43.4 percent, and the

62. Although the size of the undercount group increased about 240,000 from 1975 to 1977, I have treated it as constant for the reasons cited in footnote 53. If I assume that the understatement of CNIP increased in 1975-77, the scale element in control total error dampened the ANWSW increase by more than 104,000.

63. In algebraic notation: $d(xy) = (x+1/2dx)dy + (y+1/2dy)dx$, which can be derived from the more familiar expansion $xdy + ydx + dx dy$.

64. In estimating that the ANWSW ratio increased 4.8 percentage points, I adjusted for the break in the household survey in January 1967 that is described in footnote 5.

increase in the size of the undercount group, about 600,000. Similar calculations show that the scale element dampened the ANWSW increase by about 140,000 in 1962-64, when DIFF declined, and dampened it by about 320,000 in 1964-69, when DIFF increased a record amount.

The period from the first quarter of 1971 to the first quarter of 1972 is unique, in that ANWSW increased while the labor market remained loose—as indicated by the fact that the adult male unemployment rate remained high. In this period, both elements of control total error exaggerated the ANWSW increase; accordingly, they contributed to the observed decline in DIFF. First, the scale element caused ANWSW to increase about 320,000 in January 1972, because the size of the undercount group abruptly fell 700,000.⁶⁵ Second, the nonscale element caused ANWSW to increase somewhat, because the employment ratio data indicate that the ANWSW ratio of men did not increase while that of women did, and that the ANWSW ratio of black men declined sharply while that of white men remained level (chart 5).

65. The estimate is equal to the product of the ANWSW ratio, 45.5 percent, and 700,000. It overstates the effect of the January 1972 revision in the control totals, because it does not take account of a nonscale element in the revision. A Census Bureau study of the revision found that CNIP increased 787,000, and nonagricultural employment increased 288,000. The small increase in nonagricultural employment, relative to that in CNIP, is due to the fact that persons with low nonagricultural employment ratios—women, particularly women age 65 and over—accounted for a disproportionate share of the increase in CNIP. Gary M. Shapiro and Marvin M. Thompson, "Revisions in Current Population Survey," *Employment and Earnings*, February 1972, pp. 6-9.

Section 5: Summary and Conclusions

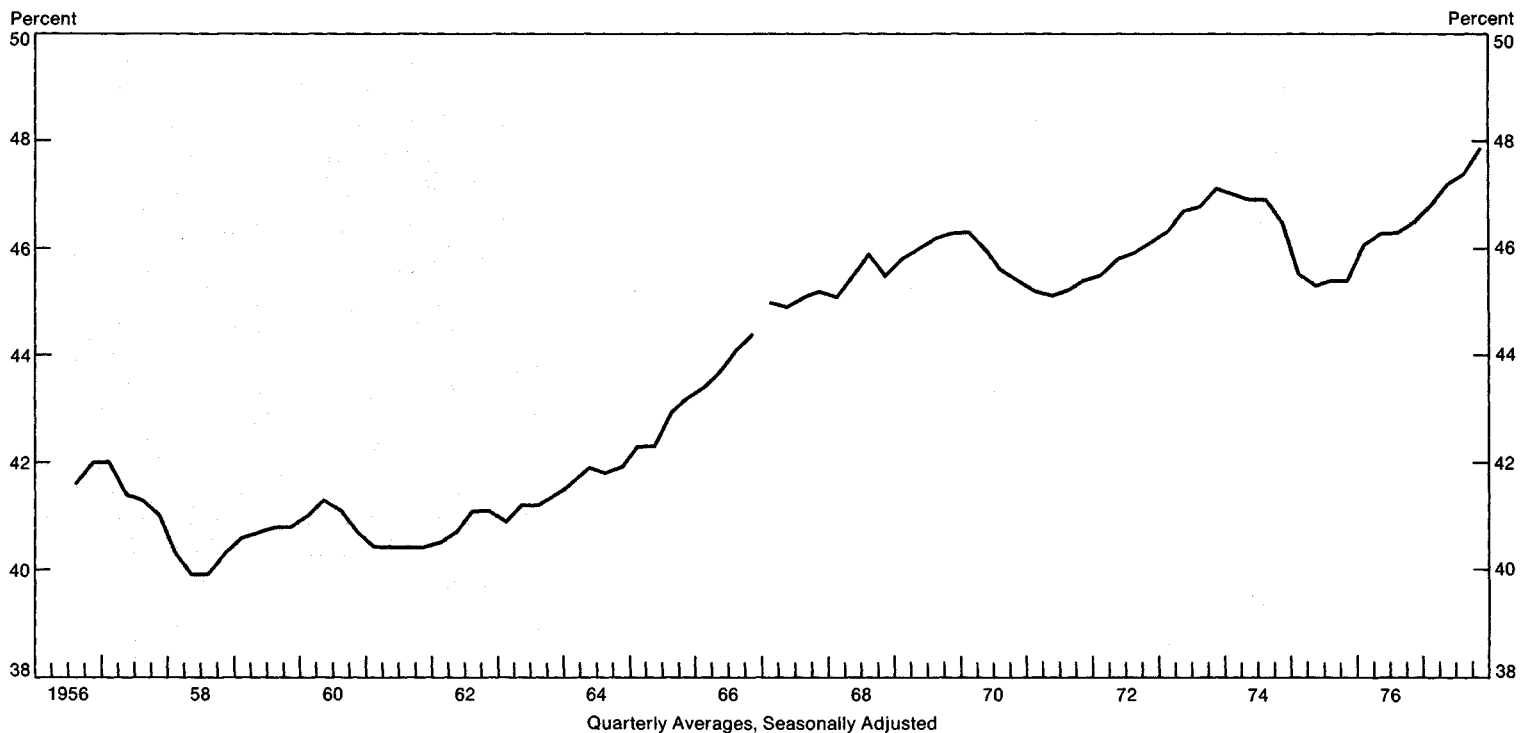
THE payroll employment measure shows larger cyclical changes than the household measure after the two measures are adjusted for those differences in coverage for which monthly data are available. Specifically, DIFF—the seasonally adjusted difference between the adjusted payroll and adjusted household measures of nonagricultural wage and salary employment—declined in labor market contractions during the period 1956-77 and generally increased in labor market recoveries and expansions.

In the two earlier contractions in the period, DIFF declined more than in

the two most recent ones; DIFF declined about 0.9-1.0 million in 1957-58 and 1960-61, but it declined only about 600,000 in 1969-70 and only about 400,000 in 1974-75. In recoveries, DIFF increased about 600,000-700,000 in 1958-59, 1961-62, and 1972-73, but it did not increase in 1975-77. In the 1962-69 expansion DIFF initially declined about 150,000 from 1962 to 1964 and then increased the record amount of about 2.2 million from 1964 to 1969.

In this section, I will first set out in summary form the factors that do—or that may—cause DIFF to fluctuate cyclically, and then discuss in an

The ANWSW Ratio



Note: The ANWSW ratio is the ratio of adjusted nonagricultural wage and salary workers (ANWSW) to civilian noninstitutional population age 14 and over (C 1P).

Data: Bureau of Labor Statistics

U.S. Department of Commerce, Bureau of Economic Analysis

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integrated way some broad relationships between these factors and the observed cyclical behavior of DIFF.

Factors that affect DIFF

I have concluded that statistical error in the household survey and conceptual differences between the two adjusted employment measures contribute to the cyclical behavior of DIFF, but that statistical error in the payroll survey probably does not. I will now summarize the findings that led me to this conclusion, and then briefly discuss two kinds of factors that may affect the cyclical behavior of DIFF, but in regard to which I was unable to arrive at conclusions.

Statistical error in the household survey.—Two statistical errors substantially dampen cyclical declines in the adjusted household employment measure (adjusted nonagricultural wage and salary workers (ANWSW)), and one of the errors somewhat dampens cyclical increases in ANWSW.

1. Although ANWSW is derived by multiplying population control totals for 84 sex-race-age groups by corresponding ANWSW ratios, it can be

thought of as equaling an aggregate population control total times an aggregate ANWSW ratio. Error in the control totals dampens cyclical declines in ANWSW for two reasons. First, census undercount causes the control totals to understate the aggregate population; I call this the scale element in control total error. The scale element has dampened most cyclical fluctuations in ANWSW.⁶⁶ Second, census undercount causes the control totals to understate the population in each sex-race-age group by varying percentages; I call this the nonscale element in control total error. Because the percentage understatement is largest for those groups (i.e., men, particularly black men) that experience the largest cyclical declines in their ANWSW ratios, the nonscale element dampens cyclical declines in the aggregate ANWSW ratio.⁶⁷

2. ANWSW ratios for the various sex-race-age groups are based on a sample of households that misses some of the persons it is designed to cover. Because uncovered persons are poorer than their

covered counterparts of the same sex, race, and age, and because poor persons probably experience larger cyclical ANWSW ratio declines than do more affluent persons of the same sex, race, and age, I concluded that uncovered persons probably experience larger cyclical ANWSW ratio declines than do their covered counterparts of the same sex, race, and age. Therefore, undercoverage probably dampens cyclical declines in the aggregate ANWSW ratio, and in ANWSW.⁶⁸

An illustrative calculation of the understatement in the decline of a close variant of ANWSW from the first three quarters of 1974 to the first three quarters of 1975 showed that: (1) Control total error caused an understatement of 105,000, of which the scale element in control total error accounted for 65,000, and the nonscale element accounted for 40,000; and (2) undercoverage caused an understatement of 189,600. Together, the two statistical errors dampened the decline of the close variant of ANWSW by 294,600, or 69 percent of the decline in DIFF.

Because, in the absence of data on

⁶⁶ See pp. 30 and 33.

⁶⁷ See p. 27.

⁶⁸ See pp. 28-29.

the ANWSW ratios of uncovered persons, the estimate of the effect of undercoverage is subject to a large margin of error, I made an alternative estimate, based on a more moderate assumption about the difference between the declines in the ANWSW ratios of covered and uncovered persons. This estimate of the combined effect of the two statistical errors was 199,800, or 47 percent of the decline in DIFF.

When I tried to generalize the results of my illustrative calculation to other contractions, I concluded that the two statistical errors probably dampened the 1960-61 and the 1970 ANWSW declines less than they dampened the 1974-75 decline, and probably did not dampen the 1957-58 decline substantially more than they dampened the 1974-75 decline.

Because the nonscale element in control total error did not dampen post-1959 cyclical increases in the ANWSW ratio, and because there is no evidence that undercoverage dampened cyclical increases in the ANWSW ratio at any time, the scale element in control total error is the only factor that has clearly and generally dampened ANWSW increases in recoveries and expansions. In recoveries, the scale element never dampened the ANWSW increase by more than about 100,000. In the 1962-69 expansion, the scale element dampened the ANWSW increase by about 460,000.

Multiple jobholding and job changing.—A conceptual difference in the coverage of the two adjusted employment measures contributes to the cyclical behavior of DIFF. The payroll measure counts jobs, whereas the household measure counts workers, and this difference has two consequences for DIFF.

1. In the case of a multiple jobholder, the payroll measure counts all the worker's jobs, whereas the household measure counts one worker. The data indicate that civilian multiple jobholding declines relatively little in contractions, and may have contributed an average of only about 40,000 to cyclical declines in DIFF. The data also indicate that civilian multiple jobholding increased relatively little in recoveries before 1962, and substantially in recoveries and expansions thereafter. More specifically, civil-

ian multiple jobholding may have tended to raise DIFF by 300,000-500,000 in the periods 1962-69, 1972-73, and 1975-77.

Because the household survey does not cover Armed Forces members, civilian jobs that they hold in off-duty hours are omitted from the adjusted household employment measure. Cyclical fluctuations in the number of military multiple jobholders have probably contributed somewhat to DIFF, but the contribution cannot have been very large.

2. In the case of a job changer, the payroll measure, under certain circumstances, counts both the old and new jobs, whereas the household measure counts the job changer once. There is considerable evidence that job changing increases when the labor market tightens and declines when it slackens. An illustrative calculation suggested that the decline in job changing from 1973 to 1975 may have contributed from 80,000 to 137,000 to the decline in DIFF. There are some indications that the effect of job changing on the change in DIFF was larger in 1973-75 than in any other period in 1956-77; there are also indications that job changing contributed more to cyclical increases in DIFF after 1962 than before.

Statistical error in the payroll survey.—Any tendency for statistical error in the payroll measure to exaggerate cyclical employment fluctuations would contribute to the cyclical pattern in DIFF. The most serious cause for concern is the possibility that evasion of payroll taxes increases during contractions and decreases during recoveries and expansions. Because BLS uses unemployment insurance (UI) tax returns as the principal source for benchmarking the payroll survey, cyclical fluctuations in UI tax evasion would cause the payroll measure to exaggerate cyclical employment fluctuations. For the most recent recession, there is circumstantial evidence that no substantial increase in UI tax evasion occurred, but for earlier years, there is no evidence. I concluded that cyclical fluctuations in tax evasion were probably small, but I could not rule out the possibility that they were substantial.

Other factors.—I was unable to arrive at conclusions in regard to two kinds

of factors that affect the cyclical behavior of DIFF.

1. My findings with regard to statistical error in the household survey are based on the assumption that population control totals corrected for census undercount accurately measure the population. This assumption must be qualified, because the corrected control totals do not take account of two types of migration: net illegal immigration, and some emigration of citizens and legally resident aliens. On the basis of the evidence shown in appendix D, I concluded that differences in the coverage of these uncounted migrants in the household and payroll surveys may be an important factor in DIFF, and may have accounted for part of the increase in DIFF that began in 1964. However, because there is no evidence on the cyclical behavior of the employment of uncounted migrants, I was unable to draw conclusions about the effect of these differences in coverage on the cyclical behavior of DIFF.

2. Because multiple jobholding, job changing, control total error and undercoverage cannot account for abrupt month-to-month changes in DIFF, the existence of such changes (chart 2) is *prima facie* evidence that other conceptual differences between the two adjusted employment measures, or statistical errors in the measures, affect the behavior of DIFF. I identified about a dozen "outlier" months in which DIFF was 400,000-800,000 above or below its average level in surrounding months; these outliers are too frequent and too extreme to be attributable to sampling error in either of the adjusted employment measures. On several other occasions DIFF changed abruptly for no apparent reason. Whatever factors explain the outliers and the other abrupt changes in DIFF may also contribute to the cyclical behavior of DIFF.

Contribution of the factors to DIFF's behavior

I will now discuss, in an integrated way, some broad relationships between the observed cyclical behavior of DIFF and the factors that I have found contributed to it. I will deal separately with contractions and with recoveries and expansions, because the contribu-

tions of the various factors to the behavior of DIFF differ substantially in the two kinds of periods, and because my findings more fully explain the behavior of DIFF in contractions than in recoveries and expansions.

1. Job changing, multiple jobholding, and the two statistical errors in the household survey contributed to declines in DIFF in all four contractions. The limited evidence available indicates that they contributed most to the 1957-58 and the 1974-75 declines in DIFF, and least to the 1960-61 and the 1969-70 declines.

The assumptions underlying my illustrative calculations are somewhat arbitrary, and I have not been able to estimate the varying effect of each factor in each contraction. Together, however, the factors that I have identified do not appear to have accounted for more than 330,000-480,000 of the cyclical declines in DIFF.⁶⁹ Accordingly, these factors may have largely accounted for DIFF's decline in the two most recent contractions, but probably accounted only in part for DIFF's decline in the two earlier contractions.

2. Job changing, multiple jobholding, and the scale element in control total error tended to raise DIFF in all periods of recovery and expansion, but these factors failed in two ways to explain the behavior of DIFF in such periods. First, for reasons that are unclear, DIFF did not increase in 1962-64 and 1975-77, despite the influence of the three factors cited above. Second, the three factors came close to fully explaining the increase of DIFF in only one of the remaining periods—the 1972-73 recovery; in the other periods, the factors explained less than half of the increase in DIFF.⁷⁰

With regard to recoveries, the limited evidence available indicates that the three factors tended to raise DIFF less in the two earlier recoveries than in the two most recent ones. In 1958-59 and 1961-62, the factors probably accounted for less than half of the increase in

69. To arrive at this estimate I added the illustrative estimate of the error in the 1974-75 ANSW decline, the average decline in the number of civilian workers with secondary jobs in the four contractions, an allowance of 10,000 for declines in military jobholding, and the illustrative estimate of the effect on DIFF of the 1973-75 decline in job changing.

70. The period from the first quarter of 1971 to the first quarter of 1972 is unique, in that the adult male unemployment rate remained high, and the smoothed DIFF (see footnote 5) declined about 400,000. In this period, control total error caused DIFF to decline, as I showed at the end of section 4.

DIFF. In 1972-73, multiple jobholding may have contributed about 310,000 to the increase in DIFF, and the other factors may have accounted for much of the remaining increase. The failure of DIFF to increase in 1975-77 is puzzling, inasmuch as multiple jobholding may have tended to raise it about 400,000 and the other factors may have tended to raise it, very roughly, an additional 200,000.

With regard to the 1962-69 expansion, it is necessary to distinguish two subperiods: 1962-64 and 1964-69. The failure of DIFF to increase in 1962-64 is puzzling, because the scale element of control total error and multiple

jobholding tended to raise DIFF.⁷¹ In 1964-69, the three factors contributed to, but by no means fully explained, the record increase in DIFF. The scale element contributed about 320,000 to the increase in DIFF, multiple jobholding may have contributed about 300,000, and job changing may have contributed, very roughly, about 100,000. The unexplained portion of the increase in DIFF may be due in part to uncounted migration.

71. The decline of about 150,000 in DIFF in 1962-64 is entirely attributable to a sharp decline in DIFF in August 1962. The latter decline may somehow be connected with changes in the household survey sample that were introduced from August 1962 to March 1963.

Appendix A: Arithmetic Example of Statistical Error in the Household Survey

THIS example illustrates the effects of control total error and undercoverage on the household survey estimate of the decline in employment in a contraction.

Assume that population is constant and consists only of civilians age 16 and over living outside institutions, and that the Census Bureau maintains population control totals for only two sex-race-age groups—men and women. Assume, further:

1. The true population is 100 million—50 million men and 50 million women. The decennial census undercounts the true population by 10 million men and no women (table 9, line 3); this is control total error. The scale element in control total error is the understatement of aggregate CNIP by 10 million; the nonscale element is the 20 percent understatement for men and the zero understatement for women.

2. The household survey is a 1 in 1,000 sample. Accordingly, it should pick up 100,000 persons. Actually, it picks up only 85,000, and the 15,000 missed are all men (line 6); this is undercoverage.

3. There are two points of time: I—the prerecession peak, and II—the recession trough. Employment ratios for both points of time for covered persons are taken from the household survey sample (line 7). I assume that the Census Bureau, in a supplementary survey, finds and interviews the 15,000 men missed by the household survey

sample; their employment ratios are shown in line 8. The employment ratio declines more for uncovered men than for covered men.

Effect of control total error

When the sample employment ratios are multiplied by the decennial census population, the aggregate employment ratio declines 4.44 percentage points; when they are multiplied by the true population, the ratio declines 5.00 percentage points (table 10). The former product is equivalent to the official measure published by the Census Bu-

Table 9.—Data for Arithmetic Example

Line		Total	Men	Women
		Millions		
	Population:			
1	True population.....	100	50	50
2	Decennial census population.....	90	40	50
3	Undercount (1-2).....	10	10	0
		Thousands		
	Sample:			
4	Expected size.....	100	50	50
5	Actual size.....	85	35	50
6	Undercoverage (4-5).....	15	15	0
		Percent		
	Employment ratios:			
7	Covered persons:			
	a. Period I.....		70	50
	b. Period II.....		60	50
	c. Change.....		-10	0
8	Uncovered persons:			
	a. Period I.....		60	-----
	b. Period II.....		45	-----
	c. Change.....		-15	-----

reau; the latter, I call the corrected measure. The decline in the corrected employment ratio is larger than that in the official employment ratio because men are undercounted in the census and women are not, and because covered men experience an employment ratio decline and covered women do not. The difference between the two declines, 0.56 percentage points, is the dampening effect of control total error on the employment ratio decline.

In terms of employment, the declines are 4 million, and 5 million. The difference between them (1 million) is the dampening effect of control total error. This difference can be computed also by multiplying the change in the employment ratio for covered men (−10.0 percentage points) by the size of the male census undercount (10 million), and reversing the sign. More generally, the difference between the changes in corrected and official employment can be found by multiplying the changes in employment ratios of covered persons by the size of the undercount, by sex. This procedure is a shortcut that is used when illustrative calculations are made in the text with actual numbers from the household survey.

The difference equals the sum of the effects of the scale and nonscale elements of control total error. The effect of the scale element, 444,000, is the product of the undercount (10 million) and the change in the aggregate employment ratio (−4.44 percentage points). This component measures the extra decline in employment that would have been found if the undercount group had had the same sex composition as the decennial census, and, accordingly, the corrected employment ratio had been the same as the published employment ratio. The effect of the nonscale element is the remainder of the 1 million, or 556,000. This component measures the extra decline in employment that is due to the fact that the corrected employment ratio declines more than the published employment ratio, because the undercount group consists entirely of men, whose employment ratio declines more than that of women.

Effect of undercoverage

I define full-coverage employment as

the product of employment ratios from a sample that fully covers the population and corrected control totals. Thus, it equals the sum of: (1) the product of employment ratios for covered persons and the covered portion of the true population (line 3a); and (2) the product of employment ratios for uncovered persons and the uncovered portion of the true population (line 3b). The full-coverage employment ratio declines 5.75 percentage points (line 3c), whereas the corrected employment ratio declines only 5.00 percentage points (line 2). The former ratio declines more, because the employment ratio for the uncovered men declines more than that for the covered men. The difference between the two declines, 0.75 percentage points, is the dampening effect of undercoverage on the decline in the corrected employment ratio.

In terms of employment, the decline in full-coverage employment is 5.75 million, 750,000 more than in corrected employment. The difference is the dampening effect of undercoverage on the decline in corrected employment. This difference can also be computed by multiplying the difference (−5.0 percentage points) between the change in the employment ratio for uncovered men (−15.0 percentage points) and that for covered men (−10.0 percent-

age points) by the size of the uncovered male population (15 million), and reversing the sign. More generally, the difference between the changes in full-coverage and corrected employment equals the true employment decline for the uncovered population, minus the decline imputed to it by multiplying the changes in employment ratios of covered persons by the size of the uncovered population, by sex. This procedure is a shortcut that is used when illustrative calculations are made in the text with actual numbers from the household survey.

The example also suggest the following generalization: Whether cyclical changes in the full-coverage employment ratio exceed those in the corrected employment ratio depends on whether cyclical changes in employment ratios of uncovered persons exceed on average those in the employment ratios of covered persons of the same sex. If, in the example, the employment ratio of uncovered men had declined only 10 percentage points, the full coverage ratio would have declined the same amount as the corrected ratio. If the employment ratio of uncovered men had declined less than 10 percentage points, the full-coverage ratio would have declined less than the corrected ratio.

Appendix B: Housing Units Not Covered by the Household Survey

THE household survey misses people in two ways. First, the survey misses some housing units, and therefore misses the residents of such units. Second, the survey misses some or all of the residents of some covered housing units and persons with no usual residence. I will discuss the first type of miss in this appendix and the second type in the next appendix.

Selection of sample housing units

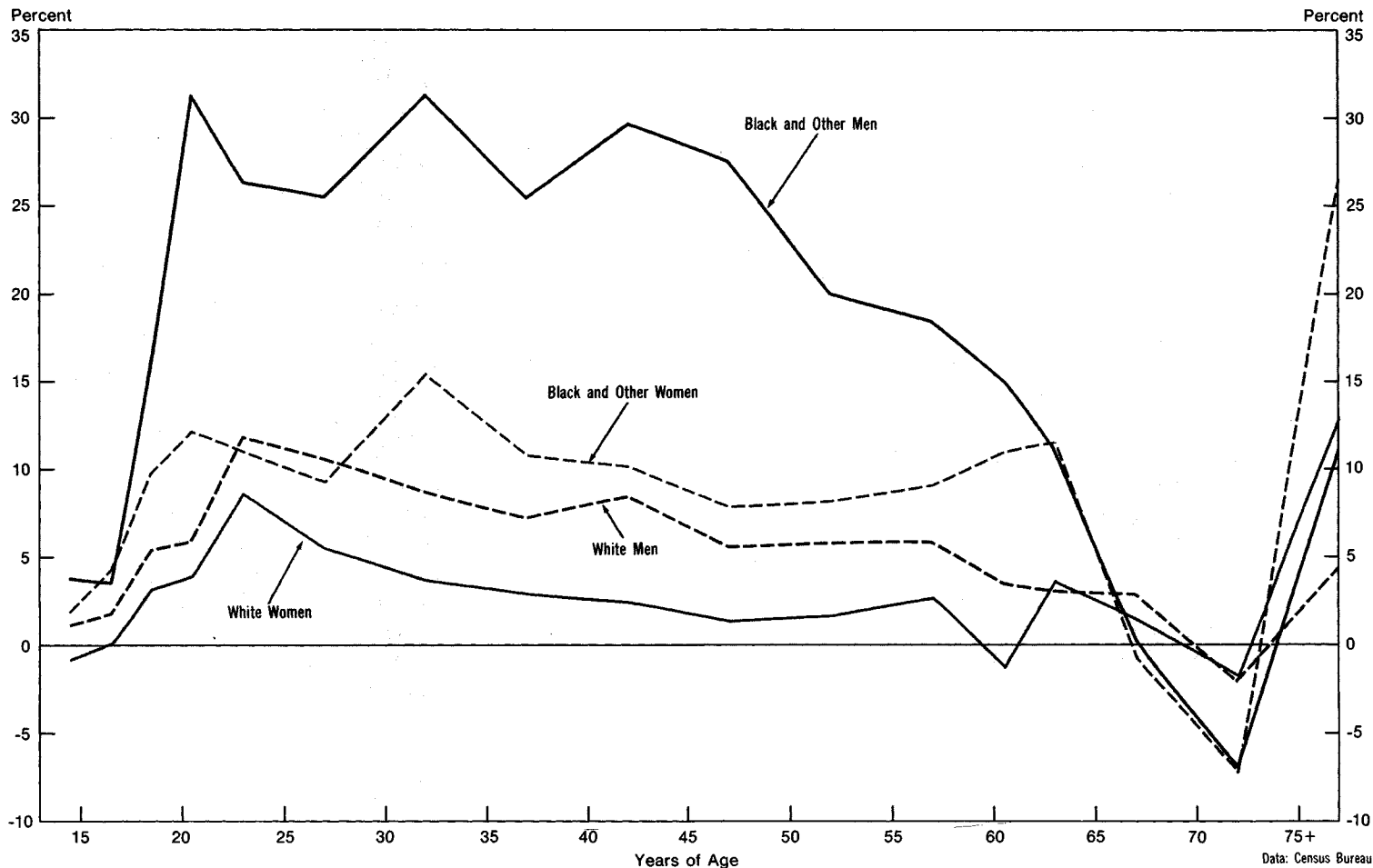
The sample is, and has always been, selected by a multistage procedure.⁷² First, a probability sample of large geographic areas consisting of a county

or group of counties, and known as Primary Sampling Units (PSU's) is selected. Within each sample PSU, a probability sample of census enumeration districts (ED's) containing an average of 350 housing units is selected. Finally, since 1973, a group of four housing units has been selected randomly within each ED, by one of two methods.

Address lists.—About 75 percent of the sample housing units (mostly in urban areas) have been selected randomly from three types of address lists that represent housing units in list ED's, i.e., those ED's for which complete address lists exist. First, address lists from the decennial census contain those housing units in the sample ED that were enumerated in the census. Second, lists of building permits for

72. Thompson and Shapiro, and Technical Paper No. 40 (see footnote 44); and "Concepts and Methods Used in Labor Force Statistics Derived from the Current Population Survey," jointly published as *Bureau of Labor Statistics Report No. 463*, and Census Bureau, *Current Population Reports*, Series P-23, No. 62, October 1976.

Household Survey Undercoverage of the Corrected Civilian Noninstitutional Population Age 14 and Over,
by Sex, Race, and Age, 1975 Annual Average



new construction issued since January 1970 contain housing units built after the decennial census (in the sample PSU but not necessarily in the sample ED). Third, a subsample from the "census supplemental (Cen-Sup) sample" represents housing units that were overlooked in the 1970 census. Cen-Sup is based on an intensive one-time, post-censal canvass of city blocks or equivalent areas in a sample of list ED's in sample PSU's throughout the country.

Area sampling.—About 25 percent of the sample housing units (mostly in rural areas) have been selected randomly by area sampling methods in area ED's, i.e., those ED's for which complete address lists do not exist. The sample ED's are subdivided into small land areas with well-defined boundaries, and one area is selected. Interviewers prepare a complete "pre-list" of housing units in the area, from which the Census

Bureau selects sample units by following a standard set of rules.

I will first discuss the types of housing units that were missed by the sample in 1975, one of the years for which illustrative calculations are made in the text, then review the types that were missed in other years. Finally, I will discuss the average income of residents of uncovered housing units.

Uncovered housing units, 1975

The household survey missed about 1.67 million housing units in 1975—1.27 million in list ED's, and 0.40 million in area ED's.

List ED's.—The sample missed several types of housing units that were omitted from the ostensibly complete address lists.

1. The building permit lists omitted housing units for which building permits were issued before January 1970, and on which construction was not

complete when the census was taken in April 1970. The Census Bureau estimates that 598,000 units were so missed, most of which were in multiunit structures, because multiunit structures take longer to build than do single-unit structures.⁷³

2. The sample omitted mobile homes put in place after the 1970 census at sites outside mobile home parks, and in mobile home parks that were established after the census. It also omitted mobile homes in parks missed by the census and at nonpark sites missed by the census. Census Bureau data indicate that 269,000 occupied mobile homes were so missed.

3. The sample omitted residential structures converted from nonresidential use, and houses moved to their present site after the 1970 census. Reliable data are lacking, but Census

73. Irene C. Montie and Dennis J. Schwanz, "Coverage Improvement in the Annual Housing Survey," *Proceedings of the Social Statistics Section, 1977*, American Statistical Association, p. 169.

Table 10.—Measures of Employment Decline in the Contraction

[Millions except where noted]

Line		Popula- tion	Employment		
			I	II	Change
1	Official employment measure (product of sample employment ratios and decennial census population):				
	Men.....	40	28.00	24.00	-4.00
	Women.....	50	25.00	25.00	0
	Total.....	90	53.00	49.00	-4.00
	Employment ratio (percent).....		58.89	54.44	-4.44
2	Corrected employment measure (product of sample employment ratios and true population):				
	Men.....	50	35.00	30.00	-5.00
	Women.....	50	25.00	25.00	0
	Total.....	100	60.00	55.00	-5.00
	Employment ratio (percent).....		60.00	55.00	-5.00
3	Derivation of full-coverage employment measure:				
	a. Product of sample employment ratios and covered population:				
	Men.....	35	24.50	21.00	-3.50
	Women.....	50	25.00	25.00	0
	Total.....	85	49.50	46.00	-3.50
	b. Product of supplemental survey employment ratios and uncovered male population:	15	9.00	6.75	-2.25
	c. Full-coverage employment measure (a+b):				
	Men.....	50	33.50	27.75	-5.75
	Women.....	50	25.00	25.00	0
	Total.....	100	58.50	52.75	-5.75
	Employment ratio (percent).....		58.50	52.75	-5.75

Bureau officials believe that roughly 200,000 units may have been so missed. The sample probably missed additional units in a variety of ways, but the Census Bureau does not know how many. I allow for 200,000, but the true number could be very different.⁷⁴

Area ED's.—When interviewers prelist housing units in area ED's, they occasionally overlook units within the designated boundaries. They tend to overlook dwellings that are off roads, on back roads, concealed, or otherwise inconspicuous. The most recent small-scale intensive coverage checks, in October 1966 and June 1967, found that the interviewers had missed 1.6–2.1 percent of housing units in area segments.⁷⁵ In the absence of reliable data, Census Bureau estimates of uncovered housing units in area ED's range from about 200,000 upwards. I estimate that 400,000 units, about 2.0 percent of housing in area ED's, were missed in 1975.

Historical review of uncovered housing units

The types of housing units missed by the household survey have changed over time.

74. The additional units missed by the sample include the following: Units missed by Cen-Sup, units enumerated in the census but lost in the processing of address tapes for the household survey, some new hotels and motels, and new units for which builders—in contravention of their legal obligation—did not take out permits.

75. Census Bureau, *The Current Population Survey Re-interview Program, January 1961 Through December 1968*, Technical Paper No. 19, 1968, p. 40. The 1970 census missed 4.8 percent of all housing units, and 3.1 percent of occupied housing units, in rural areas. Census Bureau, *The Coverage of Housing in the 1970 Census*, PHC(E)-5, 1973, p. 31.

1. Before 1962, the Census Bureau relied mainly on area sampling methods to select the sample. Interviewer oversight in prelisting was probably the major cause of housing units being missed.

2. In 1962–71, address lists based on the 1960 census were used to select the sample in about two-thirds of ED's. The Census Bureau believes that the number of permit-lag units was much smaller in that period than it was after 1971. Some mobile homes and units in structures converted from nonresidential to residential use were missed, for the same reasons as in 1975; the number of such missed units increased steadily from 1962 to 1971. There was no Cen-Sup sample, and the Census Bureau used a different method to cover housing units missed by the 1960 census; it believes that the method missed a substantial proportion of units missed by the 1960 census.

3. In 1972–77, address lists based on the 1970 census were used for about three-quarters of ED's. The number of uncovered mobile homes and uncovered units in converted structures increased steadily from 1972 to 1977.⁷⁶

Average income of residents of uncovered housing units

I estimate that, in 1975, 2.80 million persons age 14 and over (table 5, line

76. In October 1978, the household survey began to cover permit-lag units and previously missed mobile homes in new mobile home parks and in parks missed in the 1970 census.

6)—a little less than one-third of the uncovered population—lived in the 1.67 million housing units missed by the household survey.⁷⁷ I assume that the ratio of men to women in the uncovered housing units was the same as in the corrected CNIP, and I estimate that black and other races accounted for 14 percent of the population in the uncovered units.⁷⁸

The evidence on the average income of the missed persons is as follows:

1. Residents of permit-lag units may have somewhat higher incomes than covered persons of the same sex, race, and age, because they occupy new, mostly rental, housing—but the evidence on this point is inconclusive.

2. Residents of missed mobile homes have considerably lower incomes than covered persons of the same sex, race, and age.⁷⁹

3. Little is known about the average income of residents of units converted from nonresidential to residential use, and houses moved to their present site, but there are indications that they may be poorer than covered persons of the same sex, race, and age. There is no evidence regarding the average income of residents of other uncovered housing units in address ED's.

4. Residents of uncovered housing units in area ED's are probably poorer than covered persons of the same sex, race, and age, for two reasons. First, area ED's have largely been in rural places since 1962, and residents of rural areas are poorer than residents of urban areas. Second, in prelisting, interviewers are most likely to miss out-of-the-way housing units, and these are more likely to contain poor persons than are more visible rural housing units.⁸⁰

77. This estimate is based on data on persons per occupied unit, and on vacancy rates, for housing units with characteristics similar to those of the missed units. Census Bureau *Annual Housing Survey: 1975, 1977*, and Technical Paper No. 19, pp. 39–40.

78. The estimate is based on the percentage of blacks and other races in housing units with characteristics similar to those of the missed units. See sources cited in previous footnote, and Census Bureau, "Results Pertaining to the Coverage of Persons," Results Memorandum #1, 1950 Post-Enumeration Survey.

79. For families and unrelated individuals in 1975, the median income in mobile homes in urban areas was \$8,200; the median for all housing units in the country was \$11,200. *Annual Housing Survey: 1975*, Part E, "Urban and Rural Housing Characteristics," pp. 7, 50.

80. The 1950 Post-Enumeration Survey showed that, in rural areas, units missed in the 1950 census were more likely than enumerated units to lack hot and cold piped water or an installed bathtub or shower, and to be dilapidated. Census Bureau, "Analysis of the Characteristics of Erroneously Omitted Occupied Dwelling Units," Results Memorandum #27, 1950 Post-Enumeration Survey, 1954.

In sum, the evidence indicates that residents of permit-lag units are the only residents of uncovered housing units whose incomes may be higher than those of covered persons of the same sex, race, and age. For 1972-77, I conclude that the relative affluence of permit-lag residents was at least offset by the rela-

tive poverty of residents of other uncovered housing units, so that residents of uncovered housing units were, as a group, as poor as or somewhat poorer than their covered counterparts. For 1956-71, I conclude that they were probably somewhat poorer than their covered counterparts.

1970 (1.57), and 1971 (1.56).⁸³ In most other years, it was more than 1.70 times the rate for women. Therefore, the share of undercoverage accounted for by the residual group was usually larger than, and never much smaller than, 50 percent.

Appendix C: Residual Uncovered Persons

IN this appendix I will discuss "residual uncovered persons"—that is, uncovered persons in covered housing units and persons with no usual residence. I will first present evidence that this group has usually accounted for one-half or more of the uncovered population, and then show that members of this group are poorer on average than their covered counterparts of the same sex, race, and age.

Size of residual uncovered population

The residual uncovered population equals the uncovered population minus the population in uncovered housing units. The method for estimating the uncovered population was described in section 4. The size of this population in 1975 is shown in line 5 of table 5, and the 1975 rates of undercoverage by sex, race, and age are shown in chart 9.⁸¹ The method for estimating the population in uncovered housing units was presented in Appendix B, and the estimate for 1975 is shown in line 6 of table 5. The residual uncovered population—line 5 minus line 6—is shown in line 7. There were 6.87 million persons in the residual group in 1975—71 percent of the 9.67 million persons in the uncovered population. Census Bureau data on uncovered housing units in 1973-74 and 1976-77 indicate that the residual group accounted for over 60 percent of annual average undercoverage in those years also.

For 1956-72, there are no data on uncovered housing units that would support a direct estimate of the share of undercoverage accounted for by the residual group. But the following argument suggests that the share was usually larger than, and never much smaller than, 50 percent. In uncovered housing units, men have probably always been missed at about the same rate as women; I will assume that the miss rates for the sexes have always

been equal. Among residual uncovered persons in 1975, men were missed at 2.6 times the rate for women (table 5, line 10). Given the causes of residual undercoverage (discussed below), the miss rate for men must have always greatly exceeded that for women; I will assume it has always been 2.6 times as large. Because men are overrepresented in the residual uncovered population but not in missed housing units, it follows that the smaller the share of undercoverage accounted for by the residual group, the lower the ratio of the male to the female undercoverage rate. Under the above assumptions, when residual uncovered persons account for only 50 percent of undercoverage, it can be shown that the undercoverage rate for men is only 1.58 times that for women.⁸² In 1956-72, the undercoverage rate for men was less than 1.58 times the rate for women in only 3 years—1969 (1.52),

81. The following argument indicates that the uncovered population in table 5 is an underestimate. Household survey interviewers are unable to conduct interviews at an average of about 2,400 occupied housing units each month, because residents are unavailable or refuse to cooperate. The Census Bureau redistributes the selection probabilities of these "noninterview" households among respondent households, thereby assigning the characteristics of respondent households to noninterview households. There is evidence, however, that noninterview households are smaller than respondent households: A 1965 reinterview study found that unavailable households contained only 78 percent as many residents age 14 and over as respondent households; refusal households were about the same size as respondent households. (Susan Palmer, "On the Character and Influence of Nonresponse in the Current Population Survey," *Proceedings of the Social Statistics Section, 1967*, American Statistical Association, pp. 73-80).

The effect of overstatement of the size of noninterview households can be estimated for 1975 as follows. The covered population was 154.1 million (table 5, line 4). Noninterview households accounted for about 4.2 percent of that figure, or about 6.5 million persons, including 3.4 million refusals and 3.1 million unavailables. I assume that the refusal households were the same size as respondent households, but that the unavailable households were 78 percent as large as respondent households. Thus, the unavailable households in 1975 actually contained only 2.4 million persons, 0.7 million fewer than the Census Bureau estimate. Consequently, the 1975 covered population was 0.7 million smaller than estimated in table 5, and the uncovered population was 0.7 million larger. In the absence of reliable data on the size of noninterview households by sex, race, and age, it is not feasible to correct the estimate of the uncovered population.

82. The estimate of 1.58 is based on the equation $u_m - \frac{1}{2}u_w = 2.6(u_w - \frac{1}{2}u_m)$, where u , u_m , and u_w are: the overall undercoverage rate, and the undercoverage rates for men, and for women, respectively.

Characteristics of residual uncovered persons

Each month the Census Bureau provides interviewers with lists of about 65,500 sample housing units. Three types of persons are missed by interviewers. (1) Interviewers classify an average of 9,500 housing units as vacant or otherwise ineligible for interview.⁸⁴ Some of the units classified as vacant are actually occupied; the residents of such "false vacancies" are missed. (2) At respondent households, interviewers ask a responsible household member to name all persons "who are living or staying here," including persons who are temporarily absent. Persons whom the respondent omits are missed by the survey. (3) Most persons with no usual residence are also missed.

I will present evidence that each type is poorer, on average than covered persons of the same sex, race, and age. I will also point out that men greatly outnumber women among two of the three types of residual uncovered persons, and, at the end of this appendix, I will present evidence that the uncovered men tend to live in metropolitan poverty areas.

Residents of false vacancies.—Estimates of the number of false vacancies are lacking. In 1974, routine reinterviews by Census Bureau supervisory personnel found that interviewers erroneously classified as vacant 0.3 percent of sample housing units.⁸⁵ The percentage of false vacancies is probably larger than 0.3, because many false vacancies are not detected in routine reinterviews.⁸⁶

83. The apparently low share of residual uncovered persons in undercoverage in 1969-71 is consistent with the fact that the number of uncovered mobile homes and uncovered units in converted structures must have been larger than at any other time in the period 1962-71 (appendix B).

84. Units whose occupants are Armed Forces members or under age 14, or who "usually reside elsewhere" are considered ineligible for interview.

85. Census Bureau, "CPS Reinterview Results from the Listing Check and the Check of Noninterview Classifications for 1974," memorandum by Irwin Schreiner, March 25, 1975.

86. For example, an intensive coverage check made in October 1966 found about three times as many false vacancies as did routine reinterviews made in the same year. Technical Paper No. 19 (see footnote 75), p. 41.

For two reasons, interviewers are more likely to report false vacancies in urban poverty areas than elsewhere. First, the dilapidated condition of many housing units in urban poverty areas, the frequent absence of nameplates or even of apartment numbers, and the difficulty at times of securing entrance to the buildings make it difficult for interviewers to ascertain whether a sample housing unit is occupied. Second, because urban poverty areas frequently have, or are perceived to have, high crime rates, the interviewers may feel reluctant to venture into such areas in the evening or to make repeated callbacks to ascertain whether a unit is occupied.

At the request of BEA, the Census Bureau made a special tabulation of the location of 235 false vacancies detected in routine monthly reinterviews in 1973-75. The Census Bureau found that there were about three times as many false vacancies per inhabitant in metropolitan poverty areas as outside these areas.

Persons omitted from rosters.—Analysts of census undercount and ethnographic observers of poor neighborhoods have identified two broad reasons why respondents give incomplete rosters to census enumerators and survey interviewers. They are concealment and oversight, and both are associated with poverty.

1. Some respondents conceal the names of some residents, apparently fearing that information given to the Census Bureau will be used against them, even though the Census Bureau assures respondents that the information will be held confidential.

Recipients of public assistance, who are frequently poor, have (or may think they have) an incentive to conceal wage-earning or other income-receiving residents. Women receiving Aid to Families with Dependent Children (AFDC) have an incentive to conceal the natural father or adopting stepfather of their children, and may feel safer not reporting a husband or boyfriend even in cases where it would not affect AFDC eligibility. In many States, AFDC recipients also have an incentive to con-

ceal nonearning residents not eligible for AFDC, because welfare officials prorate rent and utilities among all residents in computing AFDC grants.⁸⁷ In an ethnographic study of 35 Puerto Rican households in a poor New York neighborhood, Alan Harwood found that the households had not reported 15 of 52 resident men, and 2 of 48 resident women, to a 1967 survey. Whereas the survey indicated that 67 percent of the households were female-headed, Harwood found that only 38 percent were actually female-headed. Fear of losing public assistance was the main motive for concealing male residents.⁸⁸

Regulations against overcrowding create incentives for poor tenants of crowded apartments to conceal residents. "Enumerators tell of respondents who fear to report complete household rosters because public housing authorities or their landlords would evict them for overcrowding. They say that violations of increasingly strict housing codes result in underreporting of lodgers or tenants."⁸⁹

Fear of police or other persons is another motive for concealment that is associated with poverty. Persons engaged in illegal activities or wanted by the police, and persons avoiding bill collectors or personal enemies are frequently poor. Illegal immigrants, who are generally poorer than citizens and legally resident aliens, have a strong incentive to hide from investigators of the U.S. Immigration and Naturalization Service.

87. Robert I. Lerman, "The Family, Poverty, and Welfare Programs: An Introductory Essay on Problems of Analysis and Policy," Marjorie Honing, "The Impact of Welfare Payment Levels on Family Stability," and Carol B. Stack and Herbert Semmel, "The Concept of Family in the Poor Black Community," in U.S. Congress, Joint Economic Committee, Subcommittee on Fiscal Policy, *Studies in Public Welfare*, Paper No. 12, "The Family, Poverty, and Welfare Programs: Factors Influencing Family Instability," 1973. See also "Finding the Missing Men: The Sampling Problem," an appendix to *Six Years in the Lives of the Impoverished: An Examination of the WIN Thesis*, by Samuel Z. Klausner, unpublished report to the Employment and Training Administration of the U.S. Department of Labor, 1978.

88. Alan Harwood, "Participant Observation and Census Data in Urban Research," paper delivered at the annual meeting of the American Anthropological Association, November, 1970; and personal communication to the author.

89. Leon Pritzker and N.D. Rothwell, "Procedural Difficulties in Taking Past Censuses in Predominantly Negro, Puerto Rican, and Mexican Areas," in *Social Statistics and the City*, pp. 72-73, (See footnote 46).

2. Some respondents apparently overlook persons loosely attached to their household. If they are reinterviewed in more depth—by a more skilled interviewer or by one in possession of the name of a resident omitted in the first instance—they may readily admit that the omitted resident lives there. It appears that the initial oversight was unintentional, or linked to a general wish to protect privacy or a wish to keep interviews short.

The 1950 Post-Enumeration Survey found that "persons loosely attached to households, members of the extended family and nonrelatives, were more likely than the head of households, wife, or children to be missed in the census. 'Lodgers' showed a particularly high rate of net deficiency."⁹⁰

Ethnographic evidence for blacks indicates that loose attachment to households is far more prevalent in poor neighborhoods than in more affluent neighborhoods, and that it is more characteristic for men than women.⁹¹ Elliot Liebow, who spent a year and a half socializing with streetcorner black men in a poor neighborhood in Washington, D.C., concluded that they were less likely to be counted "in census reports" than "stable workers and family men."⁹²

In general, men are much more frequently concealed and overlooked than women, for four reasons. First, the great majority of respondents are women, and respondents usually cannot omit themselves from rosters. Second, when children are present in a household, it is difficult to conceal a mother or female guardian. Third, many of the motives for concealment—such as AFDC eligibility, reciprocity of wage income, and fear of police—apply exclusively or at

90. *Ibid.*, p. 64.

91. Stack and Semmel (See footnote 87); Stack, *All our Kin: Strategies for Survival in a Black Community*, New York, 1975; Andrew Billingsley, "Black Family Structure: Myths and Realities," in *Studies in Public Welfare*, Paper No. 12; Charles Valentine, *Culture and Poverty: Critique and Counter-Proposals*, Chicago, 1968.

92. Elliot Liebow, *Tally's Corner*, Boston, 1967, p. 20n. See also National Academy of Sciences, *America's Uncounted People*, Report of the Advisory Committee on Problems of Census Enumeration, 1972; Deborah P. Klein, "Determining the Labor Force Status of Men Missed in the Census," *Monthly Labor Review*, March 1970.

least more frequently to men. Fourth, men are more likely than women to be loosely attached to households, and therefore overlooked.

Persons with no usual residence.—Persons who sleep in cars or vans, hallways, abandoned buildings, parks, alleys, on sidewalks, or in tents located away from tent sites enumerated in the decennial census have no "usual residence" in the sense recognized by the Census Bureau, and are not covered by the household survey. Such persons probably account for a small proportion of residual uncovered persons; they are, of course, poorer on average than covered persons of the same sex, race, and age; and they are more likely to be men than women.

Evidence that residual uncovered men live in poverty neighborhoods

Men were missed at the rate of 6.18 percent, 2.6 times the 2.37 percent rate for women, among residual uncovered persons in 1975 (table 5, line 10). Inasmuch as men were missed at about the same rate as women in false vacancies, it follows that men were missed at a rate substantially more than 2.6 times that for women among persons omitted from household rosters and persons with no usual residence. In other years, too, the miss rate for men must have greatly exceeded that for women among persons omitted from household rosters and persons with no usual residence.

In the remainder of this appendix, I will present two types of evidence that indicate that the uncovered men tend to live in metropolitan poverty neighborhoods.

Driver's license study.—Although it does not compare poor and nonpoor neighborhoods, a Census Bureau study indicates that respondents in poor black neighborhoods omitted many men from rosters they provided to enumerators for the 1970 census—and, presumably, to household survey interviewers as well. From the rolls of the District of Columbia's Department of Motor Vehicles, the Bureau took a sample of 710 men, mostly black, with addresses in poor neighborhoods and with newly issued or renewed driver's licenses.⁹³ In attempting to match the names and addresses with persons reported to the 1970 census, the Bureau found that 23.5

percent of the men had been missed or probably missed by the census. There were two groups of missed men.

Twelve percent were misses that were confirmed by a resident at the man's address in reinterviews. Of these, 9.0 percent were in housing units that were enumerated and classified as occupied in the census. The investigators were generally unable to obtain clear explanations of why the men had not been reported to the census. "Oversight" may have been a major reason for this type of miss.

The other 11.5 percent were misses or probable misses that residents would not confirm in reinterviews, although the men had received their licenses by mail, and the investigators were frequently able to obtain corroborative evidence from the Post Office or the IRS that the men received other mail at the address. Residents said they did not know the men, or said the men lived at other addresses that could not be confirmed in interviews at these addresses, or said the men were drifters with no permanent addresses, or gave replies that appeared evasive or confused to the investigators. Deliberate concealment on the part of respondents, and absence of any usual residence on the part of the missed men may have been major reasons for this type of miss.

Sex ratios in the household survey.—Comparisons of sex ratios, the number of men per 100 women, for metropolitan poverty and other areas of residence in the household survey indicate that men omitted from rosters tend to live in metropolitan poverty areas. Poverty areas are areas in which 20 percent or more of the population reported 1969 incomes below the poverty level.

Sex ratios in the population covered by the household survey sample for 1975 are shown in column 1 of table 11 by race, for metropolitan poverty areas, metropolitan nonpoverty areas, and nonmetropolitan areas.⁹⁴ The "corrected" sex ratios, i.e. those based on population estimates corrected for census

undercount, are shown in column 2 by race. For metropolitan areas, the data show that: (1) For whites, the sample found 2.3 fewer men per 100 women in poverty areas than in nonpoverty areas. The difference between the observed area ratio and the national corrected ratio was 1.5 times as large in the poverty areas as in the nonpoverty areas. (2) For blacks and other races, the sample found 10.0 fewer men per 100 women in poverty areas than in nonpoverty areas. The difference between the observed area ratio and the national corrected ratio was 1.9 times as large in the poverty areas as in the nonpoverty areas.

There are two possible explanations for these differences: The differences may reflect more sample undercoverage of men in poverty areas than in nonpoverty areas, due to incomplete rosters, or they may reflect lower true sex ratios in poverty areas than in nonpoverty areas.

Although data are lacking with which to settle the issue, the former explanation is more plausible. In defense of the latter, it is sometimes argued that low sex ratios in poverty areas reflect a situation in which men have left their wives and children in poverty areas and gone to live elsewhere. This view is not persuasive, for two reasons. First, it ignores the findings of ethnographers that many of the households that the household survey counts as female-headed are actually male-headed. Second, it begs the question of where the departed husbands and fathers went to live. Because ethnographers have found that the inability of men to earn steady incomes is a major cause of marital instability among poor persons, it would be surprising if the men were to resettle in the more affluent sections of metropolitan areas.⁹⁵

Sex ratios in the 1970 census.—Analysis of black sex ratios in the 1970 census provides insight into the resi-

94. In metropolitan areas, the Census Bureau classified poverty areas according to the poverty rate of each census tract, which included an average of about 2,500 inhabitants. In nonmetropolitan areas, the Bureau classified poverty areas according to the poverty rate of each minor civil division (MCD). MCD's are townships and cities and may contain up to 50,000 inhabitants. Consequently, the poverty area concept distinguishes sharply between small districts in metropolitan areas, but in nonmetropolitan areas it distinguishes less sharply and is not useful for purposes of the present discussion.

95. Stack, *All Our Kin*, and Liebow, *Talley's Corner*.

93. The sample originally included 1,000 men, of whom 290 were out-of-scope or noninterviews. See Census Bureau, "1970 Census: Preliminary Evaluation Results Memorandum No. 21," prepared by Ralph Novoa, October 1971. For a report on driver's license studies in connection with pretests for the 1980 census, see John Thompson, "The Nonhousehold Sources Coverage Improvement Program," paper presented at the American Statistical Association annual meetings, 1978.

Table 11.—Sex Ratios for Persons Age 18–64, 1975

Race and area of residence	Sex ratios: men per 100 women		Addenda	
	Household survey sample (1)	"Corrected" (2)	Percent with 1975 income below poverty level (3)	Population 18–64 (millions) (4)
White.....	91.8	95.8	9.7	107.1
Metropolitan poverty.....	89.1	.....	25.0	4.7
Metropolitan nonpoverty.....	91.4	.....	7.0	68.2
Nonmetropolitan.....	93.0	.....	12.6	34.2
Black and other.....	75.0	89.2	29.3	14.6
Metropolitan poverty.....	68.3	.....	37.4	4.4
Metropolitan nonpoverty.....	78.3	.....	17.6	7.0
Nonmetropolitan.....	77.8	.....	41.6	3.1

Col. (1) Before blow-up of sample data to census-level population control totals. Annual averages based on monthly data from BLS and Census Bureau.

Col. (2) Based on population corrected for census undercount. Census Bureau.

Col. (3) Based on civilian noninstitutional population, all ages, plus Armed Forces members living off-base in the United States. Census Bureau.

Col. (4) Civilian noninstitutional population. BLS.

dence of the relatively large group of black and other men apparently missed by the household survey in metropolitan poverty neighborhoods.

The 1970 census published detailed data on poverty neighborhoods in 50 large central cities. The neighborhoods consisted of contiguous census tracts with poverty rates of 20 percent or more, and contained populations of 20,000 persons or more. Tabulations for blacks age 22–44 in the 15 cities with

the largest black populations show that the higher the poverty rate of the black residents of the neighborhood, the lower the sex ratio (table 12)⁹⁶. The sex ratio was 78.2 in neighborhoods where the black poverty rate was 20–29.9 percent. This ratio fell to 74.6 and 69.9 in neighborhoods where the black poverty rate was 30–39.9 percent, and 40 percent and over, respectively. (In nonpoverty areas of the 15 cities, the sex ratio was 82.5).

Appendix D: Uncounted Migration

IN this appendix, I will present evidence on the amount of two types of migration that are not counted in the corrected population control totals, and discuss the effects of this uncounted migration on DIFF.⁹⁷ The two types of uncounted migration are: uncounted emigration by citizens and legally resident aliens, and net illegal immigration.

Uncounted emigration

In discussing emigration, it is convenient to distinguish foreign-born and native-born persons.

1. By comparing the foreign-born population in the 1960 and 1970 censuses, Robert Warren and Jennifer Peck concluded that 1,065,000 foreign-born persons emigrated in 1960–70. Their finding was supported by independent estimates of emigration by

96. Ages 22–44 are the ones for which Siegel showed that the difference between the undercount for black men and black women was largest. Census Bureau, *Estimates of coverage* (see footnote 39).

97. For a description of the migration data that the Census Bureau uses to estimate corrected population control totals, see Census Bureau, *Estimates of Coverage* p. 15.

registered, legally-resident, aliens, who account for a large share of emigration by foreign-born persons.⁹⁸ Ongoing research at the Census Bureau confirms the Warren-Peck findings, and indicates that emigration of legally-resident aliens increased substantially after 1970. That there has been an increase in such emigration is not surprising, because the legally-resident alien population has grown steadily, increasing from about 3.0 million in 1965 to about 4.5 million in 1977.⁹⁹

2. On the basis of partial data, it appears that about 300,000 native-born persons may have emigrated in 1960–70.¹⁰⁰

98. "Emigration from the United States: 1960 to 1970," paper presented at the annual meetings of the Population Association of America, 1975; also Warren, "Recent Immigration and Current Data Collection," *Monthly Labor Review*, October 1977, p. 40.

99. The figures refer to aliens admitted for permanent residence, who, together with parolees, net arrivals from Puerto Rico, and net arrivals of civilian citizens, constitute immigration as measured by the Census Bureau. Because other aliens, such as foreign students and tourists, are not considered immigrants, they are not counted in the corrected population control totals, and are not at issue in this article.

In sum, about 1,365,000 persons may have emigrated in 1960–70, an average of about 136,000 per year, Census Bureau corrected population control totals allow for an average of 25,000 emigrants per year in 1960–70, and about 36,000 per year after 1970. Accordingly, there may have been about 110,000 uncounted emigrants per year in 1960–70, and there are indications that the number has increased substantially since 1970.

Net illegal immigration

By net illegal immigration I mean increases in the illegal alien population, i.e., illegal immigration minus emigration by illegal immigrants. Two types of evidence indicate that substantial net illegal immigration occurred after 1964.

1. The increase in apprehensions of illegal aliens by the Immigration and Naturalization Service (INS) from 74,000 in fiscal year 1964 to 412,000 in fiscal year 1971 and to 1,033,000 in fiscal year 1977 probably reflects a large increase in illegal immigration; it is unlikely that stricter enforcement of immigration laws has accounted for a large share of the increase in apprehensions.¹⁰¹ Although many of the illegal immigrants remain in the United States only briefly, there are indications that some of them remain for extended periods.

2. Published estimates of the number of illegal aliens in the United States vary greatly, but none of the estimates for 1972–77 has been less than about 3 million, and it is generally believed that most of the growth in this population took place after 1964. By analyzing consistencies and inconsistencies between IRS tax records and earnings and benefit records of the Social Security Administration, and comparing these records with corrected population control totals, Clarise Lancaster and Fritz Scheuren tentatively concluded that there may have been about 3.9 million illegal aliens age 18–44 in the United States in April 1973.¹⁰²

100. The estimate is based on a study by Ada Finifter that showed that 338,000 native-born and foreign-born citizens emigrated to 15 foreign countries between the censuses of 1960 and 1970. Finifter's findings are summarized by Warren in "Recent Immigration and Current Data Collection," p. 41.

101. The apprehensions figures exclude "nonwillful crew violators," that is, foreign seamen who remained in the United States when their ships left port.

Table 12.—Sex Ratios for Blacks Age 22-44 in 15 Cities With the Largest Black Population, in Neighborhoods Classified by Poverty Rate, 1970 Census

Cities, ranked by black population	Poverty neighborhoods, by black poverty rate ¹						Remainder of city		City total	
	40 percent and over		30-39.9 percent		20-29.9 percent		Population age 22-44	Sex ratio ²	Population age 22-44	Sex ratio ²
	Population age 22-44	Sex ratio ²	Population age 22-44	Sex ratio ²	Population age 22-44	Sex ratio ²				
New York.....	1,788	59.2	172,861	70.0	146,840	74.9	218,657	77.4	540,146	74.2
Chicago.....	32,082	65.8	97,596	73.2	36,047	77.1	160,759	84.4	326,484	78.2
Detroit.....	7,713	89.8	36,712	79.9	37,943	83.3	103,762	84.0	186,130	83.2
Philadelphia.....	13,919	65.3	64,472	70.3	7,550	82.9	98,657	80.7	184,598	75.8
Washington, D.C.....	4,969	56.6	11,786	102.1	46,422	81.2	105,799	86.1	168,976	84.7
Los Angeles-Long Beach.....	9,856	73.9	38,408	78.7	43,187	83.2	70,425	90.7	161,876	84.7
Baltimore.....	21,712	64.0	25,370	79.9	13,828	79.3	54,423	83.6	115,333	78.2
Houston.....	17,940	81.3	31,845	83.4	12,918	82.1	32,769	85.9	95,472	83.7
Cleveland.....	18,763	70.8	11,714	77.4	9,949	71.7	40,251	77.5	80,677	75.2
Atlanta.....	20,741	71.9	17,344	77.3	.....	.....	37,150	85.5	75,235	79.6
New Orleans.....	49,796	71.5	6,454	82.7	.....	.....	11,298	81.1	67,548	74.1
St. Louis.....	15,318	65.1	8,191	70.9	25,472	77.4	15,515	78.2	64,496	73.7
Newark.....	.....	.....	19,045	69.3	28,389	72.7	16,962	78.2	64,396	73.1
Dallas.....	5,291	61.6	23,744	84.7	17,987	84.4	16,117	86.9	63,139	83.0
Memphis.....	26,873	71.1	22,236	75.5	5,865	82.8	4,648	80.2	59,622	74.5
Total, 15 cities.....	246,761	69.9	587,778	74.6	432,397	78.2	987,192	82.5	2,254,128	78.1

1. Poverty neighborhoods contain all census tracts with an overall poverty rate of 20 percent or more, grouped into neighborhoods with a combined population of 20,000 or more. These neighborhoods are here classified by the poverty rate of their black population.

2. Men per 100 women.

Source: Census Bureau, 1970 Census of Population, Supplementary Reports, *Low-Income Neighborhoods in Large Cities: 1970*, for each city.

Effect of uncounted migration on DIFF

I will discuss the effect of uncounted migration on the accuracy of the household and payroll employment measures, and on DIFF.

As previously mentioned, the household employment measure equals the population control totals times the corresponding employment ratios. The household survey does not measure increases in illegal alien employment, or employment declines associated with uncounted emigration, because the population control totals do not measure uncounted migration.¹⁰³

The payroll survey measures employment declines that occur when non-agricultural wage and salary workers emigrate, and there are indications that it counts a large proportion of the nonagricultural wage and salary jobs held by illegal aliens. Because UI tax returns are the principal source for benchmarking the payroll survey, the survey covers illegal aliens to the extent

102. "Counting the Uncountable Illegals: Some Initial Statistical Speculations Employing Capture-Recapture Techniques," *Proceedings of the Social Statistics Section, 1977*, American Statistical Association, p. 533.

103. Uncounted migration may affect the employment ratios as well as the population control totals, but such changes in the employment ratios cannot cause the household survey to measure changes in the employment of uncounted migrants when the population control totals do not measure the population change associated with uncounted migration. Uncounted migration probably has only a small effect on the employment ratios, because the employment ratios of uncounted migrants probably do not differ greatly from those of citizens and legally-resident aliens. There are some indications that the household survey sample misses a large proportion of illegal aliens.

that their employers pay UI taxes on them. The following argument indicates that employers pay UI taxes on most of their illegal alien workers. Employers who evade UI taxes on illegal alien workers probably evade Social Security taxes on these workers as well, because employers fear that tax investigators will match the two types of returns. A number of small-scale surveys have found that illegal aliens interviewed in a variety of circumstances say that their employer, in most cases, deducts Social Security taxes from their wages. Also, IRS tax investigators believe that employers pay Social Security taxes on most covered illegal alien workers. No evidence has been presented to the contrary.

The findings of the surveys are as follows. (1) In a sample of 625 apprehended illegal aliens who had worked at nonagricultural jobs in the United States, 80 percent said their employer had deducted Social Security taxes from their wages.¹⁰⁴ (2) In a sample of 145 Mexicans who had worked at non-agricultural jobs in the United States and were later interviewed in their villages in Mexico, 78 percent said their employer had deducted Social Security taxes from their wages.¹⁰⁵ (3) In a sample of 185 Mexicans living illegally in

104. David S. North and Marion F. Houston, *The Characteristics and Role of Aliens in the U.S. Labor Market: An Exploratory Study*, report to the U.S. Department of Labor, 1976, p. 143; and North, "Interactions Between Illegal Alien Respondents and the Social Security Tax Collection System" July 1976, p. 16.

the United States and interviewed informally, most of those who worked said their employer deducted Social Security taxes from their wages.¹⁰⁶ (4) In a sample of 447 Mexicans who had worked illegally in the United States, were apprehended, and were interviewed by Mexicans upon their return to Mexico, 65 percent said their employer had deducted Social Security taxes from their wages.¹⁰⁷ (5) In a sample of 49 Haitians and Dominicans working illegally in New York City at jobs not in private households, 86 percent said their employer deducted Social Security taxes.¹⁰⁸ Because some of these samples included agricultural and private household workers, some of whom are not covered by the Social Security law, and because tax evasion in regard to those agricultural and private household workers who are covered is probably much higher than it is in regard to other wage and salary workers, the percentages cited may understate the percentage of illegal alien nonagricultural wage and salary workers outside

Cont. on page 55

105. Wayne A. Cornelius, *Mexican Migration to the United States: Causes, Consequences, and U.S. Responses*, Migration and Development Study Group, Center for International Studies, Massachusetts Institute of Technology, 1978, and personal communication to the author.

106. Cornelius, personal communication to the author.

107. Jorge A. Bustamante, "Undocumented Immigration from Mexico: Research Report," *International Migration Review*, Summer 1977, p. 170.

108. Charles B. Keely et al., "Profiles of Undocumented Aliens in New York City: Haitians and Dominicans," Occasional Paper No. 5, the Center for Migration Studies, 1978, and personal communication to the author.

Why Capacity Utilization Estimates Differ

Introduction

IN spite of continuing efforts to measure capacity utilization in manufacturing, at times serious uncertainty remains about its movements. The Census Bureau, the Bureau of Economic Analysis, the Federal Reserve Board, the McGraw-Hill Publications Company, and Wharton Econometric Forecasting Associates all maintain current measures. Broadly, these capacity utilization measures move up and down together; but there are important differences in amplitude and timing. Differences in amplitude are shown in table 1, which compares the five measures from yearend to yearend during two recent contractions and expansions.¹

There is a clear and systematic difference between "production-based" and "survey-based" measures. "Production-based" refers to measures that use production statistics to measure the numerator of capacity utilization and some technique involving the assumption of smoothness to measure capacity in the denominator. "Survey-based" refers to measures for which respondents report on utilization directly. The Federal Reserve and Wharton measures, which are production-based, show a greater amplitude of swing than the McGraw-Hill, BEA, and Census measures, which are survey-based. Of the two production-based measures, Whar-

NOTE.—The results reported in this article are largely based on special tabulations of the Census Bureau and BEA capacity utilization surveys. Wayne McCaughey at the Census Bureau and John Woodward and Kenneth A. Beckman at BEA were extremely helpful in supervising these tabulations, including modifications at various stages to make them as useful as possible. Saundria Pitts also provided capable assistance in preparing the article. A preliminary version of this article was presented at the Round Table Conference on Capacity Utilization sponsored by the Federal Reserve Board and BEA in December 1978.

1. Yearend comparisons do not match the precise timing of expansions and contractions; but two of the five measures are calculated only for the end of each year.

ton shows slightly more amplitude than the Federal Reserve. Of the survey-based measures, McGraw-Hill shows more amplitude than BEA. This article will touch briefly on differences within the survey-based group and within the production-based group; but its focus is on the reasons survey-based measures show less amplitude in their swings than do production-based measures.

An explanation of why a multiplicity of measures exists and what the various measures were intended to accomplish may be helpful. For many years, capacity and output were calculated by industry or trade associations for a relatively narrow group of materials industries—steel, cement, paper, petroleum refining, and other continuous-process industries with a high degree of capital intensity. Capacity was measured as the proven production capability of each plant in tons, barrels, or some other physical unit, summed over all plants in the industry and typically corrected for normal downtime. Capacity utilization measures were found highly useful in analyzing investment needs, profit swings, and other economic developments in these industries.

In the construction of these measures, not much attention was devoted to framing a precise theoretical definition of capacity. Clearly, "capacity" was a level of output that would be costly to exceed without increasing the capital stock; but whether capacity corresponded to minimum shortrun cost, maximum shortrun profit, or some other concept was not investigated. The next section of this article returns to the problem of definition.²

Because capacity utilization measures were useful wherever they were available, it seemed likely that broad measures for at least all manufacturing and possibly a still wider group of industries would be helpful in analyzing general business conditions. The method of measuring the physical capability of each plant, however, was not feasible for most industries. Instead, three other methods of measuring capacity or its utilization were devised—the trend-through-peaks method, the capital stock method and the survey method.

The trend-through-peaks method, which approximates capacity by linear interpolation between production peaks,

2. For a thorough discussion, see Lawrence Forest, "Capacity Utilization: A Discussion of Concepts and Selected Analytical Applications", Federal Reserve Board Staff Economic Paper (forthcoming).

Table 1.—Changes in Manufacturing Capacity Utilization: Recent Contractions and Expansions
[Percentage Points]

	Federal Reserve	McGraw-Hill	BEA
December to December ¹			
1969-70.....	-6.8	-5	-4
1970-72.....	9.4	7	5
1973-74.....	-11.7	-11	-7
1974-76.....	5.5	3.5	3
Fourth quarter to fourth quarter ¹			
1969-70.....	-8.5	-9.8	n.a.
1970-72.....	9.5	10.5	n.a.
1973-75.....	-10.8	-12.5	-10
1975-76.....	3.7	3.7	0

NOTE.—The time periods selected for comparison are dictated by data availability. Estimates from the McGraw-Hill survey are available for December; from the BEA survey, for the last month of each quarter; from the Federal Reserve, for each month; from Wharton, for the average of each quarter; and from Census, for each fourth quarter. McGraw-Hill and Census estimates are not seasonally adjusted; the others are. This difference should have little effect on the comparisons.

Rounding follows the source: Wharton and Federal Reserve estimates are published to the nearest tenth of a percent, BEA and Census to the nearest percent, and McGraw-Hill to the nearest one-half percent.

1. The December comparisons use December 1974 as a low month, and the fourth quarter comparisons use the last quarter of 1975 as a low quarter. The reason for this difference is that manufacturing production as measured by the Federal Reserve index rose from December 1974 to December 1975 but fell from fourth quarter of 1974 to the fourth quarter of 1975.

is the simplest. It begins with the assumption that output is equal to capacity at every production peak, although ways have been devised for modifying this assumption in cases where other evidence clearly indicates significant excess capacity at a production peak. Extrapolation of capacity beyond the latest peak raises another problem, and even proponents of the method admit that it is sometimes not reliable for the period since the most recent peak—often the period of greatest interest.³

Another problem of this method is that it may miss the slowdowns or speedups in capacity growth due to fluctuations in investment. A utilization measure subject to this problem would tend to fall more in contractions or rise more in expansions than a measure that is not. The results shown in table 1 are evidence that the Wharton measure, which is a trend-through-peaks measure, is subject to this problem.

The capital stock method, which uses capital stock as a proxy for capacity, does take systematic account of fluctuations in investment, because capital stocks are generally measured by the perpetual-inventory method of cumulating past investment spending and subtracting retirement or depreciation. There are, however, serious statistical problems in converting investment spending into capital stocks.⁴ Furthermore, the link between investment spending and additions to capacity is not precise; some capacity expansion requires little or no investment spending and much investment serves purposes other than expanding capacity.⁵

The survey method offered promise of a distinct improvement over the other methods. In utilization surveys, individual companies or establishments make the determination of their capacity utilization. They are given wide latitude in defining output and capac-

ity, especially the latter, because it is assumed that respondents are best able to measure capacity and its utilization in a way most appropriate to their situations. In the 1950's, McGraw-Hill pioneered this area. In the 1960's, BEA extended the survey method to cover a much larger sample and to provide quarterly instead of just annual estimates. Census restricted itself to an annual survey, covered establishments rather than companies, and collected information on actual operating conditions (number of shifts per day, days per week, etc.) and on operating conditions assumed in measuring capacity.⁶

Survey-based methods have yielded valuable information on capacity utilization for many industries and have been employed extensively in economic analyses. They have also been used in the construction of eclectic measures of capacity utilization such as the Federal Reserve estimates, which draw on many sources of information for measuring short-run changes in utilization, but which employ survey-based measures as benchmarks in the long run.

Survey-based measures of utilization, however, have displayed a cyclical sluggishness that has been disappointing and puzzling. In conjunction with production statistics, survey-based utilization measures imply an implausible degree of short-run sensitivity of capacity to the rate of growth of output. For example, some of the survey-based measures suggest that capacity has declined during some contractions, although all other evidence indicates positive, although lower-than-average growth. This apparent bias in survey-based measures was noted by Perry some years ago with reference to the McGraw-Hill survey.⁷ The bias appears to be even larger for other survey-based measures.

This article focuses on three possible reasons for the sluggishness of survey-based utilization measures and on what might be done to correct them. The next section deals with changes in assumed operating conditions—specifically, with the possibility that survey

respondents base their notions of capacity on fewer shifts per day and days per week when output is low than when output is high. Evidence suggests that this is not an important explanation of the behavior of survey-based measures. Assumptions about shifts per day and days per week are not the only operating assumptions firms need to make to measure capacity. They also need to decide whether to include or exclude plants, or portions of plants, that can operate only at very high unit costs or that require inputs (hydroelectric power, for example) that are not always available. This article does not cover these dimensions of operating assumptions.

The third section deals with overreporting of “no change”—the possibility that respondents to surveys tend to report no change in utilization even when there has been an actual change. Evidence suggests that overreporting of no change is substantial and may be an important source of bias in the survey-based measures.

The fourth section deals with the use of labor instead of output to measure capacity utilization, a possibility that would lead to a bias because of short-term fluctuations in labor productivity. Evidence suggests that this, too, may be an important source of bias.

The final section concludes that overreporting of no change and using labor rather than output probably account for a substantial fraction of the differences in amplitude of swing between survey-based and production-based measures of capacity utilization. The section reports on two experimental adjustments to the BEA measure, and concludes that systematic correction for bias may make survey-based measures of capacity utilization more useful.

Changes in assumptions about operating conditions

Measurement of capacity rests on a series of assumptions about operating conditions—assumptions about number of shifts per day, days per week, weeks per year, hours per shift, machine downtime, obsolete facilities, product mix, and availability of labor and materials. A frequent conjecture about why survey-based measures fluctuate less than

3. Thus, Robert Summers has written that “there is no question but that the most recent values of the Wharton Index—the ones of most interest—are somewhat suspect.” See “Further Results in the Measurement of Capacity Utilization”, American Statistical Association, *Proceedings of the Business and Economics Section*, 1968, p. 32.

4. See Allan H. Young and John C. Musgrave, “Estimation of Capital Stock in the United States”, *Conference on Research in Income and Wealth*, October 1976 (to be published).

5. See Barry Bosworth, “Capacity Creation in Basic Materials Industries”, *Brookings Papers on Economic Activity*, 1976:2, pp. 311-314.

6. The appendix to this article reproduces the Census questionnaire on capacity utilization.

7. See George L. Perry, “Capacity in Manufacturing”, *Brookings Papers on Economic Activity*, 1973:3, pp. 710-712.

production-based measures is that respondents tend to change their assumptions as output changes. This section deals with the hypothesis that during periods of expanding output there is a tendency to increase the number of shifts per day or days per week that capacity is assumed to represent, and during periods of contracting output the reverse takes place. The hypothesis implies that capacity is "found" during expansions and "lost" during contractions and that utilization fluctuates less than it would if operating assumptions were held constant.

It does not necessarily follow that a capacity measure based on changing operating assumptions is useless. It may convey information about the attitudes of respondents. The level of output that maximizes shortrun profits, furthermore, probably grows during expansions and may require more shifts per day when demand is relatively high than when it is relatively low. A theoretical definition of capacity as the profit-maximizing level of output could thus imply systematic changes in operating assumptions—though not necessarily those changes assumed by respondents in any particular capacity measure. The usual theoretical definition of capacity, however, is not the level of output that maximizes profits but rather the level of output that meets a cost criterion—either the level that minimizes shortrun costs per unit of output or the level at which the cost of an additional unit of output rises above some high threshold. Under the usual definition, in contrast to a profit-maximizing definition, cyclical shifts in operating assumptions have no place.

Information collected in the Census survey of manufacturing capacity makes possible for the first time an investigation of whether assumptions about shifts per day and days per week change significantly over time. The Census survey is conducted at the end of each year, and the interval from the end of 1975 to the end of 1976 provides an excellent period for investigating the practical importance of this aspect of capacity measurement. Although this period was one of vigorous expansion in manufacturing output, the Census measure of utilization shows no change (table 1). The Census survey

Table 2.—Shifts Per Day and Days Per Week at Practical Capacity in Manufacturing Industries, Fourth Quarters of 1975 and 1976

	Shifts per day		Days per week	
	1975:IV	1976:IV	1975:IV	1976:IV
Group 1: High shifts per day:				
Textile weaving (221-222).....	3.0	3.0	5.9	5.8
Pulp, paper, and paperboard (261-263).....	3.0	3.0	6.9	6.9
Industrial inorganic chemicals (281).....	3.0	3.0	6.9	6.9
Plastic materials, synthetics (282).....	3.0	3.0	6.9	6.9
Petroleum refining (291).....	3.0	3.0	7.0	7.0
Rubber tires and tubes (301).....	3.1	3.0	5.9	5.8
Flat glass (321).....	3.0	3.0	5.9	5.8
Cement (324).....	3.0	3.0	7.0	7.0
Basic steel (331).....	3.0	3.0	6.7	6.7
Primary nonferrous metals (333).....	3.0	3.0	6.9	7.0
Average, group 1 ¹	3.01	3.00	6.55	6.55
Group 2: Medium shift per day:				
Textiles except weaving (223-229).....	2.6	2.7	5.7	5.7
Rubber except tires (302-307).....	2.7	2.7	5.9	5.8
Nonferrous foundries, rolling mills, etc. (334-339).....	2.7	2.7	5.9	5.8
Paper products (264-269).....	2.5	2.6	5.6	5.6
Aircraft and parts (372).....	2.6	2.6	5.5	5.5
Tobacco products (21).....	2.5	2.5	5.7	5.1
Chemicals except industrial and plastics (283-289).....	2.4	2.4	6.0	6.0
Transportation equipment except motor vehicles and aircraft (373-379).....	2.3	2.4	5.7	5.7
Iron and steel foundries (332).....	2.2	2.3	6.0	6.1
Fabricated metal products (34).....	2.3	2.3	5.5	5.5
Machinery, except electrical (35).....	2.3	2.3	5.5	5.6
Electric and electronic equipment (36).....	2.3	2.3	5.6	5.5
Motor vehicles and equipment (371).....	2.2	2.3	5.3	5.4
Average, group 2 ¹	2.37	2.40	5.60	5.60
Group 3: Low shifts per day:				
Clay, pottery, and concrete products (32 excl. 321.4).....	2.3	2.2	5.9	5.9
Food and kindred products (20).....	2.2	2.1	5.6	5.6
Millwork and plywood (243).....	2.1	2.1	5.3	5.3
Printing and publishing (27).....	2.1	2.1	5.9	5.8
Instruments and related products (38).....	2.1	2.1	5.5	5.4
Petroleum except refining (295-299).....	2.1	2.0	5.4	5.8
Miscellaneous manufactures (39).....	2.0	2.0	5.4	5.4
Lumber except millwork and plywood (24 excl. 243).....	1.6	1.6	5.4	5.3
Furniture and fixtures (25).....	1.6	1.6	5.3	5.2
Leather and leather products (31).....	1.3	1.3	5.3	5.2
Apparel and other textile products (23).....	1.2	1.2	5.2	5.2
Average, group 3 ¹	1.89	1.86	5.54	5.50
Average, all manufacturing ¹	2.27	2.27	5.67	5.66

NOTE.—Numbers in parenthesis are SIC numbers.

1. Averages for the three groups and for all manufacturing are based on employment weights.
Source: Census Survey of Plant Capacity, 1975 and 1976.

includes questions not only about utilization but also about operating conditions at practical capacity, defined as "the greatest level of output a plant can achieve within the framework of a realistic work pattern" (appendix A). Responses to the questions about conditions at practical capacity enable us to determine how much, if any, of the extreme sluggishness of reported utilization was due to respondents increasing the number of shifts per day or days per week used to define practical capacity between 1975 and 1976.

The somewhat surprising answer is that, in the aggregate, there was no shift in operating conditions at practical capacity during this period of expansion. A special tabulation of establishments reporting to Census in both years showed no change in the average number of shifts per day—2.27—and a miniscule decline in days per week—

from 5.67 to 5.66 at practical capacity (table 2). These results thus cast grave doubt on the hypothesis that changes in assumed operating conditions at capacity have much to do with the sluggishness of survey-based measures.

It is of some interest to divide manufacturing industries into three groups, based on their reported practical capacity shifts per day in 1976.⁸ The first group consists of those industries that typically operate on a continuous basis, accounting for 10 percent of manufacturing employment in 1976. It includes almost all of the industries for which physical capacity and output data have been calculated for many years. It is not surprising that these industries reported a practical capacity of three shifts per day in both years. They also reported high and unchanged

8. The division is based on a 34-industry break. Of the 20 standard two-digit manufacturing industries, 9 are further subdivided to provide more homogeneous groupings with respect to operating assumptions.

days per week—6.55 days for both surveys.

The next group consists of industries—56 percent of manufacturing employment—that reported 2.3 to 2.7 shifts per day in 1976. These industries do not operate continuously but they are close enough that capacity could be an important constraint on production when actual shifts reach practical capacity. These industries did show a slight increase—from 2.37 to 2.40—in assumed shifts per day at capacity from 1975 to 1976. Their average days per week at capacity was exactly the same—5.60 days—in both years. The increase in shifts implies that utilization for these industries would have risen by a little over 1 percentage point more than the reported figure had it been based on unchanging operating assumptions.

The experience of this middle group, however, is offset by industries (34 percent of manufacturing employment) that typically have low shifts per day. These industries showed a decline in assumed shifts per day at capacity from an average of 1.89 in 1975 to 1.86 in 1976, and a decline in days per week at capacity from 5.54 to 5.50. For these industries, utilization would have declined by 2 percentage points more than the reported figure had it been based on unchanging operating assumptions.

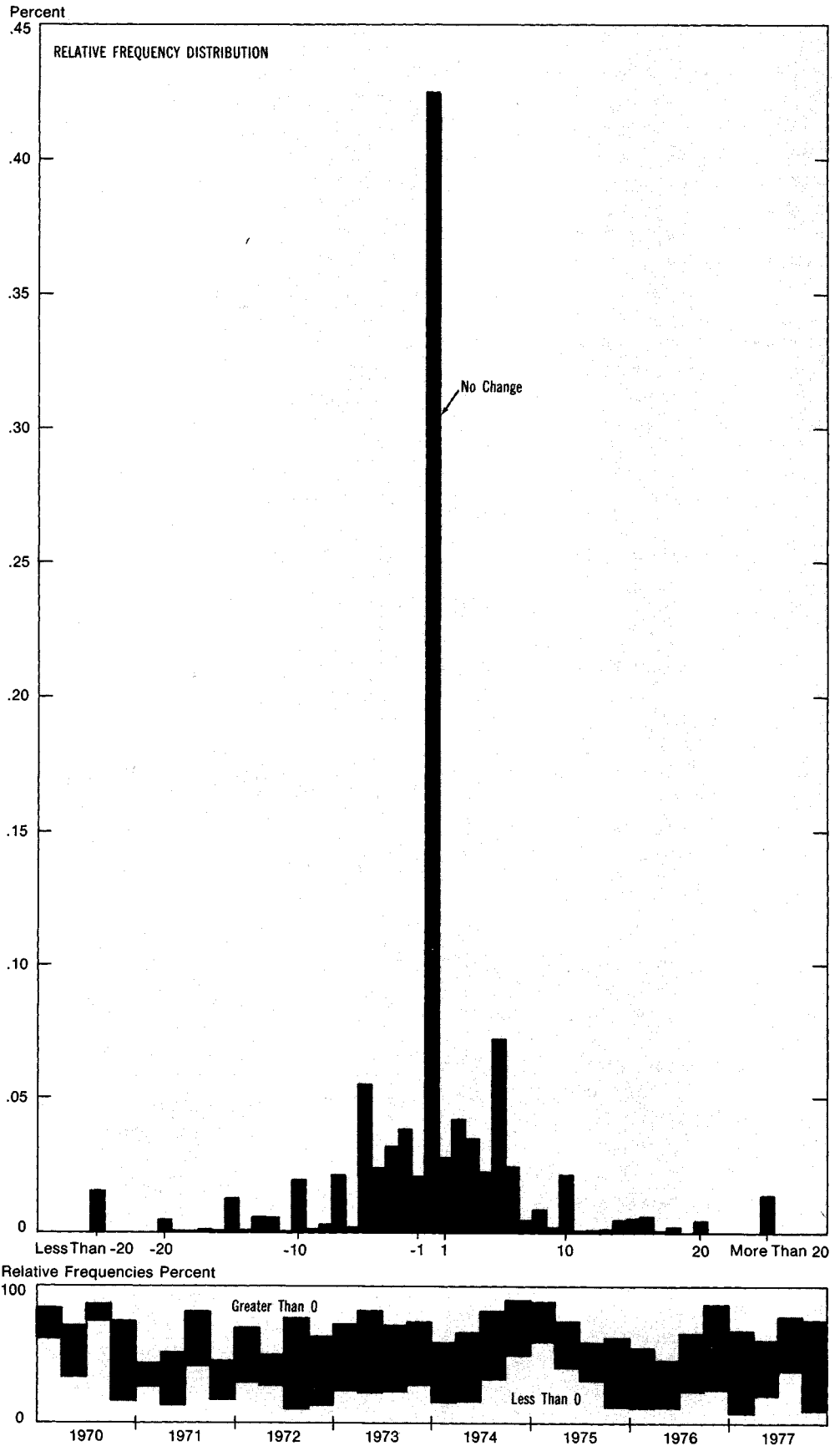
Overreporting of “no change”

The simplest possible explanation of the cyclical sluggishness of survey-based measures of capacity utilization is that respondents find it much easier to report no change than anything else and therefore report no change too frequently.

Evidence on the frequency of no-change responses is available from a special tabulation covering 1970-77 of individual company reports submitted to BEA for its quarterly survey of manufacturing capacity utilization. Charts 10, 11, and 12 show frequency distributions of quarter-to-quarter changes in capacity utilization among respondents in the electrical machinery, nonelectrical machinery, and paper industries. Reported frequencies were weighted by the asset size of the company. Reports tabulated for each quarter were limited to companies that reported utilization rates for that and

CHART 10

Quarterly Changes in Utilization, 1970-77, Electrical Machinery



U.S. Department of Commerce, Bureau of Economic Analysis

79-5-10

the previous quarter. On an average, 237 company reports per quarter were tabulated for electrical machinery, 310 for nonelectrical machinery, and 89 for paper.

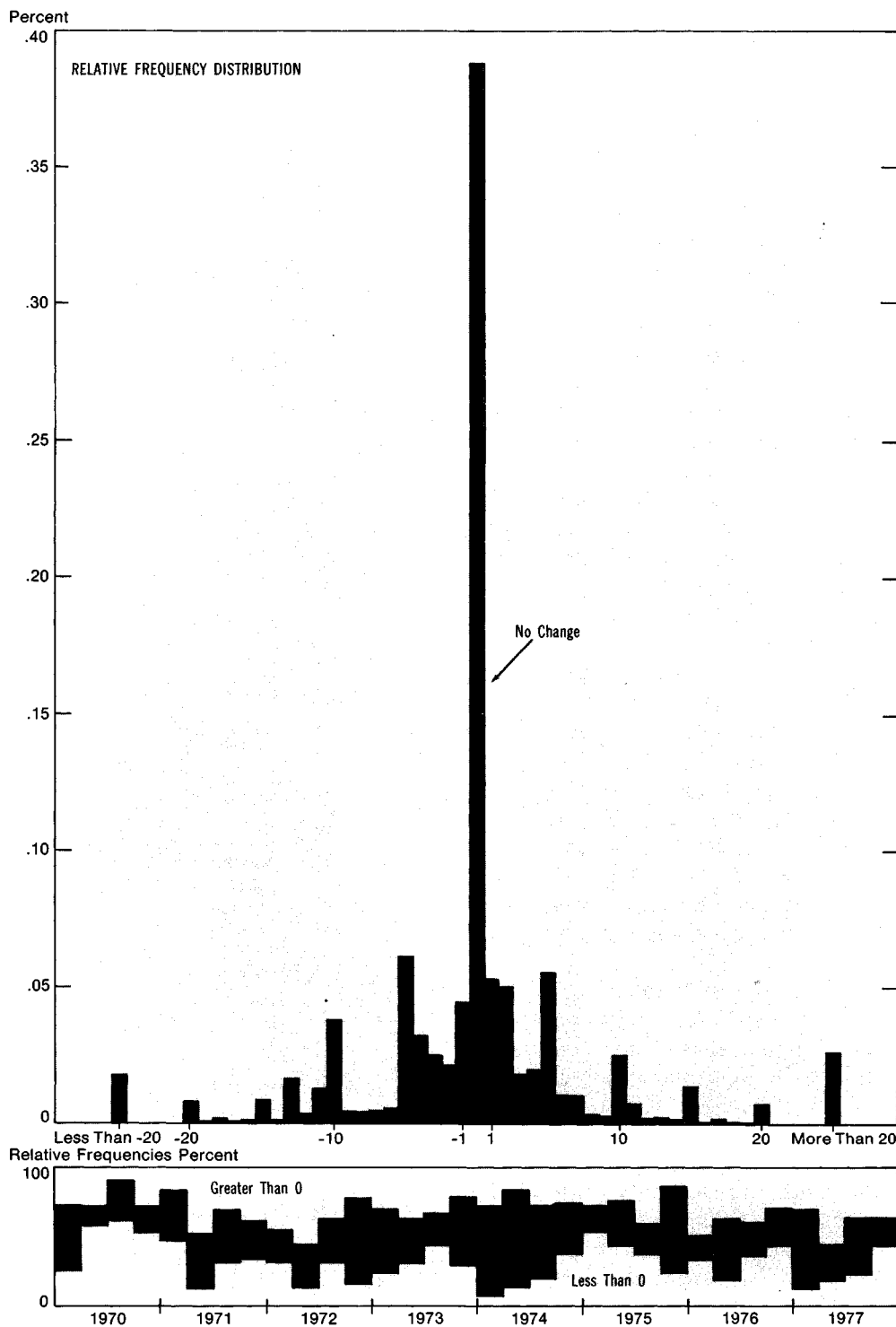
Each bar in the top panel of the charts represents the relative frequency of some possible percentage-point value of quarter-to-quarter changes in the capacity utilization rate. The bar at the center represents the relative frequency of no-change reports, and the bars on the left and right represent percentage point decreases and increases.

The charts show that there is an enormous frequency of no-change reports. In electrical machinery, 42 percent of all reports showed no change in the utilization rate from the previous quarter. For nonelectrical machinery, the no-change frequency was 37 percent and for paper, 27 percent. Frequencies at multiples of 5 and -5 percentage points are also high—though not nearly as high as at no change.

It seems almost certain that much of the extraordinarily high frequency of no-change reports is due to biased reporting. To be sure, there are times when upward changes in utilization rates are not possible because production is constrained by a capacity ceiling. At these times, the true frequency of no change could be quite high. However, reported high frequencies of no change are not confined to periods of high utilization. The bottom panels of charts 1-3 show quarterly frequencies of positive-change reports, no-change reports, and negative-change reports. They demonstrate that while no-change reports did not have a high frequency in each quarter, quarters of high no-change frequency occurred throughout the 1970-77 period—not just during times when aggregate utilization was high. In the electrical machinery industry, for example, at least one quarter with a no-change frequency over 40 percent occurred in seven of the eight years (1971 is the exception).

Some of the high frequency of no-change reports appears to be due to rounding to the nearest 5 percent. The peaks in the three charts at multiples of 5 and -5 provide evidence for this conclusion. The fact that peaks at multiples of 5 and -5 are much less pronounced than the peaks at no change

Quarterly Changes in Utilization, 1970-77, Nonelectrical Machinery



U.S. Department of Commerce, Bureau of Economic Analysis

79-5-11

suggests, however, that such rounding is only a minor part of the explanation of the high no-change frequency.

A recent tabulation of employment data also suggests that the true frequency of no change is much less than

reported in the BEA survey. A tabulation of a sample of 378 electrical machinery establishments reporting to the Bureau of Labor Statistics revealed that only 10 percent reported no change in employment from June to Septem-

ber 1978.⁹ Because employment generally shows less short-term variation than output, this tabulation suggests that the true frequency of no change in output may well have been even less than 10 percent. Although this finding relates to only one quarter and to establishments rather than companies, the difference between the 10 percent no changes in the BLS employment survey and the 1970-77 average of 42 percent no change for the same industry in the BEA capacity utilization survey is so large that it strongly suggests the presence of biased reporting in the latter.

Because the true frequency of no change is unknown, it is impossible to make a precise correction for the bias caused by no-change responses. The experimental calculations reported in the final section of this article suggest, however, that no-change responses may be an important source of the sluggishness of the BEA estimates of capacity utilization.

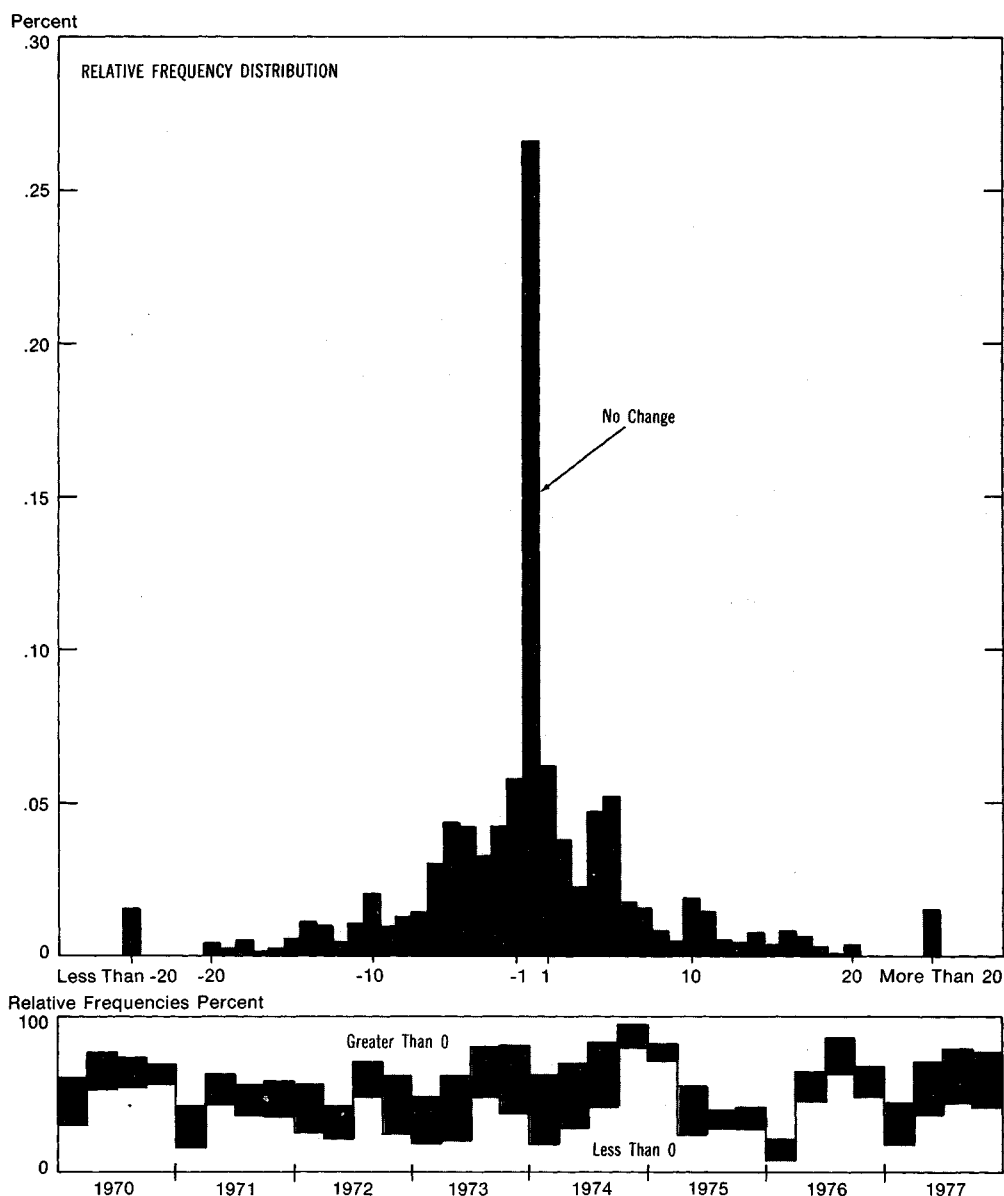
No-change responses and company size.—There is weak evidence that the frequency of no-change responses varies with the size of the company. Responses in the paper industry clearly show lower frequencies of no-change reports for large than for small companies. For the two machinery industries, however, there is no association in either direction between no-change frequency and size.

A tendency in manufacturing as a whole for no-change responses to be most frequent among small companies would help to explain differences between McGraw-Hill and BEA utilization estimates. McGraw-Hill estimates rely much more heavily on large firms than BEA estimates, and, as table 1 indicated, McGraw-Hill estimates show a greater amplitude of swing than BEA estimates. The suggestion by Ragan that this difference may be due to a tendency of utilization to vary more over time for large firms than for small ones could be reinterpreted to say that the difference may be due to a tendency for reported utilization, but not necessarily actual utilization, to vary more for large firms than for small ones.¹⁰

9. The tabulation was prepared under the supervision of John Tucker, Chief, Division of Industry Employment Statistics, Bureau of Labor Statistics.

CHART 12

Quarterly Changes in Utilization, 1970-77, Paper Industry



U.S. Department of Commerce, Bureau of Economic Analysis

79-5-12

Labor utilization

For establishments or companies with heterogeneous or complex products it is difficult to measure output, but relatively easy to measure employment or hours. It may therefore be tempting to respond to a survey of capacity utilization by calculating actual hours relative to some measure of "practical capacity" hours rather than attempting to calculate actual output relative to "practical capacity" output.

10. See James F. Ragan, "Measuring Capacity Utilization in Manufacturing", Federal Reserve Bank of New York, *Quarterly Review*, Winter 1976, p. 18.

Measuring capacity utilization in terms of labor, e.g., hours, rather than output could introduce bias in a number of ways. The most serious source of bias is probably cyclical variations in labor productivity. Labor input varies less in the short run than does output and as a consequence labor-based measures of capacity utilization vary less than output-based measures.

Evidence of the importance of the use of labor to calculate capacity utilization comes from the Census survey. The Census questionnaire includes a series of questions relating to labor

Table 3.—Labor Utilization and Capacity Utilization, 1975 and 1976

	[Percent]						Change in capacity utilization less change in labor utilization
	Labor utilization ¹			Capacity utilization			
	1975	1976	Change	1975	1976	Change	
Group 1: Industries probably relying least on labor to measure utilization...	82.9	84.3	1.4	76.2	79.1	2.9	1.5
Group 2: Industries probably relying most on labor to measure utilization...	67.4	69.0	1.6	68.1	68.8	.7	-.9
Group 3: All other industries.....	79.4	79.5	.1	77.7	77.2	-.5	-.6

NOTE.—For criteria for grouping industries, see text. Group 1: SIC codes 20, 261-3, 281-2, 29, 301, 324, 331-3. Proportion of total is 0.215 (based on 1975 employment). Group 2: SIC codes 25, 334-9, 34, 35, 36, 372, 38. Proportion of total is 0.388. Group 3: SIC codes 21, 22, 23, 24, 264-9, 27, 283-9, 302-9, 31, 32 excluding 321 and 324, 371, 373-9, 39. Proportion of total is 0.397.

1. For derivation of the labor utilization measure, see text.

utilization (see question 1, lines 3-6 in the appendix), and also separate questions relating to capacity utilization however the establishment chooses to define it (question 2). For establishments that answer both questions, it is possible to compare the changes over time in reported labor utilization and in reported capacity utilization. The general hypothesis to be investigated is that, in periods when labor productivity is rising cyclically, reported capacity utilization will rise relative to reported labor utilization for those establishments that do not rely on labor to measure capacity utilization, but that it will not rise (or rise less) for establishments that do. Correspondingly, in periods when labor productivity is falling cyclically, reported capacity utilization will fall relative to labor utilization for establishments that do not rely on labor to measure capacity utilization, but less so for establishments that do.

The period from the end of 1975 to the end of 1976 provides an appropriate test—it was a period of strong cyclical recovery in output, and one in which labor productivity appears to have increased at an above-trend rate for manufacturing as a whole. The reported Census utilization rate for all manufacturing, however, did not increase at all.

To investigate the hypothesis, it is first necessary to separate the establishments responding to the Census questionnaire into those that relied heavily on a labor measure of capacity utilization and those that did not. There is no direct way of making this separation; but there are two ways of deriving indirect indicators that give a reason-

ably accurate separation. The first is an examination, for those establishments that answer the labor utilization questions, of the differences between the level of labor utilization and the level of capacity utilization. In those industries for which the two differ substantially—four percentage points or more in 1975 was chosen to define “substantially”—it seems reasonable to infer that labor utilization was not used as a proxy for capacity utilization. The second indicator can be obtained by reference to a Census question relating to the quantity of production measured by units (question 1, line 8 in the appendix), and is the proportion of establishments responding to this question. The proportion varied enormously by industry, from 20 percent or less in some of the machinery groups to 80 percent or more in petroleum refining and organic chemicals. A reasonable inference is that the use of labor as a measure of utilization was much more widespread among establishments that did not respond to the quantity question than among establishments that did.

Based on these two indicators, the Census tabulation was divided into three industry groups. The first group consisted of those industries for which (a) the level of labor utilization and reported capacity utilization differed by 4 percentage points or more (in either direction) 1975, and (b) more than 60 percent of the establishments responded to the quantity question. Paper, basic chemicals, petroleum, primary metals, and a few other industries were in this group. The second group, at the other extreme, consisted of those industries for which (a) the level of labor utilization and reported capacity

utilization in 1975 differed by 2 percentage points or less, and (b) less than 40 percent of establishments, responded to the quantity question. Fabricated metals, machinery, aircraft, furniture, and a few other industries were in this group. The third, or middle, group consisted of all other industries.¹¹ Textiles and apparel, lumber, printing, motor vehicles, and a number of others were in this group. Table 3 shows labor utilization and reported capacity utilization for the three groups of industries.

The key findings shown by the table are: For the first group, both labor utilization and reported capacity utilization increased, the latter more than the former, for a difference of 1.5 percentage points; for the second group, both increased, the former more than the latter, for a difference of -0.9 percentage points; for the third group, the former increased and the latter decreased, for an intermediate difference of -0.6 percentage points.

The results of the tabulation support the notion that establishments that rely heavily on labor to measure capacity utilization understated the rise in utilization during 1976. If it is assumed that those in Group 1 give a true picture of the increase in capacity utilization relative to labor utilization and that deviation from this group's performance is a measure of bias in the other two groups, then the aggregate downward bias in the Census utilization introduced by reliance on labor to calculate capacity utilization is -1.8 percentage points for all manufacturing.¹² This is about one half of the difference between the 1975-76 change in the Census estimate of manufacturing capacity utilization and the change in either of the production-based estimates of the Federal Reserve and Wharton.

The assumptions underlying the calculation of the downward bias are highly uncertain. The fact that the classification of industries into three groups is itself uncertain, with some

11. The group consisted of industries that met one criterion but not the other for either group 1 or group 2 (or both), and of industries that met neither criterion for either group.

12. This estimate is equal to the difference between group 2 and group 1 (last column of table 3) multiplied by the group 2 proportion of the total (-2.4 times 0.388) plus the difference between group 3 and group 1 multiplied by the group 3 proportion of the total (-2.1 times 0.397).

establishments in the first group probably relying on hours and some in the second group relying on quantity of production, would cause the aggregate estimate to understate the true bias. On the other hand, the fact that productivity varies from one industry to another for all kinds of reasons having nothing to do with the way capacity utilization is measured, means that some of the reported differences between reported capacity utilization and labor utilization could well reflect industry-specific developments, and might cause the aggregate estimate to overstate the true bias. Another complication is possible interaction between the use of labor to calculate capacity utilization and the reporting of no change. All of these factors could distort the quantitative measure of bias, although it is hard to say whether, on balance, they lead to an understatement or an overstatement.

Adjustment of the BEA measure

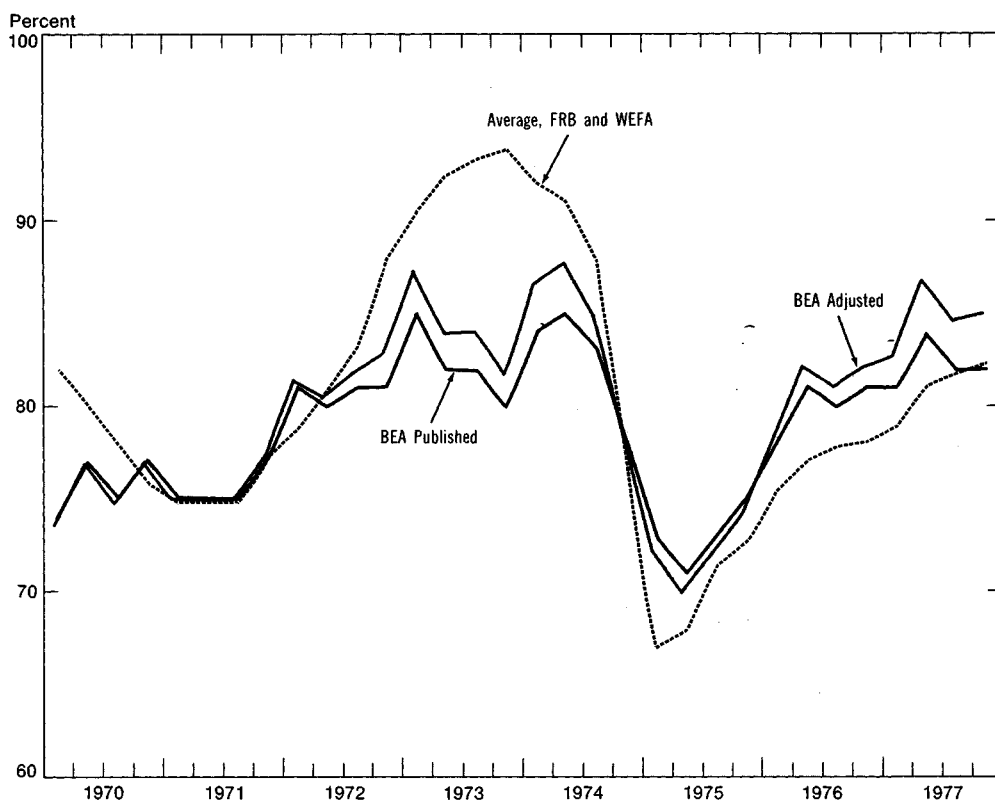
This section reports on two experimental adjustments to the BEA measure of capacity utilization. One adjustment deals with the bias due to the overreporting of no change; the other, with the bias due to the use of labor to measure capacity utilization. Utilization measures before and after the adjustments are compared with the Federal Reserve and Wharton measures. The comparisons suggest that the two biases together may account for most of the difference in cyclical variability between the BEA measure and production-based measures of utilization.

The first adjustment eliminates from BEA tabulations for 1970-77 those firms that report the same utilization rate in the current quarter as in the two previous quarters. From quarter to quarter the firms that fall into this category are not the same, although a small number falls into the category most of the time. In electrical machinery, the proportion of firms eliminated in a single quarter (weighted by asset size) varies from 8 to 42 percent; in nonelectrical machinery, from 8 to 58 percent; and in paper, from 5 to 33 percent.

Clearly, this adjustment reduces the the influence of no-change reports on the utilization rate; but it is hard to

CHART 13

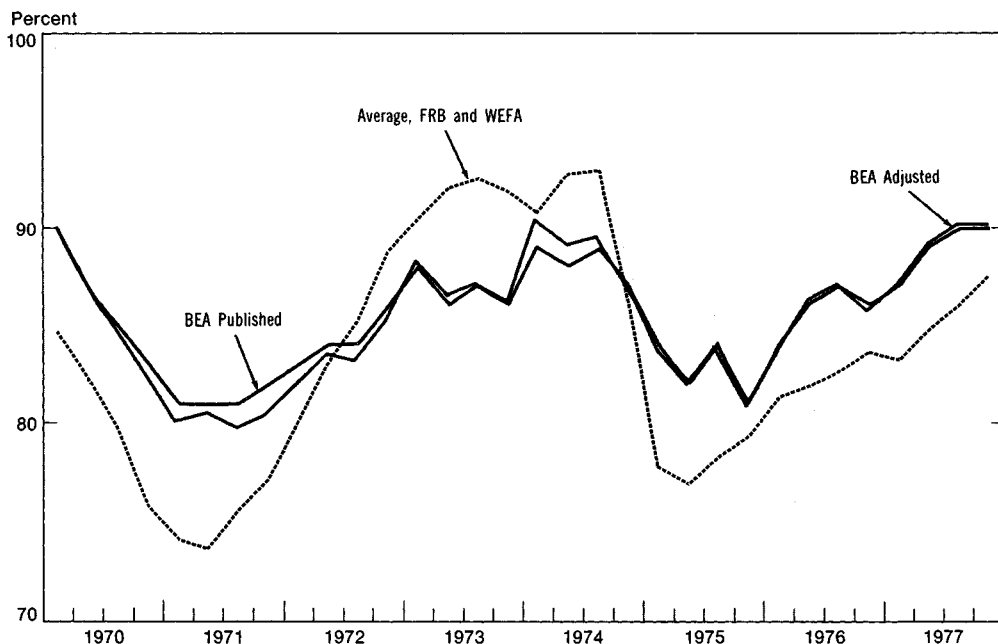
Capacity Utilization, Electrical Machinery



Note: BEA adjusted for overreporting of no change. Data: BEA, FRB, and Wharton. U.S. Department of Commerce, Bureau of Economic Analysis. 79-5-13

CHART 14

Capacity Utilization, Nonelectrical Machinery



Note: BEA adjusted for overreporting of no change. Data: BEA, FRB, and Wharton. U.S. Department of Commerce, Bureau of Economic Analysis. 79-5-14

know whether it over- or under-corrects. On one hand, firms that correctly report that they have operated at the same utilization rate for three quarters in a row are excluded from the adjusted utilization rate. On the other hand, firms that incorrectly report no change from the second to the third quarter but correctly report change from the first to the second are included in the adjusted rate.

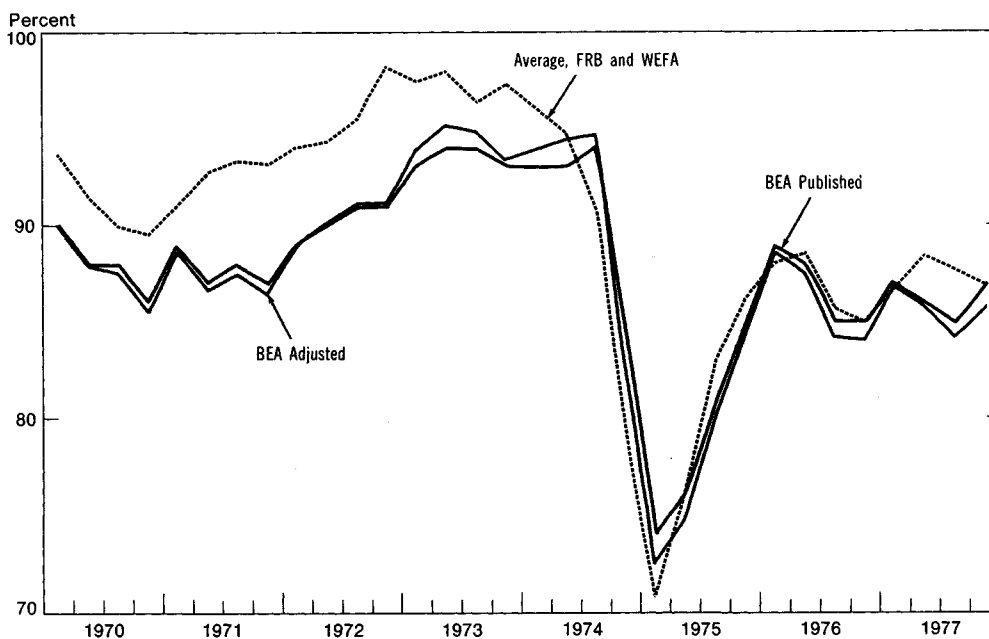
The effect of this adjustment is to increase somewhat the variability of the capacity utilization rate. Even after adjustment, however, these survey-based utilization rates are less variable than the production-based rates of the Federal Reserve and Wharton (charts 13 through 15). According to an estimate of cyclical variability based on regression analysis, in electrical machinery the published BEA measure shows only 53 percent as much cyclical variation as an average of the two production-based measures.¹³ In contrast, the adjusted BEA measure shows 69 percent as much. In nonelectrical machinery the corresponding measures are 49 to 57 percent. In paper, they are 74 and 85 percent. Thus, the adjustment raises the measure of relative cyclical variability by 16, 8, and 10 percentage points in the three industries.

The second adjustment adds to the BEA utilization rate a proportion of the estimated cyclical change in output per hour. Because quarterly output per hour figures are not available in industry detail, the adjustment is made to total manufacturing. The adjusted measure was derived by (a) starting with quarterly percent changes in output per hour in manufacturing, as calculated by the Bureau of Labor Statistics, (b) subtracting from these changes 0.64 percentage points, the quarterly rate of productivity growth from 1969 through 1978, (c) smoothing the resulting estimates of cyclical change in productivity by means of a

13. The estimate of relative cyclical variability is based on regression analysis of utilization rates. A regression of BEA utilization rates on an average of the two production-based rates yields a regression coefficient that is downward biased as an estimate of relative cyclical variability because any uncorrelated irregular movements in the two variables lowers the coefficient. The reverse regression, with an average of the two production-based rates as the dependent variable and the BEA estimates as independent, yields a regression coefficient whose reciprocal is upward biased. The estimate presented in the text is a geometric mean of the two estimates.

CHART 15

Capacity Utilization, Paper

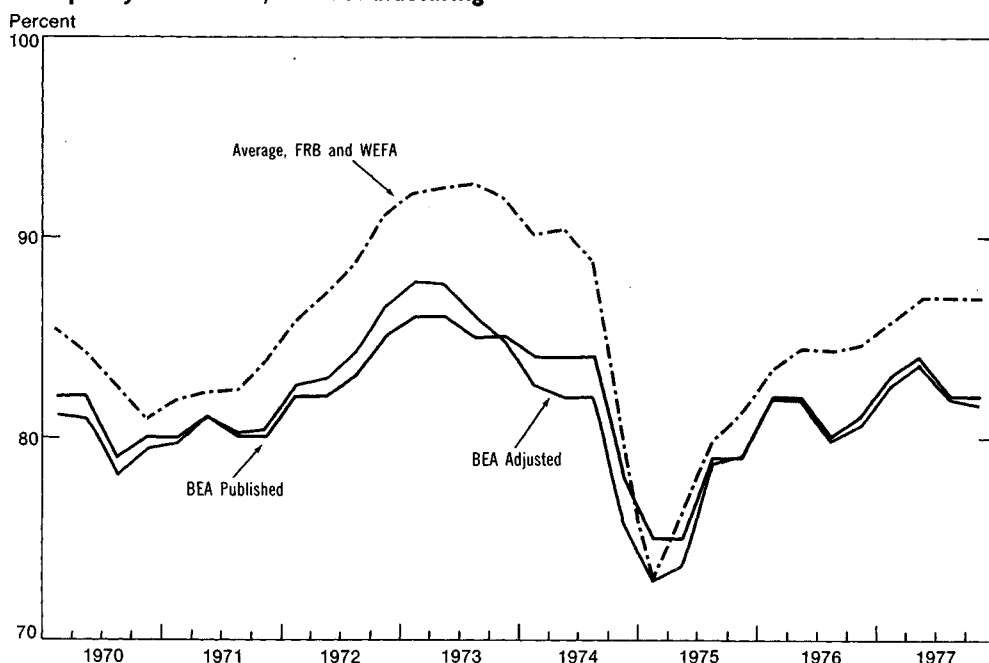


Note: BEA adjusted for overreporting of no change. Data: BEA, FRB, and Wharton. U.S. Department of Commerce, Bureau of Economic Analysis. 79-5-15

three-quarter centered moving average (to eliminate highly irregular quarterly fluctuations), and (d) adding one half of the resulting estimate to quarterly changes in the BEA utilization rate for all manufacturing. The adjusted BEA measure, together with the published BEA measure and two production-based measures are shown in chart 16.

CHART 16

Capacity Utilization, All Manufacturing



Note: BEA adjusted for use of labor to measure capacity utilization. Data: BEA, FRB, and Wharton. U.S. Department of Commerce, Bureau of Economic Analysis. 79-5-16

Once again, it is hard to know whether the adjustment over- or under-corrects for the partial omission of short-term movements in productivity due to the use of labor in the calculation of survey-based measures of utilization. The evidence shows that industries accounting for 39 percent of manufacturing employment probably relied heavily on labor to measure utilization and showed strong evidence of bias due to the neglect of productivity change, and that industries accounting for another 40 percent of manufacturing employment probably relied somewhat on labor to measure utilization and showed some evidence of bias. It is not possible to deduce from these findings whether adding one half of productivity change is too much or too little.

The result of this adjustment, like the previous one, is to increase the cyclical variation shown by the BEA measure. Before adjustment, the BEA utilization rates for all manufacturing display 58 percent as much cyclical variation as the average of the two production-based measures.¹⁴ After adjustment, the BEA estimates show 72 percent as much variation, an increase of 14 percentage points.

Although there are arbitrary elements in both of these adjustments, it is nevertheless of interest to ask to what extent the two corrections taken together eliminate the difference in cyclical variability between the BEA and production-based measures. The adjustment for overreporting of no change raised the estimate of cyclical variability by 8 to 16 percentage points in the three industries to which it was applied. The adjustment for use of labor to measure capacity utilization raised the estimate of cyclical variability for all manufacturing by 14 percentage points. If no-change bias in the three industries is representative of manufacturing generally, and if interaction of the two sources of bias is minor, the two adjustments together increase cyclical variability by 22 to 30 percentage points. Because it would take an increase of 38 percentage points to elim-

14. The estimate of cyclical variability is described in the preceding footnote.

Appendix

DUE DATE: WITHIN 30 DAYS AFTER RECEIPT

Form Approved: O.M.B. No. 41-R2806

<p>FORM MQ-C1 (11-29-77)</p> <p>U.S. DEPARTMENT OF COMMERCE BUREAU OF THE CENSUS</p> <p style="text-align: center;">SURVEY OF PLANT CAPACITY</p> <p style="text-align: center;">FOURTH QUARTER 1977</p> <p>RETURN TO Bureau of the Census 1201 East Tenth Street Jeffersonville, Indiana 47132</p> <p><i>Please READ carefully the specific instructions with each item on the reverse side before filling this report.</i></p>	<p>NOTICE - Response to this inquiry is required by law (title 13, U.S. Code). By the same law, your report to the Census Bureau is confidential. It may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.</p> <p>In correspondence pertaining to this report, refer to the file number above your name.</p>
<p>YOUR FILE COPY</p> <p><i>(Please correct any error in name and address including ZIP code)</i></p>	

GENERAL INSTRUCTIONS

Fourth Quarter 1977 (October-December) - Please complete the information requested for the establishment described in the address box of this form. If your company operates more than one manufacturing location, you are requested to report only for those specifically selected for this survey.

This report will be used to compile estimates of capacity by industry and for manufacturing as a whole in order to evaluate the actual performance of manufacturing in the months ahead. The information is of great value not only to the Bureau of the Census, but also to the Federal Reserve Board, Council of Economic Advisers, and other parts of the Government responsible for tracking the performance of the economy. It is recognized that many companies do not have records readily at hand to compile a precise measure of capacity. It is also recognized that estimated capacity may vary considerably with the product mix which may be subject to substantial short run variation in many establishments. However, past surveys conducted by the Bureau of the Census and discussions with many firms indicate that most firms can overcome these obstacles and estimate the capabilities of the plants reasonably accurately in terms of man-hours or another item such as output or materials put through.

We urge you to make a reasonable effort to complete the various sections of the report form. If you feel that you cannot complete the **item 1 data for production or materials**, a man-hour estimate of preferred rate and practical capacity is acceptable.

Please use the remarks section to make comments about the method you used to obtain your estimate of capacity. Such comments will enhance the usefulness of the resulting data or will reduce questions we may have about your report.

Shifts Per Day - Most shifts are assumed to be of 8 hours duration so that a 3-shift operation is usually maximum. If you are operating with a variation that leads to more than three shifts or to fractional shifts, please use the remarks to explain briefly your operations.

Days Per Week and Hours Per Day - Refer to the duration the plant is open and operating, not to the man-hours put in by your work force.

Number of Production Workers and Total Man-hours - Should be the same as reported for this establishment on your 1977 Annual Survey of Manufactures Form MA-100 (Items 2 and 4).

Preferred Level of Operations - This is ordinarily an intermediate level of operations between actual operations and practical capacity which you would prefer not to exceed because of costs or other considerations (although in some instances it may be possible to prefer a higher level of operations than practical capacity would permit). If no such level exists as far as the plant operation is concerned, please enter "same as practical capacity" in item 1, column c.

Practical Capacity - This is the greatest level of output this plant can achieve within the framework of a realistic work pattern. In estimating practical capacity, please take into account the following considerations:

1. Assume a normal product mix. If the plant is subject to considerable short run variation in product mix you may assume that the current pattern of production is normal unless it is unusually different because of a unique situation in the 4th quarter 1977.
2. In setting capacity in terms of the number of shifts and hours of plant operation assume an expansion of operations that can be reasonably attained in your industry and your locality.
3. Consider only the machinery and equipment in place and ready to operate. Do not consider facilities which have been inoperative for a long period of time and, therefore, require extensive reconditioning before they can be made operative.
4. Take into account the additional downtime for maintenance, repair, or clean-up which would be required as you move from current operations to full capacity.
5. Assume availability of labor, materials, utilities, etc., sufficient to utilize the machinery and equipment that was in place at the end of the quarter.
6. Do not consider overtime pay, added costs for materials, or other costs to be limiting factors in setting capacity.
7. Although it may be possible to expand plant output by using productive facilities outside of the plant, such as by contracting out subassembly work, do not assume the use of such outside facilities in more than the proportion that has been normal in your current level of operations.

Appendix —Continued

1. ACTUAL, PREFERRED, AND PRACTICAL LEVELS OF OPERATIONS FOR FOURTH QUARTER 1977 (OCT.—DEC.)
 In reporting shifts, days, and hours of operations you may use the most typical pattern during the period.
 Lines 1 through 7 — Please make every effort to report information requested in columns (b), (c), and (d).

Line No.	Item (a)	4th Quarter 1977		
		Actual operations (b)	Preferred level of operations (c)	Practical capacity (d)
1	Shifts per day (Number)	1011	1012	1013
2	Days per week in operation (Number)	1021	1022	1023
3	Hours per day in operation (Number)	1031	1032	1033
4	Number of production workers as of November 12	1041	1042	1043
5	Total man-hours worked during the quarter by production workers (Thousands)	1051	1052	1053
6	Percent of overtime hours included in line 5	1061 %	1062 %	1063 %
7	Value of production (\$1,000)	1071	1072 \$	1073 \$
If possible, please report for lines 8 and 9 below. Use reasonable estimates for the item(s) most suitable for your establishments.				
8	Quantity of production — Specify units	1081	1082	1083
9	Quantity of materials consumed — Specify units	1091	1092	1093

2. OPERATING RATES DURING THE FOURTH QUARTER 1977

Line No.	Item	Percent	
		2011	2012
1	At what percentage of practical capacity did this plant actually operate during the fourth quarter 1977?		%
2	At what percentage of practical capacity would you have preferred this plant to operate during the fourth quarter 1977?		%

3. REASONS FOR OPERATING AT LESS THAN 100% OF PRACTICAL CAPACITY AND LENGTH OF TIME REQUIRED TO REACH AND MAINTAIN PRACTICAL CAPACITY — If during the 4th quarter 1977 this establishment operated at less than 100% of your practical capacity, please report 3a, 3b, and 3c.

a. Principal reason your operations fell short of practical capacity. Enter the number 1 through 6 for each applicable item to indicate the ranking of the reason in importance. Number only those reasons which pertain to your operations.

3011 <input type="checkbox"/> Insufficient orders	3014 <input type="checkbox"/> Lack of materials or supplies
3012 <input type="checkbox"/> Inadequate labor force (total or specific skills)	3015 <input type="checkbox"/> Strike or other work stoppages, etc.
3013 <input type="checkbox"/> Lack of sufficient fuel or electric energy	3016 <input type="checkbox"/> Other (fire, flood, etc.) — Specify _____

b. Length of time it would require to expand actual operations to practical capacity providing there was sufficient demand for the output. Mark (X) one.

3021 <input type="checkbox"/> 1 week or less	3024 <input type="checkbox"/> 4–6 months
3022 <input type="checkbox"/> 2 weeks to a month	3025 <input type="checkbox"/> More than 6 months — Specify _____
3023 <input type="checkbox"/> 2–3 months	3026 <input type="checkbox"/> Impractical to expand to practical capacity. Specify estimated percent of practical capacity that could be reached within 6 months %

c. Length of time practical level of operation could be sustained (or level specified in 3026 above)

3031 <input type="checkbox"/> Indefinitely	3032 <input type="checkbox"/> Only _____ months (Number)
--	--

inate all of the difference in cyclical variability between the BEA and production-based measures for manufacturing, the two adjustments together eliminate 58 to 79 percent of the difference in cyclical variability.

The apparent precision of these calculations should not mask the fact that the adjustments reported in this section are exploratory; they are not the only possible adjustments. Further experimentation may well uncover superior methods of adjustment. What the reported adjustments indicate is that overreporting of no change and use of labor to calculate capacity utilization can account for a substantial fraction of the difference in cyclical variability between survey-based and production-based measures of capacity utilization. Attempts to adjust for these sources of bias can therefore make survey-based measures of utilization more useful.

Cont. from page 44

private households on whom employers pay Social Security taxes.

In light of the above evidence, it seems clear that differences in the coverage of uncounted migrants in the household and payroll surveys may be an important factor affecting DIFF.¹⁰⁹ It is tempting to speculate that an increase in illegal alien employment after 1964 accounted in part for the record increase of 2.2 million in DIFF from 1964 to 1969, but the data on uncounted migration are too fragmentary to confirm this hypothesis, and I cannot exclude the possibility that other factors explain the increase in DIFF. Whatever other factors contributed to the increase in DIFF in 1964–69 may also contribute to the cyclical behavior of DIFF that is examined in this article.

109. Although changes in illegal alien employment probably change DIFF, DIFF is not an indicator of change in illegal alien employment, because DIFF is affected also by other factors. In an earlier article, I speculated that the failure of DIFF to increase since 1970 casts doubt on “the widespread impression that illegal alien employment has grown rapidly since 1970” (“Coverage Issues Raised by Comparisons Between CPS and Establishment Employment,” *Proceedings of the Social Statistics Section, 1977*, American Statistical Association, p. 67). However, it is quite possible that offsetting factors—such as uncounted emigration, or an overall increase in UI tax evasion, or some unknown factor—have masked growth in illegal alien employment.

Manufacturing and Trade Inventories and Sales in Constant Dollars, 1978:I-1979:I

Quarterly estimates of inventories, sales, and inventory-sales ratios for manufacturing and trade, in constant dollars, for 1978:I-1979:I, are shown in tables 1-4. Estimates for 1974:IV-1977:IV appear in the August 1978 issue of the SURVEY OF CURRENT BUSINESS. The estimates are consistent with those presented in the July 1978 SURVEY.

Table 1.—Manufacturing and Trade Inventories in Constant Dollars, Seasonally Adjusted, End of Quarter

Table 2.—Manufacturing and Trade Sales in Constant Dollars, Seasonally Adjusted Quarterly Totals at Monthly Rates

	[Billions of 1972 dollars]					[Billions of 1972 dollars]				
	1978				1979	1978				1979
	I	II	III	IV *	I	I	II	III	IV *	I
Manufacturing and trade	237.3	240.3	242.3	244.2	246.9	150.6	155.9	156.5	160.4	159.9
Manufacturing	129.9	131.5	132.9	133.2	135.2	72.6	74.9	75.0	76.9	78.1
Durable goods	84.9	86.1	87.2	87.6	89.7	39.6	41.0	41.2	42.8	43.7
Primary metals.....	13.2	13.2	13.4	13.4	12.9	5.1	5.3	5.4	5.7	5.8
Fabricated metal products.....	10.7	10.9	10.9	11.0	11.3	4.5	4.7	4.6	4.8	5.0
Machinery, except electrical.....	18.9	19.4	19.8	20.3	20.7	6.9	7.3	7.5	7.8	8.0
Electrical machinery.....	12.2	12.4	12.6	12.5	12.9	5.7	5.7	5.8	5.9	6.2
Motor vehicles and parts.....	5.7	5.6	5.9	5.3	6.0	6.6	6.9	6.7	7.2	7.3
Other transportation equipment.....	9.8	10.0	10.1	10.6	10.8	3.0	3.1	3.2	3.1	3.4
Other durable goods ¹	14.4	14.4	14.6	14.6	15.2	7.8	8.1	7.9	8.1	8.0
Nondurable goods	45.0	45.4	45.7	45.6	45.5	33.0	33.9	33.8	34.1	34.4
Food and kindred products.....	12.9	13.0	13.2	13.1	13.1	10.5	10.6	10.7	10.8	10.6
Nonfood.....	32.1	32.4	32.6	32.5	32.4	22.5	23.3	23.1	23.3	23.8
Paper and allied products.....	3.8	3.9	3.9	3.8	3.8	2.8	2.8	2.8	2.8	2.9
Chemicals and allied products.....	8.3	8.4	8.6	8.6	8.6	6.0	6.1	5.9	6.2	6.5
Petroleum and coal products.....	3.3	3.3	3.3	3.3	3.1	2.9	3.1	3.2	3.1	3.1
Rubber and plastic products.....	2.9	2.9	2.9	2.9	3.0	2.0	2.0	2.0	2.0	2.2
Other nondurable goods ²	13.8	13.9	13.9	13.9	14.0	8.9	9.3	9.2	9.1	9.1
Merchant wholesalers	46.3	47.1	47.2	48.4	49.6	34.3	36.3	36.6	37.3	36.5
Durable goods.....	30.3	31.0	31.4	32.2	32.5	16.4	17.3	17.7	18.1	17.9
Nondurable goods.....	16.0	16.1	15.8	16.2	17.1	17.8	18.9	18.9	19.2	18.6
Groceries and farm products.....	5.7	5.7	5.4	5.4	5.5	9.5	10.0	10.0	10.2	9.6
Other nondurable goods.....	10.2	10.4	10.5	10.8	11.6	8.3	8.9	8.9	9.0	9.0
Retail trade	61.1	61.7	62.2	62.6	62.1	43.7	44.7	45.0	46.2	45.4
Durable goods.....	27.6	27.3	27.0	27.6	27.9	15.0	15.8	15.9	16.7	16.5
Automotive dealers.....	14.3	14.0	13.8	14.7	14.9	8.8	9.2	9.1	9.5	9.6
Other durable goods.....	13.4	13.3	13.3	12.9	13.0	6.2	6.5	6.8	7.2	6.9
Nondurable goods.....	33.5	34.4	35.2	35.0	34.3	28.7	28.9	29.0	29.5	28.9
Food stores.....	6.3	6.4	6.5	6.4	6.4	9.2	9.0	9.0	9.0	8.9
Other nondurable goods.....	27.1	28.0	28.7	28.6	27.8	19.6	20.0	20.1	20.4	20.0

Table 3.—Constant-Dollar Inventory-Sales Ratios for Manufacturing and Trade, Seasonally Adjusted

Table 4.—Fixed-Weighted Constant-Dollar Inventory-Sales Ratios for Manufacturing and Trade, Seasonally Adjusted

	[Ratio, based on 1972 dollars]					[Ratio, based on 1972 dollars]				
	1978				1979	1978				1979
	I	II	III	IV *	I	I	II	III	IV *	I
Manufacturing and trade	1.58	1.54	1.55	1.52	1.54	1.56	1.52	1.52	1.49	1.51
Manufacturing	1.79	1.76	1.77	1.73	1.73	1.79	1.76	1.76	1.72	1.71
Durable goods	2.15	2.10	2.12	2.05	2.05	2.15	2.11	2.11	2.05	2.04
Primary metals.....	2.58	2.50	2.46	2.32	2.23	.....	.....	.....	.....	.....
Fabricated metal products.....	2.39	2.33	2.38	2.29	2.24	.....	.....	.....	.....	.....
Machinery, except electrical.....	2.72	2.66	2.64	2.59	2.60	.....	.....	.....	.....	.....
Electrical machinery.....	2.15	2.17	2.16	2.10	2.09	.....	.....	.....	.....	.....
Motor vehicles and parts.....	.87	.82	.88	.74	.81	.....	.....	.....	.....	.....
Other transportation equipment.....	3.29	3.28	3.20	3.37	3.16	.....	.....	.....	.....	.....
Other durable goods ¹	1.85	1.79	1.84	1.80	1.89	.....	.....	.....	.....	.....
Nondurable goods	1.36	1.34	1.35	1.33	1.33	1.37	1.35	1.36	1.32	1.32
Food and kindred products.....	1.23	1.22	1.23	1.21	1.24	.....	.....	.....	.....	.....
Nonfood.....	1.42	1.39	1.41	1.39	1.36	.....	.....	.....	.....	.....
Paper and allied products.....	1.37	1.37	1.37	1.36	1.33	.....	.....	.....	.....	.....
Chemicals and allied products.....	1.38	1.37	1.46	1.39	1.32	.....	.....	.....	.....	.....
Petroleum and coal products.....	1.14	1.07	1.04	1.04	.99	.....	.....	.....	.....	.....
Rubber and plastic products.....	1.48	1.48	1.44	1.44	1.36	.....	.....	.....	.....	.....
Other nondurable goods ²	1.55	1.50	1.51	1.52	1.53	.....	.....	.....	.....	.....
Merchant wholesalers	1.35	1.30	1.29	1.30	1.36	1.36	1.29	1.29	1.29	1.34
Durable goods.....	1.84	1.79	1.78	1.78	1.82	1.88	1.81	1.81	1.80	1.84
Nondurable goods.....	.89	.85	.84	.85	.92	.93	.86	.85	.86	.93
Groceries and farm products.....	.60	.57	.54	.53	.57	.....	.....	.....	.....	.....
Other nondurable goods.....	1.23	1.17	1.17	1.20	1.29	.....	.....	.....	.....	.....
Retail trade	1.40	1.38	1.38	1.36	1.37	1.35	1.32	1.31	1.28	1.30
Durable goods.....	1.85	1.73	1.70	1.65	1.69	1.84	1.72	1.68	1.64	1.67
Automotive dealers.....	1.62	1.52	1.51	1.54	1.55	.....	.....	.....	.....	.....
Other durable goods.....	2.17	2.03	1.94	1.80	1.89	.....	.....	.....	.....	.....
Nondurable goods.....	1.17	1.19	1.21	1.19	1.19	1.11	1.11	1.13	1.10	1.11
Food stores.....	.69	.71	.72	.71	.72	.....	.....	.....	.....	.....
Other nondurable goods.....	1.39	1.40	1.43	1.40	1.40	.....	.....	.....	.....	.....

* Revised.
 1. Includes stone, clay and glass products; instruments and related products; and other durable goods.
 2. Includes tobacco manufacturers; textile mill products; apparel products; printing and publishing; and leather and leather products.

NOTE.—Tables 1, 2, and 3: Manufacturing inventories are classified according to the type of

product produced by the establishment holding inventories; constant dollar inventories in table 16 of the national income and product tables include, in addition to the industries shown here, nonmerchant wholesalers, other nonfarm industries, and farms.

Table 4: The weighted I-S ratios shown in this table were obtained by weighting detailed industry I-S ratios with 1972 sales. Additional industrial detail was used than is shown in table 2. For manufacturing, I-S ratios for 21 industries were weighted by sales; for merchant wholesalers, 20 categories of business, and for retail trade, 8.

Table with columns for years 1977, 1978, 1979 and months Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr. Includes a note: 'Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS'

DOMESTIC TRADE—Continued

Main data table under 'RETAIL TRADE' with columns for categories like 'All retail stores', 'Durable goods stores', 'Automotive dealers', 'Furniture, home furn., and equip.', 'Nondurable goods stores', 'Food stores', 'Apparel and accessory stores', 'Eating and drinking places', 'Drug and proprietary stores', 'Liquor stores', 'Mail-order houses' and corresponding sales figures for 1977, 1978, and 1979.

Revised. 1 Advance estimate. § Effective Mar. 1979 SURVEY, estimates have been revised to reflect a new sample design, benchmarking to the 1967 and 1972 Censuses, redefinition of sales to exclude sales taxes and finance charges, classifications based on the 1972 Standard Industrial Classification (SIC), and revision and updating of seasonal adjustment factors.

Revisions for retail sales (Jan. 1967-Dec. 1977) and for retail inventories (Jan. 1973-Dec. 1977), as well as a summary of the changes, are available from the Census Bureau, Washington, D. C. 20233. § Includes data not shown separately. ¶ Includes sale of mail-order catalog desks within department stores of mail-order firms.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS

Table with columns for years 1977, 1978, 1979 and months Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr.

LABOR FORCE, EMPLOYMENT, AND EARNINGS—Continued

Main data table with multiple sections: AVERAGE HOURS PER WEEK, AGGREGATE EMPLOYEE-HOURS, and HOURLY AND WEEKLY EARNINGS.

Revised. Preliminary. Production and nonsupervisory workers. See corresponding note, p. S-14.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS

	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

LABOR FORCE, EMPLOYMENT, AND EARNINGS—Continued

HOURLY AND WEEKLY EARNINGS—Con.																
Avg. hourly earnings per worker, private nonagric. payrolls. Not seas. adj. †—Continued																
Manufacturing—Continued																
Nondurable goods.....dollars.....																
Excluding overtime.....do.....																
Food and kindred products.....do.....																
Tobacco manufactures.....do.....																
Textile mill products.....do.....																
Apparel and other textile products.....do.....																
Paper and allied products.....do.....																
Printing and publishing.....do.....																
Chemicals and allied products.....do.....																
Petroleum and coal products.....do.....																
Rubber and plastics products, nec.....do.....																
Leather and leather products.....do.....																
Transportation, comm., elec., gas.....do.....																
Wholesale and retail trade.....do.....																
Wholesale trade.....do.....																
Retail trade.....do.....																
Finance, insurance, and real estate.....do.....																
Services.....do.....																
Seasonally adjusted:†																
Private nonagricultural payrolls.....do.....																
Mining.....do.....																
Contract construction.....do.....																
Manufacturing.....do.....																
Transportation, comm., elec., gas.....do.....																
Wholesale and retail trade.....do.....																
Finance, insurance, and real estate.....do.....																
Services.....do.....																
Indexes of avg. hourly earnings, seas. adj.: ††																
Private nonfarm economy:																
Current dollars.....1967=100.....																
1967 dollars.....do.....																
Mining.....do.....																
Contract construction.....do.....																
Manufacturing.....do.....																
Transportation, comm., elec., gas.....do.....																
Wholesale and retail trade.....do.....																
Finance, insurance, and real estate.....do.....																
Services.....do.....																
Hourly wages, not seasonally adjusted:																
Construction wages, 20 cities (ENR): ♂																
Common labor.....\$ per hr.....																
Skilled labor.....do.....																
Farm (U.S.) wage rates, hired workers, by method of pay:																
All workers, including piece-rate.....\$ per hr.....																
All workers, other than piece-rate.....do.....																
Workers receiving cash wages only.....do.....																
Workers paid per hour, cash wages only.....do.....																
Railroad wages (average, class I).....do.....																
Avg. weekly earnings per worker, †private nonfarm:†																
Current dollars, seasonally adjusted.....																
1967 dollars, seasonally adjusted.....																
Spendable earnings (worker with 3 dependents):																
Current dollars, seasonally adjusted.....																
1967 dollars, seasonally adjusted.....																
Current dollars, not seasonally adjusted:																
Private nonfarm, total.....dollars.....																
Mining.....do.....																
Contract construction.....do.....																
Manufacturing.....do.....																
Durable goods.....do.....																
Nondurable goods.....do.....																
Transportation, comm., elec., gas.....do.....																
Wholesale and retail trade.....do.....																
Wholesale trade.....do.....																
Retail trade.....do.....																
Finance, insurance, and real estate.....do.....																
Services.....do.....																
HELP-WANTED ADVERTISING																
Seasonally adjusted index.....1967=100.....																
LABOR TURNOVER																
Manufacturing establishments:																
Unadjusted for seasonal variation:																
Accession rate, total.....mo. rate per 100 employees.....																
New hires.....do.....																
Separation rate, total.....do.....																
Quit.....do.....																
Layoff.....do.....																
Seasonally adjusted:																
Accession rate, total.....do.....																
New hires.....do.....																
Separation rate, total.....do.....																
Quit.....do.....																
Layoff.....do.....																
WORK STOPPAGES ○																
Industrial disputes:																
Number of stoppages:																
Beginning in month or year.....number.....																
In effect during month.....do.....																
Workers involved in stoppages:																
Beginning in month or year.....thous.....																
In effect during month.....do.....																
Days idle during month or year.....do.....																

* Revised. † Preliminary. ‡ Production and nonsupervisory workers. Δ Earnings in 1967 dollars reflect changes in purchasing power since 1967 by dividing by Consumer Price Index; effective Feb. 1977 SURVEY, data reflect new seas. factors for the CPI. † See corresponding note on p. S-14. ♂ Wages as of May 1, 1979: Common, \$10.43 skilled, \$13.90. ○ Revisions for 1975 are in the July 1976 SURVEY.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

FINANCE—Continued

SECURITY MARKETS—Continued																
Bonds																
Prices:																
Standard & Poor's Corporation:																
High grade corporate:																
Composite ¹ dol. per \$100 bond.....																
Domestic municipal (15 bonds)..... do.....																
U.S. Treasury bonds, taxable ¹ do.....																
Sales:																
Total, excl. U.S. Government bonds (SEC):																
All registered exchanges:																
Market value..... mil. \$..... (1)																
Face value..... do.....																
New York Stock Exchange:																
Market value..... do.....																
Face value..... do.....																
New York Stock Exchange, exclusive of some stopped sales, face value, total..... mil. \$.....																
Yields:																
Domestic corporate (Moody's) ² percent.....																
By rating:																
Aaa..... do.....																
Aa..... do.....																
A..... do.....																
Baa..... do.....																
By group:																
Industrials..... do.....																
Public utilities..... do.....																
Railroads..... do.....																
Domestic municipal:																
Bond Buyer (20 bonds)..... do.....																
Standard & Poor's Corp. (15 bonds)..... do.....																
U.S. Treasury bonds, taxable ³ do.....																
Stocks																
Dividend rates, prices, yields, and earnings, common stocks (Moody's):																
Dividends per share, annual rate, composite dollars..... (1)																
Industrials..... do.....																
Public utilities..... do.....																
Railroads..... do.....																
N.Y. banks..... do.....																
Property and casualty insurance cos..... do.....																
Price per share, end of mo., composite..... do..... (1)																
Industrials..... do.....																
Public utilities..... do.....																
Railroads..... do.....																
Yields, composite..... percent..... (1)																
Industrials..... do.....																
Public utilities..... do.....																
Railroads..... do.....																
N.Y. banks..... do.....																
Property and casualty insurance cos..... do.....																
Earnings per share (indust., qtrly. at ann. rate; pub. util. and R.R., for 12mo. ending each qtr.):																
Industrials..... dollars..... (1)																
Public utilities..... do.....																
Railroads..... do.....																
Dividend yields, preferred stocks, 10 high-grade (Standard & Poor's Corp.)..... percent.....																
Prices:																
Dow-Jones averages (65 stocks).....																
Industrial (30 stocks).....																
Public utility (15 stocks).....																
Transportation (20 stocks).....																
Standard & Poor's Corporation: ⁴																
Combined index (500 Stocks)..... 1941-43=10.....																
Industrial, total (400 Stocks) ⁵ do.....																
Capital goods (111 Stocks)..... do.....																
Consumer goods (189 Stocks)..... do.....																
Utilities (40 Stocks)..... do.....																
Transportation (20 Stocks) ⁶ 1970=10.....																
Railroads (10 Stocks)..... 1941-43=10.....																
Financial (40 Stocks) ⁶ 1970=10.....																
New York City banks (6 Stocks)..... 1941-43=10.....																
Banks outside N.Y.C. (10 Stocks)..... do.....																
Property-Casualty Insurance (6 Stocks)..... do.....																

¹ Revised. ² No longer available. ³ Revised yields by rating for Jan. 1974-Nov. 1975 will be shown later. ⁴ Number of issues represents number currently used; the change in number does not

reflect continuity of the series. ⁵ Prices are derived from average yields on basis of an assumed 3 percent 20-year bond. ⁶ For bonds due or callable in 10 years or more. ⁷ Includes data not shown separately. ⁸ New series.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS

Table with columns for years: 1977, 1978, 1978 (Annual, Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec.), 1979 (Jan., Feb., Mar., Apr.)

FINANCE—Continued

Table containing SECURITY MARKETS—Continued, Stocks—Continued, Prices—Continued, New York Stock Exchange common stock indexes, Sales, and Shares listed, N.Y. Stock Exchange, end of period.

FOREIGN TRADE OF THE UNITED STATES

Table containing VALUE OF EXPORTS, Exports (mdse.), Incl. reexports, total, Excl. Dept. of Defense shipments, Seasonally adjusted, By geographic regions, By leading countries, Exports of U.S. merchandise, total, Excluding military grant-aid, Agricultural products, total, Nonagricultural products, total, By commodity groups and principal commodities.

* Revised. 1 Beginning Jan. 1978, data are based on a new classification system and include nonmonetary gold; the overall total and the commodity groups (but not the items within the groups) have been revised back to Jan. 1977 to reflect these changes.

because of revisions to the totals not reflected in the component items. 2 Includes data not shown separately. 3 Effective Feb. 1979 SURVEY, seasonally adjusted data have been revised to reflect sums of commodity components; comparable data prior to Dec. 1977 will be shown later.

Table header with columns for years 1977, 1978, 1979 and months Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr.

TRANSPORTATION AND COMMUNICATION—Continued

Main data table for Transportation and Communication, covering Class I Railroads, Travel, and Communication.

CHEMICALS AND ALLIED PRODUCTS

Main data table for Chemicals and Allied Products, covering Inorganic Chemicals and Inorganic Fertilizer Materials.

Footnote section with numbered notes 1-12 explaining data revisions, preliminary status, and source information.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

LUMBER AND PRODUCTS

LUMBER—ALL TYPES [¶]	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
National Forest Products Association:																
Production, total.....mil. bd. ft.	37,520	37,947	3,222	3,127	3,203	3,333	2,988	3,263	3,285	3,333	3,102	2,931	2,877	2,877		
Hardwoods.....do.....	6,597	7,395	497	571	546	574	597	591	580	629	618	595	619	607		
Softwoods.....do.....	30,923	30,552	2,725	2,556	2,657	2,759	2,391	2,672	2,705	2,704	2,484	2,336	2,258	2,270		
Shipments, total.....do.....	37,755	38,051	3,158	3,133	3,355	3,548	3,156	3,357	3,250	3,262	3,116	2,907	2,813	2,756		
Hardwoods.....do.....	6,712	7,365	511	574	583	600	574	567	577	601	600	572	604	589		
Softwoods.....do.....	31,043	30,686	2,647	2,559	2,772	2,948	2,582	2,790	2,673	2,661	2,516	2,335	2,209	2,167		
Stocks (gross), mill, end of period, total.....do.....	4,851	4,747	5,201	5,190	5,038	4,877	4,705	4,632	4,669	4,740	4,731	4,747	4,811	4,932		
Hardwoods.....do.....	772	802	749	752	715	687	706	732	737	765	783	802	817	835		
Softwoods.....do.....	4,079	3,945	4,452	4,438	4,323	4,190	3,999	3,900	3,932	3,975	3,948	3,945	3,994	4,097		
Exports, total sawmill products.....do.....	1,670	1,300	110	125	212	118	93	88	94	96	96	100	97	121	129	
Imports, total sawmill products.....do.....	10,698	12,199	939	915	1,173	1,117	1,194	1,119	1,014	1,091	979	954	925	761	998	
SOFTWOODS																
Douglas fir:																
Orders, new.....mil. bd. ft.	8,712	8,920	846	757	807	833	705	634	779	742	632	718	747	648	803	
Orders, unfilled, end of period.....do.....	565	553	649	679	706	614	597	548	610	612	526	553	622	639	685	
Production.....do.....	8,796	8,912	812	745	745	816	619	672	738	790	707	689	669	674	775	
Shipments.....do.....	8,781	8,932	783	727	780	925	722	717	717	740	718	691	678	681	757	
Stocks (gross), mill, end of period.....do.....	964	944	1,143	1,161	1,126	1,017	914	886	907	957	946	944	935	978	996	
Exports, total sawmill products.....do.....	488	478	52	37	52	50	47	30	35	39	34	35	31	46	46	
Sawed timber.....do.....	129	119	17	10	16	19	4	7	11	8	7	7	8	11	13	
Boards, planks, scantlings, etc.....do.....	359	359	36	27	36	31	44	23	24	31	27	28	23	35	33	
Price, producer:																
Dimension, construction, dried, 2" x 4", R. L. \$ per M bd. ft.	230.38	253.39	246.28	238.48	238.43	245.28	245.00	272.06	274.74	266.66	271.51	262.40	258.77	260.53	261.46	267.69
Southern pine:																
Orders, new.....mil. bd. ft.	18,291	18,319	790	767	761	696	668	769	671	738	626	618	669	691		
Orders, unfilled, end of period.....do.....	470	505	552	563	588	552	544	561	541	542	510	505	538	607		
Production.....do.....	18,198	18,287	728	730	735	728	669	733	688	737	663	646	654	642		
Shipments.....do.....	18,264	18,284	733	756	736	732	676	752	691	737	658	623	636	622		
Stocks (gross), mill and concentration yards, end of period.....mil. bd. ft.	1,166	1,169	1,210	1,175	1,174	1,170	1,163	1,144	1,141	1,141	1,146	1,169	1,187	1,207		
Exports, total sawmill products.....M bd. ft.	157,806	152,121	14,492	14,920	12,506	15,495	8,991	10,324	12,161	10,467	15,751	12,518	15,273	25,522	15,300	
Prices, producer (indexes):																
Boards, No. 2 and better, 1" x 6", R. L. 1967=100	271.0	329.7	313.6	321.5	329.7	331.5	333.6	337.7	343.4	346.4	347.1	347.8	348.6	349.4	355.6	359.8
Flooring, C and better, F. G., 1" x 4", S. L. 1967=100	250.2	276.9	272.4	271.2	274.4	274.4	276.6	280.6	282.1	283.8	284.3	285.4	285.4	286.5	288.6	290.4
Western pine:																
Orders, new.....mil. bd. ft.	10,331	9,907	850	739	877	874	854	889	980	908	714	774	793	712	818	
Orders, unfilled, end of period.....do.....	590	469	636	596	546	526	544	506	545	545	462	469	596	612	606	
Production.....do.....	10,309	9,910	871	790	865	843	786	901	927	897	776	751	701	722	852	
Shipments.....do.....	10,295	10,028	832	779	894	894	836	927	941	908	797	767	666	696	824	
Stocks (gross), mill, end of period.....do.....	1,329	1,211	1,451	1,462	1,400	1,349	1,299	1,273	1,259	1,248	1,227	1,211	1,246	1,272	1,300	
Price, producer, Ponderosa, boards, No. 3, 1" x 12", R. L. (6' and over).....\$ per M bd. ft.	231.53	237.07	264.90	267.57	240.07	251.25	232.33	236.92	254.23	267.17	317.01	304.49	332.11	366.87	371.17	
HARDWOOD FLOORING																
Oak:																
Orders, new.....mil. bd. ft.	112.8	108.6	10.8	9.5	9.3	9.3	8.5	10.5	7.9	9.8	8.3	6.3	9.4	7.3	8.4	
Orders, unfilled, end of period.....do.....	7.9	9.2	10.4	10.7	11.6	10.2	11.4	11.4	10.6	11.0	9.6	9.2	9.2	9.2	9.1	
Production.....do.....	109.8	104.7	9.9	9.0	8.8	9.1	7.2	9.9	8.7	8.9	9.4	8.0	8.3	7.8	8.3	
Shipments.....do.....	110.0	106.3	9.4	9.2	8.5	10.1	7.4	10.4	8.7	9.4	8.7	7.2	9.4	7.2	8.6	
Stocks (gross), mill, end of period.....do.....	6.2	2.7	5.4	5.2	5.4	4.0	3.7	3.1	3.2	2.7	3.4	2.7	1.6	2.1	1.9	

METALS AND MANUFACTURES

IRON AND STEEL	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Exports:																
Steel mill products.....thous. sh. tons.	2,003	2,508	191	205	255	271	174	208	174	218	194	248	193	165	217	
Scrap.....do.....	6,175	9,278	628	695	821	786	756	777	834	977	973	944	853	1,145	871	
Pig iron.....do.....	51	51	5	([¶])	1	1	5	7	1	11	8	11	35	5	2	
Imports:																
Steel mill products.....do.....	19,307	21,135	1,988	2,175	1,511	1,360	1,785	1,870	1,584	1,715	2,016	1,372	1,264	1,329	1,096	
Scrap.....do.....	625	794	71	45	127	55	77	71	70	51	67	60	46	48	68	
Pig iron.....do.....	373	655	61	35	38	99	42	78	88	41	75	48	49	33	38	
Iron and Steel Scrap[¶]																
Production.....thous. sh. tons.	49,523	51,960	4,730	4,477	4,581	4,605	4,070	4,565	4,426	4,699	4,442	4,323	4,222	4,111		
Receipts, net.....do.....	47,873	51,804	4,396	4,265	4,851	4,509	4,144	4,426	4,186	4,443	4,342	4,239	4,147	4,014		
Consumption.....do.....	92,080	99,133	8,347	8,488	8,938	8,579	7,659	8,279	8,338	8,918	8,397	8,300	8,200	7,935		
Stocks, end of period.....do.....	9,360	8,313	9,017	8,779	8,738	8,747	8,865	9,018	8,808	8,536	8,458	8,313	8,008	7,791		
Prices, steel scrap, No. 1 heavy melting:																
Composite (5 markets).....\$ per lg. ton.	55.99	73.84	71.90	75.42	71.46	71.38	76.00	75.40	72.81	71.67	79.05	85.95	94.48	108.50	133.00	111.50
Pittsburgh district.....do.....	80.35	78.29	77.00	80.50	75.50	75.00	82.50	78.50	75.50	75.50	83.50	88.50	93.50	108.50	133.00	111.50

[¶] Revised. [‡] Preliminary. ¹ Annual data; monthly revisions are not available.
² Effective with Feb. 1977, composite reflects substitution of Los Angeles for San Francisco; effective July 1977, it reflects addition of Detroit and Houston. Avg. for 1977 is for July-Dec.
³ Less than 500 short tons. ⁴ Average for 11 months; price not available for Nov.
[¶] Totals include data for types of lumber not shown separately. [†] Effective Aug. 1976

SURVEY, scrap excludes imports of rerolling rails and pig iron excludes sponge iron imports previously included. [¶] Effective with 1974 annual and Jan. 1975 figures, data reflect expanded sample and exclusion of direct-reduced (prereduced) iron, previously included in scrap series.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual	Annual	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

METALS AND MANUFACTURES—Continued

IRON AND STEEL—Continued																
Ore																
Iron ore (operations in all U.S. districts):																
Mine production.....thous. lg. tons.....	55,750	80,718	6,425	6,034	7,751	7,988	7,559	7,593	7,314	7,032	6,546	6,552	6,144	5,634	-----	-----
Shipments from mines.....do.....	54,053	82,539	2,489	5,299	8,558	8,754	9,757	9,779	8,707	8,088	7,667	7,095	3,286	2,486	-----	-----
Imports.....do.....	37,905	29,924	1,643	1,291	2,102	2,182	3,686	4,488	4,534	1,610	4,015	3,057	2,108	1,479	854	-----
U.S. and foreign ores and ore agglomerates:																
Receipts at iron and steel plants.....do.....	94,944	114,227	4,639	6,363	10,907	11,448	11,787	14,658	12,291	12,285	11,524	9,732	4,711	3,633	4,436	-----
Consumption at iron and steel plants.....do.....	108,462	116,305	9,048	9,379	10,114	10,216	9,940	10,137	9,797	10,323	9,954	10,341	9,457	8,988	10,540	-----
Exports.....do.....	2,143	3,762	2	390	393	403	143	348	520	317	733	435	183	31	20	-----
Stocks, total, end of period.....do.....	59,390	55,339	53,084	50,360	49,862	51,887	51,561	53,791	54,681	55,500	56,432	55,339	53,028	50,685	-----	-----
At mines.....do.....	14,140	12,469	21,687	22,411	21,598	20,968	18,772	16,461	15,165	14,104	12,982	12,469	14,852	18,000	-----	-----
At furnace yards.....do.....	42,271	39,301	29,195	26,199	26,903	28,127	29,939	34,349	36,738	38,585	40,049	39,301	34,473	29,059	22,862	-----
At U.S. docks.....do.....	2,979	3,569	2,202	1,750	1,361	22,792	2,850	2,981	2,778	2,811	3,401	3,569	3,703	3,626	3,053	-----
Manganese (mn. content), general imports.....do.....	834	842	113	49	71	55	82	42	97	62	64	63	62	50	60	-----
Pig Iron and Iron Products																
Pig iron:																
Production (excluding production of ferroalloys).....thous. sh. tons.....	81,328	87,687	6,894	7,189	7,936	7,754	7,637	7,518	7,391	7,809	7,533	7,658	7,064	6,636	7,953	7,726
Consumption.....do.....	82,017	88,384	7,013	7,316	7,969	7,770	7,611	7,527	7,463	7,887	7,594	7,721	7,098	6,678	8,032	-----
Stocks, end of period.....do.....	1,309	889	1,108	1,916	997	1,014	1,068	1,080	1,047	983	965	889	852	835	847	-----
Price, basic furnace.....\$ per sh. ton.....	\$183.11	196.00	191.00	191.00	191.00	191.00	191.00	203.00	203.00	203.00	203.00	203.00	203.00	203.00	203.00	203.00
Castings, gray and ductile iron:																
Orders, unfilled, for sale, end of period.....thous. sh. tons.....	935	912	1,009	1,969	976	984	946	1,000	963	917	907	912	*929	1,016	-----	-----
Shipments, total.....do.....	15,318	15,294	1,327	1,301	1,423	1,406	1,148	1,330	1,279	1,444	1,312	1,136	*1,239	1,223	-----	-----
For sale.....do.....	7,496	7,840	646	663	737	734	587	711	673	729	663	561	*600	574	-----	-----
Castings, malleable iron:																
Orders, unfilled, for sale, end of period.....thous. sh. tons.....	65	66	63	64	66	63	62	64	64	65	62	66	66	68	-----	-----
Shipments, total.....do.....	829	816	75	70	74	74	56	68	68	75	71	61	*70	69	-----	-----
For sale.....do.....	458	446	42	39	41	41	29	37	35	41	39	35	*36	36	-----	-----
Steel, Raw and Semifinished																
Steel (raw):																
Production.....thous. sh. tons.....	125,333	136,689	11,083	11,528	12,320	11,861	11,388	11,550	11,467	12,105	11,654	11,812	11,105	10,562	12,576	12,196
Rate of capability utilization*.....percent.....	78.4	86.6	83.1	88.5	91.5	91.1	85.1	86.3	88.6	89.8	89.4	87.7	83.5	87.9	94.5	93.4
Steel castings:																
Orders, unfilled, for sale, end of period.....thous. sh. tons.....	451	797	502	512	492	501	592	634	668	711	734	797	*926	938	-----	-----
Shipments, total.....do.....	1,718	1,863	158	153	168	162	124	156	159	173	161	155	*171	169	-----	-----
For sale, total.....do.....	1,488	1,627	138	133	145	140	108	134	139	153	141	136	*153	150	-----	-----
Steel Mill Products																
Steel products, net shipments:																
Total (all grades).....thous. sh. tons.....	91,147	186,187	8,718	8,055	8,610	8,787	7,608	8,298	8,252	8,599	7,813	8,196	8,206	7,996	10,293	-----
By product:																
Semifinished products.....do.....	13,991	13,922	425	434	491	467	593	457	491	463	423	461	411	410	545	-----
Structural shapes (heavy), steel piling.....do.....	4,382	4,383	421	413	460	444	393	426	419	424	424	424	400	391	542	-----
Plates.....do.....	7,529	6,588	738	714	767	772	694	697	685	701	690	746	662	648	850	-----
Rolls and accessories.....do.....	1,863	1,677	157	146	155	141	111	123	140	156	145	154	155	155	183	-----
Bars and tool steel, total.....do.....	15,420	13,807	1,438	1,423	1,509	1,524	1,272	1,463	1,465	1,531	1,370	1,430	1,401	1,440	1,851	-----
Bars: Hot rolled (incl. light shapes).....do.....	9,362	7,428	854	827	884	904	661	845	877	916	796	856	805	858	1,109	-----
Reinforcing.....do.....	4,179	4,688	384	412	437	430	359	436	407	422	411	408	396	380	499	-----
Cold finished.....do.....	1,794	1,691	191	177	180	182	149	174	173	185	155	159	191	193	232	-----
Pipe and tubing.....do.....	7,490	6,547	804	737	779	737	643	698	683	699	652	619	641	601	781	-----
Wire and wire products.....do.....	2,400	2,457	235	231	228	235	175	211	204	219	199	184	199	195	245	-----
Tin mill products.....do.....	6,382	6,100	566	449	502	549	472	498	536	487	410	524	526	461	753	-----
Sheets and strip (incl. electrical), total.....do.....	41,687	40,706	3,933	3,509	3,719	3,918	3,455	3,720	3,630	3,921	3,499	3,653	3,812	3,695	4,543	-----
Sheets: Hot rolled.....do.....	14,558	14,114	1,406	1,207	1,297	1,349	1,176	1,316	1,288	1,391	1,292	1,384	1,315	1,322	1,674	-----
Cold rolled.....do.....	17,684	17,235	1,644	1,445	1,527	1,629	1,430	1,512	1,473	1,588	1,398	1,420	1,607	1,499	1,804	-----
By market (quarterly shipments):																
Service centers and distributors@.....do.....	15,346	17,377	4,179	-----	4,709	-----	-----	4,159	-----	4,320	-----	-----	-----	4,761	-----	-----
Construction, incl. maintenance@.....do.....	7,553	9,582	2,079	-----	2,497	-----	-----	2,432	-----	2,463	-----	-----	-----	2,345	-----	-----
Contractors' products.....do.....	4,500	3,789	939	-----	926	-----	-----	934	-----	922	-----	-----	-----	1,017	-----	-----
Automotive.....do.....	21,490	21,254	5,117	-----	5,257	-----	-----	5,365	-----	5,526	-----	-----	-----	5,850	-----	-----
Rail transportation.....do.....	3,238	3,555	820	-----	856	-----	-----	864	-----	1,015	-----	-----	-----	985	-----	-----
Machinery, industrial equip., tools.....do.....	5,566	6,040	1,477	-----	1,577	-----	-----	1,497	-----	1,486	-----	-----	-----	1,579	-----	-----
Containers, packaging, ship. materials.....do.....	6,714	6,601	1,790	-----	1,652	-----	-----	1,615	-----	1,544	-----	-----	-----	1,847	-----	-----
Other@.....do.....	26,740	29,738	7,179	-----	7,977	-----	-----	7,287	-----	7,330	-----	-----	-----	8,112	-----	-----
Steel mill shapes and forms, inventories, end of period—total for the specified sectors:																
Producing mills, inventory, end of period:																
Steel in process.....mil. sh. tons.....	34.1	37.2	32.6	32.5	33.7	33.6	34.9	35.1	35.0	34.9	35.6	37.2	36.4	-----	-----	-----
Finished steel.....do.....	10.1	11.7	9.1	9.2	9.5	9.7	10.6	10.6	10.7	10.9	11.0	11.7	11.2	10.8	-----	-----
Service centers (warehouses), inventory, end of period.....mil. sh. tons.....	7.6	8.0	6.8	7.0	7.3	7.0	7.1	7.2	7.3	7.4	8.0	8.0	8.2	8.2	-----	-----
Consumers (manufacturers only):																
Inventory, end of period.....do.....	6.6	7.1	6.7	6.6	7.1	7.1	7.1	7.1	7.0	6.6	6.9	7.1	7.0	-----	-----	-----
Receipts during period.....do.....	9.8	10.4	10.0	9.7	9.8	9.8	10.1	10.2	10.0	10.0	9.7	10.4	10.0	9.9	-----	-----
Consumption during period.....do.....	63.9	67.5	5.9	5.7	6.2	6.1	5.0	5.8	5.4	6.1	5.3	5.7	5.4	5.4	-----	-----
Consumption during period.....do.....	63.9	66.9	5.8	6.0	6.1	6.1	4.7	5.7	5.6	6.1	5.6	5.0	5.8	5.5	-----	-----

* Revised. * Preliminary. 1 Annual data; monthly or quarterly revisions are not available. 2 For month shown. 3 Avg. for 11 months; Feb. price not available. @Beginning Jan. 1976, data are not comparable with those for earlier periods since oil & gas supply houses and pipelines, which were formerly shown in "Service centers and distributors" and "Construction, incl. maintenance," respectively, are now included in "Other."

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

METALS AND MANUFACTURES—Continued

NONFERROUS METALS AND PRODUCTS																
Aluminum:																
Production, primary (dom. and foreign ores) thous. sh. tons	4,539	4,804	395	387	405	395	408	410	399	416	403	418	418	379		
Recovery from scrap (aluminum content)	1,591	1,407	117	114	114	118	107	125	122	127	132	117	120	119		
Imports (general):																
Metal and alloys, crude	673.3	756.9	74.4	58.2	89.9	83.5	66.9	50.7	51.3	86.9	43.1	35.0	69.6	41.0	53.9	
Plates, sheets, bars, etc.	73.8	34.2	3.1	2.4	2.4	2.1	4.8	5.2	2.2	2.4	2.8	2.5	3.1	2.4	3.2	
Exports:																
Metal and alloys, crude	97.8	126.6	6.1	4.2	7.0	9.3	8.5	11.0	15.9	17.7	23.1	14.3	32.4	15.4	14.8	
Plates, sheets, bars, etc.	207.9	197.0	19.0	14.8	19.5	17.3	15.1	14.5	19.5	13.8	15.4	15.7	18.5	18.4	17.2	
Price, primary ingot, 99.5% minimum	5134	5308	5300	5300	5300	5300	5300	5300	5300	5300	5300	5390	5500	5500	5534	5800
Aluminum products:																
Shipments:																
Ingot and mill prod. (net ship.)	12,808	13,982	1,276	1,079	1,222	1,256	1,113	1,185	1,174	1,340	1,179	1,204	1,332	1,130		
Mill products, total	10,419	11,332	987	931	981	998	880	1,007	936	1,009	935	928	1,003	903		
Sheet and plate	6,041	6,812	552	523	565	556	509	562	535	575	519	523	570	512		
Castings	2,009	1,986	184	104	172	171	126	165	165	184	174	154	194	183		
Inventories, total (ingot, mill products, and scrap), end of period	5,685	5,496	5,732	5,751	5,697	5,666	5,705	5,588	5,612	5,577	5,550	5,496	5,387	5,258		
Copper:																
Production:																
Mine, recoverable copper	1,504.0	1,490.3	133.5	129.3	133.7	128.0	97.8	125.1	123.2	130.4	127.6	113.9	106.4	105.7		
Refinery, primary	1,496.2	1,533.1	134.6	119.8	129.6	128.4	104.8	133.6	123.4	136.4	147.4	142.8	114.1	118.6		
From domestic ores	1,411.0	1,408.9	124.4	113.7	119.3	121.4	95.9	126.9	117.4	128.5	136.1	116.8	102.0	111.1		
From foreign ores	85.2	124.2	10.2	6.1	10.3	7.0	8.9	6.7	6.0	7.9	11.3	26.0	12.1	7.6		
Secondary, recovered as refined	376.0	453.0	41.0	41.0	41.0	44.0	30.0	36.0	37.0	41.0	39.0	43.0	41.2	37.6		
Imports (general):																
Refined, unrefined, scrap (copper cont.)	528.1	607.5	69.3	94.5	62.6	63.8	46.5	38.6	28.4	34.5	24.8	24.2	19.2	17.2	30.5	
Refined	394.0	463.4	58.2	77.9	47.8	53.4	39.2	28.7	17.6	27.7	12.3	6.6	11.2	7.0	15.7	
Exports:																
Refined and scrap	220.3	321.6	24.2	20.4	28.1	26.5	23.3	31.6	41.2	20.8	34.4	34.8	29.8	26.3	33.1	
Refined	52.7	109.3	11.9	7.3	11.4	10.1	7.2	10.2	22.2	5.3	5.3	8.8	9.8	9.4	11.6	
Consumption, refined (by mills, etc.)	2,202	2,417	566			635			621			595			664	
Stocks, refined, end of period	649	491	620	648	637	642	595	578	560	550	534	491	430	388	372	
Fabricators'	178	128	144	162	163	156	144	189	154	133	126	124	101	100	110	
Price, electrolytic (wirebars), dom., delivered \$ per lb.	6677	6651	6241	6462	6477	6657	6408	6723	6763	7050	7119	7190	7657	8970	9672	9832
Copper-base mill and foundry products, shipments (quarterly total):																
Brass mill products	2,670	2,769	654			741			666			708				
Copper wire mill products (copper cont.)	2,691	2,775	679			708			682			706				
Brass and bronze foundry products	579	566	142			148			137			139				
Lead:																
Production:																
Mine, recoverable lead	589.2	582.9	57.1	49.4	54.3	40.1	35.5	47.6	49.5	55.5	50.0	49.1	47.6	43.9		
Recovered from scrap (lead cont.)	734.4	753.1	63.7	57.8	64.3	62.1	54.1	62.6	68.5	71.2	70.1	67.6				
Imports (general), ore (lead cont.), metal	204.3	83.9	13.2	7.7	5.5	4.8	11.0	11.0	4.5	7.4	5.2	4.9	4.0	5.4	5.3	
Consumption, total	1,582.3	1,468.6	125.2	122.5	117.4	121.6	99.5	125.2	124.9	140.4	130.9	123.4				
Stocks, end of period:																
Producers', ore, base bullion, and in process (lead content), ABMS	184.6		184.4	189.8	198.6	198.5	199.2									
Refiners' (primary), refined and antimonial (lead content)	15.4	19.4	20.0	31.4	31.4	32.1	30.1	24.2	19.6	17.5	18.2	19.4				
Consumers' (lead content)	109.3	110.8	119.4	111.9	119.7	115.9	113.8	109.6	115.6	113.4	110.5	110.8				
Scrap (lead-base, purchased), all smelters (gross weight)	91.3	86.6	83.7	82.8	73.8	64.4	61.1	63.8	63.7	68.7	75.4	86.6				
Price, common grade, delivered	3070	3365	3300	3300	3100	3100	3100	3217	3406	3661	3800	3800	4076	4363	4575	4800
Tin:																
Imports (for consumption):																
Ore (tin content)	6,724	3,873	664	439	635	40	62	355	273	52	193	718	115	1,477	176	
Metal, unwrought, unalloyed	48,338	46,773	5,070	4,369	3,438	5,413	3,144	3,382	3,861	3,410	4,518	2,530	4,581	4,115	4,957	
Recovery from scrap, total (tin cont.)	18,503	17,855	1,505	1,485	1,555	1,630	1,215	1,410	1,285	1,855	1,475	1,380	1,545			
As metal	1,688	1,865	125	135	160	155	180	155	150	155	155	155	150			
Consumption, total	68,000	63,100	5,500	5,200	5,700	5,400	4,600	5,200	5,200	5,300	5,400	4,900	5,400	5,500		
Primary	55,500	47,000	4,100	3,900	4,200	4,000	3,500	3,700	3,700	4,000	4,000	3,700	4,000	3,900		
Exports, incl. reexports (metal)	5,462	4,693	579	617	405	384	274	508	298	269	280	375	286	332	344	
Stocks, pig (industrial), end of period	8,441	5,040	6,291	7,785	8,139	7,846	7,817	7,260	5,774	4,975	5,666	5,040	4,594	4,254	4,110	
Price, Straits quality (delivered)	5,3460	6,2958	5,5757	5,3962	5,7027	6,0092	6,0700	6,3925	6,7484	7,3918	7,4502	6,9562	6,8423	7,2008	7,4180	7,3590
Zinc:																
Production (recoverable zinc):																
Mine prod., recoverable zinc	449.6	337.6	35.3	35.2	33.1	22.7	19.9	25.6	24.6	26.6	23.6	23.9	23.0	21.5		
Imports (general):																
Ores (zinc content)	122.8	207.2	13.7	17.9	13.0	19.0	6.0	25.6	9.2	25.3	29.2	33.6	30.8	14.9	28.0	
Metal (slab, blocks)	576.7	681.1	35.1	65.1	78.8	56.1	49.9	47.4	49.2	54.0	53.4	83.8	43.7	42.1	47.0	
Consumption (recoverable zinc content):																
Ores	100.8	99.0	8.4	8.8	9.9	8.6	8.8	8.1	7.4	6.8	9.1	8.4	7.5	7.3		
Scrap, all types	238.2	237.3	28.6	28.4	16.4	15.9	15.6	15.6	15.6	16.3	16.3	15.2	14.1	14.2		
Slab zinc:																
Production (primary smelter), from domestic and foreign ores																
Secondary (redistilled) production	450.1	444.8	27.0	30.1	32.0	31.3	31.7	34.5	33.5	41.3	39.0	39.1	36.9	38.4		
Consumption, fabricators	50.6	38.7	3.4	3.4	3.7	3.2	2.7	3.1	3.9	2.9	3.4	3.5	4.6	3.5		
Exports	1,103.1	1,127.3	96.0	93.0	99.0	99.9	84.3	100.0	96.4	105.3	95.6	87.9	88.4	89.5		
Inventories, end of period:																
Producers', at smelter (ABMS)	65.8	38.4	56.9	50.0	40.9	32.5	31.8	27.4	30.1	26.9	32.9	38.4	36.2	34.5	34.0	40.4
Consumers'	86.8	94.6	83.6	86.4	82.5	88.1	93.2	92.3	86.8	89.0	85.3	94.6	84.2	76.6		
Price, Prime Western	3439	3097	2900	2900	2900	2901	2980	3116	3237	3283	3442	3450	3457	3562	3724	3899

† Revised. † Annual data; monthly revisions are not available. ‡ Less than 50 tons. § See "††" note for this page. § For month shown. ¶ See "ⓓ" note, this page. ⓓ Includes secondary smelters' lead stocks in refinery shapes and in copper-base scrap. ⓔ All data (except annual production figures) reflect GSA remelted zinc and zinc purchased for direct shipment. ⓕ Revised Dec. 31 stocks for 1970-73 (thous. sh. tons); 124.2; 48.6; 30.1, 25.9. Producers' stocks elsewhere, end of Apr. 1979, 10,315 metric tons. * New series effective with data for Jan. 1976. Source: Metals Week. MW Composite monthly price (Straits quality, delivered) is based on average of daily prices at two markets (Penang, Malaysia—settlement, and LME 3-month—High grade), and includes fixed charges plus dealer's and consumer's 70-day financing costs; no comparable earlier prices are available. † Effective with the Apr. 1977 SURVEY, data are expressed in metric tons (to convert U.S. long tons to metric tons, multiply by factor, 1.01605). ⓓ Beginning with Jan. 1979 data, units are expressed in metric tons; earlier data are shown in short tons (to convert sh. tons to metric tons, multiply by factor 0.907185).

Table with columns for years 1977, 1978, 1979 and months Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec, Jan, Feb, Mar, Apr.

METALS AND MANUFACTURES—Continued

Main data table for METALS AND MANUFACTURES with various sub-sections like MACHINERY AND EQUIPMENT, ELECTRICAL EQUIPMENT, and GAS EQUIPMENT (RESIDENTIAL).

PETROLEUM, COAL, AND PRODUCTS

Table for PETROLEUM, COAL, AND PRODUCTS, specifically focusing on COAL production and exports.

Footnote section containing revision notes and data availability information.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978 ¹	1978										1979			
	Annual	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
PETROLEUM, COAL, AND PRODUCTS—Continued																
PETROLEUM AND PRODUCTS—Continued																
Refined petroleum products—Continued																
Distillate fuel oil:																
Production †..... mil. bbl.	1,196.3	1,149.9	93.0	88.2	99.4	93.2	96.4	101.6	95.2	101.9	100.6	103.5				
Imports †..... do	91.3	62.8	5.8	3.0	3.7	4.4	4.6	4.4	4.9	5.5	6.7	7.9				
Exports..... do	.5	1.2	(?)	2	(?)	(?)	.1	.1	.1	.1	.1	(1)				
Stocks, end of period..... do	250.3	216.4	137.9	136.3	145.1	157.5	180.5	200.4	220.8	233.1	233.2	216.4				
Price, wholesale (middle distillate) ‡																
Index, 1967=100.....	384.1	398.1	394.8	393.3	393.3	393.3	393.2	393.6	394.0	400.1	408.5	417.8	425.5	432.3	452.1	479.4
Residual fuel oil:																
Production †..... mil. bbl.	640.1	611.0	54.5	46.6	51.0	47.5	49.4	50.7	49.4	48.8	50.2	54.4				
Imports †..... do	496.1	491.0	52.7	46.9	37.9	30.4	40.2	39.2	39.4	34.7	40.5	43.2				
Exports..... do	2.3	4.6	7	2	5	.1	3	8	.4	.2	2	.6				
Stocks, end of period..... do	90.2	90.2	62.2	66.2	72.4	71.9	75.3	73.7	81.2	83.4	88.8	90.2				
Price, wholesale ‡																
Index, 1967=100.....	522.5	497.0	491.6	494.6	505.9	509.3	494.5	480.8	481.5	485.4	500.9	502.2	517.9	520.5	541.9	607.6
Jet fuel:																
Production †..... mil. bbl.	355.0	355.2	30.1	29.5	31.4	28.8	28.8	30.1	29.7	29.1	30.5	30.8				
Stocks, end of period..... do	34.5	33.7	32.0	34.6	38.5	37.4	38.0	35.7	35.3	33.1	32.8	33.7				
Lubricants:																
Production..... do	64.5	60.5	5.8	5.7	5.9	5.8	6.3	6.1	6.0	6.3	6.1	5.7				
Exports..... do	9.6	9.7	8	1.1	.7	.8	.7	.9	1.0	.6	.7	.9				
Stocks, end of period..... do	12.1	12.2	12.4	12.0	11.9	11.3	11.9	11.6	11.8	12.1	12.3	12.2				
Asphalt:																
Production..... do	154.1	171.7	9.8	12.2	15.9	16.4	17.7	18.9	19.1	18.6	15.4	12.3				
Stocks, end of period..... do	18.7	20.8	26.8	28.6	29.2	25.0	21.8	16.8	16.2	13.7	16.1	20.8				
Liquefied gases (incl. ethane and ethylene) †																
Production, total..... do	571.6	561.0	49.5	47.1	47.7	46.0	46.4	46.3	46.1	46.8	46.8	48.0				
At gas processing plants (L.P.G.)..... do	443.0	431.5	38.3	36.7	36.5	34.9	35.6	35.4	34.7	35.8	36.1	36.8				
At refineries (L.R.G.)..... do	128.6	129.5	11.2	10.5	11.2	11.0	10.8	10.9	11.4	10.9	10.7	11.3				
Stocks (at plants and refineries)..... do	136.3	132.0	112.6	121.5	129.4	138.5	147.3	155.1	156.7	152.4	144.2	132.0				

PULP, PAPER, AND PAPER PRODUCTS

PULPWOOD AND WASTE PAPER																
Pulpwood:																
Receipts..... thous. cords (128 cu. ft.)	72,875	77,025	6,998	6,538	6,463	6,949	6,203	6,349	6,251	6,894	6,429	6,288	5,949	5,766		
Consumption..... do	73,971	77,290	6,780	6,776	6,751	6,884	6,090	6,231	6,275	6,508	6,358	5,980	6,404	6,287		
Stocks, end of period..... do	5,761	6,244	5,382	5,151	4,844	5,020	5,141	5,323	5,363	5,895	5,976	6,244	5,820	5,379		
Waste paper:																
Consumption..... thous. sh. tons	12,192	13,178	1,183	1,155	1,217	1,119	988	1,136	1,020	1,144	1,071	1,004	1,078	1,029		
Stocks, end of period..... do	728	740	706	744	745	753	732	732	744	721	709	740	673	616		
WOODPULP																
Production:																
Total, all grades ♀..... thous. sh. tons	149,033	147,075	4,149	4,101	4,100	4,109	3,672	3,848	3,878	4,051	3,954	3,628	3,905	3,815		
Dissolving and special alpha..... do	1,401	1,415	142	113	136	130	114	117	84	118	105	90	98	92		
Sulfate..... do	34,005	35,739	3,149	3,150	3,064	3,085	2,823	2,983	2,960	3,088	3,007	2,745	3,000	2,926		
Sulfite..... do	2,000	1,758	166	165	173	178	129	116	127	120	131	114	104	122		
Groundwood..... do	4,753	4,216	352	342	387	389	304	302	362	375	370	364	353	347		
Semichemical..... do	3,569	3,948	340	330	341	325	301	329	345	351	341	316	351	328		
Stocks, end of period:																
Total, all mills..... do	4,135	4,760	1,090	1,074	1,069	898	1,014	1,048	993	999	788	760	845	800		
Pulp mills..... do	4,684	4,254	613	613	611	426	516	545	473	486	300	254	410	389		
Paper and board mills..... do	609	435	415	397	395	407	432	436	454	442	423	435	371	347		
Nonpaper mills..... do	62	70	62	64	63	66	66	67	66	70	65	70	64	64		
Exports, all grades, total..... do	1,264	1,259	233	210	227	266	230	174	269	207	204	210	165	198	213	
Dissolving and special alpha..... do	796	757	83	46	71	80	69	54	73	60	52	47	41	58	60	
All other..... do	1,844	1,841	150	163	156	186	161	120	196	147	152	163	124	139	150	
Imports, all grades, total..... do	3,864	4,025	327	300	402	303	327	325	316	351	367	362	331	347	384	
Dissolving and special alpha..... do	179	176	20	8	16	7	20	5	20	8	33	7	16	5	27	
All other..... do	3,686	3,849	307	292	386	296	307	320	297	343	333	355	315	341	357	
PAPER AND PAPER PRODUCTS																
Paper and board:																
Production (Bu. of the Census):																
All grades, total, unadjusted..... thous. sh. tons	61,869	62,066	5,547	5,242	5,602	5,463	4,793	5,233	4,963	5,321	5,198	4,745	5,175	4,936		
Paper..... do	27,491	27,729	2,553	2,379	2,533	2,444	2,075	2,201	2,134	2,332	2,287	2,144	2,316	2,227		
Paperboard..... do	28,727	28,723	2,494	2,368	2,559	2,541	2,278	2,513	2,374	2,543	2,440	2,172	2,411	2,282		
Wet-machine board..... do	128	109	10	10	10	11	6	10	9	9	9	9	9	9		
Construction paper and board..... do	5,523	5,505	489	484	499	467	435	509	446	436	463	421	440	418		
Producer price indexes:																
Book paper, A grade..... 1967=100	176.4	179.4	174.5	177.3	178.0	178.6	179.5	179.4	185.1	185.5	186.3	186.8	188.5	190.2	192.3	197.2
Paperboard..... do	157.0	187.4	186.6	188.7	190.8	192.3	193.1	189.8	187.0	189.5	188.7	187.6	185.2	183.6	182.6	183.4

¹ Revised. ² Preliminary.

³ Reported annual total; revisions not allocated to the months. ⁴ Less than 50 thousand barrels. ⁵ Beginning with January 1975, data for soda (formerly combined with semichemical) is now combined with sulphate; not comparable with data for earlier periods.

⁶ Data exclude small amounts of pulp because reporting would disclose the operations of individual firms.

⁷ Monthly revisions back to 1974 for imports and back to 1977 for other refined petroleum products are available upon request. ⁸ Includes data for items not shown separately.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

PULP, PAPER, AND PAPER PRODUCTS—Continued

PAPER AND PAPER PRODUCTS—Con.																
Selected types of paper (API):																
Groundwood paper, uncoated:																
Orders, new.....thous. sh. tons.....	1,312	1,274	118	111	124	132	72	84	124	100	88	104	127	104	138	
Orders, unfilled, end of period.....do.....	134	133	155	133	130	144	138	143	173	160	140	133	174	185	211	
Shipments.....do.....	1,307	1,245	116	111	124	106	83	81	95	110	110	105	106	102	119	
Coated paper:																
Orders, new.....do.....	4,279	4,413	419	337	385	376	333	382	342	360	365	363	396	346	392	
Orders, unfilled, end of period.....do.....	398	391	403	391	390	397	405	408	405	367	356	391	405	420	412	
Shipments.....do.....	4,261	4,435	402	359	394	370	326	381	353	390	379	333	363	353	396	
Unbleached free sheet papers:																
Orders, new.....do.....	6,878	7,462	702	658	709	666	572	636	592	598	574	568	657	594	671	
Shipments.....do.....	7,170	7,546	691	644	661	648	575	659	597	648	630	602	646	613	694	
Unbleached kraft packaging and industrial converting papers:																
Orders, new.....thous. sh. tons.....																
Orders, unfilled, end of period.....do.....																
Shipments.....do.....	3,815	3,894	347	345	348	320	301	293	301	319	305	292	321	320	341	
Tissue paper, production.....do.....	4,286	4,218	373	364	388	369	317	338	327	360	344	328	376	348	380	
Newsprint:																
Canada:																
Production.....do.....	8,988	9,713	826	834	843	807	838	823	759	855	782	768	828	750		
Shipments from mills.....do.....	9,005	9,792	927	798	895	853	833	813	770	868	792	834	779	725		
Stocks at mills, end of period.....do.....	282	203	350	386	333	287	293	303	292	279	269	203	252	276		
United States:																
Production.....do.....	3,871	3,806	352	328	336	339	258	279	319	331	322	311	318	311		
Shipments from mills.....do.....	3,866	3,818	360	323	340	342	255	284	316	337	323	312	318	309		
Stocks at mills, end of period.....do.....	34	22	34	38	34	30	33	28	30	25	24	22	22	24		
Consumption by publishers ¹.....do.....	6,772	7,106	600	620	631	586	560	558	566	624	657	636	555	547		
Stocks at and in transit to publishers, end of period.....thous. sh. tons.....	796	728	818	818	835	876	898	868	829	840	761	728	705	713		
Imports.....do.....	6,559	7,484	611	604	639	747	649	680	580	672	648	532	623	613	651	
Price, rolls, contract, f.o.b. mill, freight allowed or delivered.....Index, 1967=100.....	215.4	226.2	216.7	228.2	228.2	228.2	228.2	230.5	230.5	230.5	230.5	230.5	230.5	238.9	241.7	244.7
Paperboard (American Paper Institute):																
Orders, new (weekly avg.).....thous. sh. tons.....	558	600	610	622	634	622	560	598	584	605	566	546	618	621	657	630
Orders, unfilled.....do.....	1,037	1,370	1,306	1,385	1,546	1,556	1,560	1,600	1,470	1,479	1,412	1,370	1,451	1,482	1,583	1,638
Production, total (weekly avg.).....do.....	557	582	595	598	616	611	542	587	576	597	600	531	593	612	628	619
Paper products:																
Shipping containers, corrugated and solid fiber shipments.....mil. sq. ft. surf. area.....	227,198	243,898	21,555	19,970	21,759	22,116	17,583	22,311	20,548	22,654	20,407	18,675	20,923	19,537	22,884	20,572
Folding paper boxes, shipments.....thous. sh. tons.....	2,639.0	2,734.0	240.7	216.2	236.3	230.1	200.3	244.7	232.4	247.4	231.0	238.3	218.1	207.8	252.4	
.....mil. \$.....	2,105.0	2,278.1	195.9	178.2	195.0	193.1	167.4	207.6	195.5	210.7	193.3	202.3	187.4	180.2	217.4	

RUBBER AND RUBBER PRODUCTS

RUBBER																
Natural rubber:																
Consumption.....thous. metric tons.....	780.13		63.79	61.23	67.98	61.88	51.68	69.13	65.55	69.47	70.89	62.81				
Stocks, end of period.....do.....	127.65		117.10	115.60	122.76	123.39	125.41	126.06	127.65	133.48	123.95	125.58				
Imports, incl. latex and guayule.....thous. lg. tons.....	792.41	746.23	71.77	93.44	75.96	54.36	47.79	71.02	77.07	54.90	46.05	71.51	72.84	64.22	72.80	
Price, wholesale, smoked sheets (N.Y.)...\$ per lb.....	.416	.496	.455	.439	.450	.490	.494	.520	.544	.543	.581	.558	.544	.570	.615	.674
Synthetic rubber:																
Production.....thous. metric tons.....	2,417.53		210.31	214.92	211.17	194.36	195.95	205.67	207.37	212.33	212.10	219.09				
Consumption.....do.....	2,464.09	2,436.40	206.16	197.47	212.71	194.69	170.59	213.94	211.70	220.29	212.14	209.84				
Stocks, end of period.....do.....	426.83		434.49	446.93	411.41	433.09	456.46	445.08	437.67	425.32	419.91	424.07				
Exports (Bu. of Census).....thous. lg. tons.....	239.98	254.96	22.55	19.48	24.90	22.28	19.35	20.04	20.77	22.22	23.81	23.77	23.62	22.29	27.74	
Reclaimed rubber:																
Production.....thous. metric tons.....	478.47		9.61	10.05	9.85	9.88	9.53	10.79	5.00	10.40	10.15	9.91				
Consumption.....do.....	4103.12		9.39	10.11	10.28	10.26	8.75	9.60	10.01	11.28	9.58	10.58				
Stocks, end of period.....do.....	16.26		14.52	13.45	13.70	13.56	13.67	15.14	15.51	14.84	15.25	14.12				
TIRES AND TUBES																
Pneumatic casings, automotive:																
Production.....thous.....	231,638		18,987	18,828	19,148	18,946	15,108	19,245	19,155	20,497	18,299	18,869	20,352	19,592		
Shipments, total.....do.....	226,583		22,198	21,738	20,597	22,509	17,584	20,516	22,214	22,727	18,872	16,946	17,227	16,422		
Original equipment.....do.....	65,998		6,386	6,161	6,300	6,121	4,077	4,680	5,933	6,408	5,911	5,085	5,644	5,451		
Replacement equipment.....do.....	155,195		15,373	15,224	13,888	16,008	13,265	15,464	15,888	15,871	12,597	11,486	11,148	10,530		
Exports.....do.....	5,390		439	352	409	440	242	372	392	447	365	396	436	442		
Stocks, end of period.....do.....	147,181		51,986	50,006	49,276	46,293	44,280	44,067	41,796	40,135	40,394	43,472	47,212	51,284		
Exports (Bu. of Census).....do.....	6,023	5,328	474	406	458	483	314	462	414	520	483	541	560	437		
Inner tubes, automotive:																
Production.....do.....	(²)															
Shipments.....do.....	(³)															
Stocks, end of period.....do.....	(³)															
Exports (Bu. of Census).....do.....	2,298	3,015	240	198	268	188	143	223	223	342	274	343	312	218		

¹ Revised. ² Beginning Jan. 1977, producers' stocks are included; comparable data for earlier periods will be shown later. ³ Beginning Jan. 1977, data cover passenger car and truck and bus tires; motorcycle tires and tires for mobile homes are excluded. ⁴ Reported total; revisions not distributed to the months.

⁵ As reported by publishers accounting for about 75 percent of total newsprint consumption. ⁶ Monthly data are averages for the 4-week period ending on Saturday nearest the end of the month; annual data are as of Dec. 31.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS	1977	1978	1978										1979			
	Annual	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	

TEXTILE PRODUCTS—Continued

COTTON AND MANUFACTURES—Con.															
Cotton (excluding linters)—Continued															
Exports.....thous. running bales..	4,448	5,875	704	640	510	528	456	524	388	283	355	464	517	577	574
Imports.....thous. net-weight(bales)	25	3	(10)	0	(10)	1	(10)	0	(10)	(10)	0	0	(10)	8	7
Price (farm), American upland ¹.....cents per lb.	52.1	58.5	51.1	51.7	53.7	54.8	56.5	56.6	55.9	59.6	61.1	58.1	56.0	54.2	52.5
Price, Strict Low Middling, Grade 41, staple 34 (1 1/8"), average 10 markets.....cents per lb.	52.7	50.8	55.0	54.7	57.6	57.4	57.0	59.8	60.0	64.1	65.6	64.4	61.5	60.6	58.7
Spindle activity (cotton system spindles):															
Active spindles, last working day, total.....mil.	16.6	16.4	16.5	16.6	18.4	16.3	16.3	16.3	16.3	16.4	16.4	16.4	16.4	16.4	16.4
Consuming 100 percent cotton.....do.	6.7	6.4	6.5	6.6	6.4	6.3	6.4	6.3	6.3	6.3	6.3	6.4	6.3	6.3	6.3
Spindle hours operated, all fibers, total.....bil.	103.6	102.4	10.1	8.2	8.2	10.0	6.5	7.9	9.6	8.1	10.0	7.3	10.1	7.9	8.3
Average per working day.....do.	.398	.394	.403	.413	.408	.402	.327	.395	.385	.406	.399	.367	.406	.393	.416
Consuming 100 percent cotton.....do.	43.4	41.5	4.0	3.4	3.3	4.1	2.7	3.2	3.9	3.3	4.0	2.9	4.2	3.1	3.3
Cotton cloth:															
Cotton broadwoven goods over 12" in width:															
Production (qtrly.).....mil. lin. yd.	4,356	3,986	1,046			1,010			913			1,017			
Orders, unfilled, end of period, as compared with avg. weekly production.....No. weeks' prod.	11.7	16.1	14.4	14.0	13.7	13.9	22.7	17.7	17.2	16.6	17.0	21.1	19.4	19.1	18.9
Inventories, end of period, as compared with avg. weekly production.....No. weeks' prod.	4.7	4.9	4.8	4.9	4.8	4.8	5.9	5.2	4.7	5.7	4.3	4.6	4.1	4.0	3.6
Ratio of stocks to unfilled orders (at cotton mills), end of period.....	.40	.30	.33	.35	.35	.35	.26	.29	.28	.25	.25	.22	.21	.21	.19
Exports, raw cotton equiv. thous. net-weight(bales)	460.1	457.9	37.1	35.2	34.5	33.0	31.4	35.9	37.9	44.8	50.1	50.4	45.6	45.4	56.7
Imports, raw cotton equivalent.....do.	525.2	676.2	56.7	68.7	53.9	60.6	60.8	51.3	52.1	62.2	51.1	44.1	54.0	48.8	47.5
MANMADE FIBERS AND MANUFACTURES															
Fiber production, qtrly:															
Filament yarn (acetate).....mil. lb.	282.0	300.9	71.5			76.3			76.9			76.2			
Staple, incl. tow (rayon).....do.	527.0	534.6	129.3			131.7			133.8			139.8			
Noncellulosic, except textile glass:															
Yarn and monofilaments.....do.	3,659.9	3,814.3	909.9			951.5			955.5			997.4			
Staple, incl. tow.....do.	3,653.8	3,952.8	1,002.1			996.8			952.1			1,001.8			
Textile glass fiber.....do.	786.7	928.3	225.2			229.1			233.7			240.3			
Fiber stocks, producers', end of period:															
Filament yarn (acetate).....do.	16.7	15.4	13.1			11.7			12.6			15.4			
Staple, incl. tow (rayon).....do.	49.8	28.7	48.8			46.1			37.4			28.7			
Noncellulosic fiber, except textile glass:															
Yarn and monofilaments.....do.	353.0	343.4	353.6			336.5			334.3			343.4			
Staple, incl. tow.....do.	299.7	335.6	306.3			347.6			328.1			335.6			
Textile glass fiber.....do.	67.9	97.6	84.5			89.4			89.3			97.6			
Manmade fiber and silk broadwoven fabrics:															
Production (qtrly.), total.....mil. lin. yd.	6,223.6	6,602.9	1,648.5			1,691.4			1,528.5			1,734.5			
Filament yarn (100%) fabrics.....do.	2,014.1	2,247.4	555.3			566.8			511.3			614.0			
Chiefly rayon and/or acetate fabrics.....do.	371.5	406.4	98.6			104.6			99.9			103.4			
Chiefly nylon fabrics.....do.	356.9	384.4	78.4			100.6			97.6			107.8			
Spun yarn (100%) fab., exc. blanketing.....do.	3,583.2	3,703.1	931.8			946.2			863.1			962.0			
Rayon and/or acetate fabrics, blends.....do.	286.2	331.2	84.7			83.3			79.1			84.1			
Polyester blends with cotton.....do.	2,677.1	2,593.1	660.8			662.3			596.3			673.7			
Filament and spun yarn fabrics.....do.	359.5	376.2	97.5			97.3			89.2			92.2			
Manmade fiber gray goods, owned by weaving mills:															
Ratio, stocks to unfilled orders, end of period.....	.42	.22	.30	.34	.22	.21	.21	.20	.19	.17	.19	.18	.20		
Prices, manufacturer to mfr., f.o.b. mill:															
50/50 polyester/carded cotton printcloth, gray, 48", 3.90 yds./lb., 78x54-56.....\$ per yd.	.405	.492	.475	.495	.515	.493	.496	.496	.516	.514	.496	.495	.491	.470	.469
65% poly/35% comb. cot. broadcl., 3.0 oz/sp yd, 45", 128x72, gray-basis, wh. perm. presfin.....\$ per yd.	.901	.765	.729	.751	.763	.780	.778	.776	.794	.824					
Manmade fiber knit fabric prices, f.o.b. mill:															
65% acetate/35% nylon tricot, gray, 32 gauge, 54", 3.2 oz./linear yd.....\$ per yd.	.501	.7458	.451	.456	.467	.472									
100% textured polyester DK jacquard, 11 oz./linear yd., 60", yarn dyed, finished.....\$ per yd.	1.708	1.657	1.658	1.658	1.651	1.655									
Manmade fiber manufactures:															
Exports, manmade fiber equivalent.....mil. lbs.	367.08	441.70	36.83	35.57	39.06	36.63	32.06	35.38	38.12	43.68	44.41	42.88	42.86	43.91	53.20
Yarn, tops, thread, cloth.....do.	206.34	267.28	22.86	21.50	23.30	20.85	18.62	20.99	23.29	27.52	27.15	26.82	27.30	27.70	33.37
Cloth, woven.....do.	131.35	165.41	13.07	12.77	13.24	13.82	11.11	12.48	15.12	16.95	17.93	17.72	17.69	16.39	19.37
Manufactured prods., apparel, furnishings.....do.	160.74	174.42	13.96	14.07	15.77	15.79	13.43	14.39	14.82	16.16	17.26	16.06	15.56	16.20	19.83
Imports, manmade fiber equivalent.....do.	531.13	642.59	46.34	53.87	59.74	67.70	70.41	64.90	58.31	50.47	41.08	37.54	47.07	36.31	39.06
Yarn, tops, thread, cloth.....do.	110.11	147.55	13.29	16.11	13.74	12.36	14.13	12.29	11.79	10.24	8.68	8.06	10.02	7.23	10.92
Cloth, woven.....do.	67.70	87.76	7.27	7.85	8.05	7.94	8.61	8.51	7.85	8.66	8.00	4.93	6.88	4.58	6.72
Manufactured prods., apparel, furnishings.....do.	421.02	495.04	33.05	37.76	46.01	55.34	56.28	52.61	46.52	40.23	32.40	29.49	37.05	29.08	28.13
Apparel, total.....do.	365.24	425.18	27.48	31.08	40.00	48.88	49.66	47.10	40.24	34.38	27.49	24.58	31.64	24.71	22.87
Knit apparel.....do.	218.68	212.40	15.78	18.46	25.09	30.40	29.34	26.89	22.92	18.53	13.53	12.02	15.64	11.72	11.16
WOOL AND MANUFACTURES															
Wool consumption, mill (clean basis):															
Apparel class.....mil. lb.	95.5	103.3	10.5	8.8	9.2	10.3	7.0	8.4	9.4	8.1	8.1	7.5	10.1	8.2	8.8
Carpet class.....do.	12.5	13.0	1.2	1.1	1.0	1.5	.8	1.0	1.4	1.2	1.2	.8	1.4	1.1	.8
Wool imports, clean yield.....do.	53.0	50.4	4.1	4.9	4.0	3.8	4.7	5.4	3.4	4.0	4.8	4.0	4.5	3.4	4.2
Duty-free (carpet class).....do.	18.8	23.4	1.4	2.2	1.5	2.0	2.3	2.5	1.9	1.8	1.5	2.0	1.9	1.3	2.2
Wool prices, raw, shorn, clean basis, delivered to U.S. mills:															
Domestic—Graded territory, 64's, staple 2 3/4" and up.....\$ per lb.	1.83	1.90	1.78	1.81	1.84	1.92	1.92	1.92	1.95	1.97	2.02	2.02	2.02	2.02	2.06
Australian, 64's, Type 62, duty-paid.....do.	2.27	2.34	2.31	2.32	2.33	2.36	2.36	2.36	2.36	2.36	2.37	2.37	2.37	2.49	2.65
Wool broadwoven goods, exc. felts:															
Production (qtrly.).....mil. lin. yd.	101.6	116.4	28.2			31.2			27.3			29.8			
FLOOR COVERINGS															
Carpet, rugs, carpeting (woven, tufted, other), shipments, quarterly.....mil. sq. yds.	1,024.6	1,075.9	242.6			281.3			269.8			282.2			
APPAREL															
Women's, misses', juniors' apparel cuttings: ^a															
Coats.....thous. units	18,083	18,727	1,199	1,439	1,787	2,011	1,565	2,242	2,126	1,857	1,434	1,001	1,286	1,206	
Dresses.....do.	183,702	179,078	17,113	16,653	16,161	15,675	12,430	15,664	15,493	14,730	14,883	12,501	11,293	11,650	
Suits (incl. pant suits, jumpsuits).....do.	36,904	27,856	3,006	2,502	2,338	2,164	1,881	2,418	2,175	1,953	2,247	1,877	2,844	2,461	
Blouses.....thous. dozen	23,507	27,893	2,610	2,135	2,353	2,335	1,862	2,662	2,452	2,867	2,433	1,883	2,710	2,650	
Skirts.....do.	5,260	6,414	615	515	612	551	475	580	532	561	604	433	567	652	

^a Revised. ^b Preliminary. ^c Season average. ^d For 5 weeks, other months, 4 weeks. ^e Monthly average. ^f Effective Sept. 1976 SURVEY, data omit production and stocks of saran and spandex yarn. ^g Effective 1976, production of blanketing is included in 100% spun yarn fabric (prior to 1976, in "all other group," not shown separately). ^h Avg. for Jan.-Oct. ⁱ Avg. for Feb.-Jun. ^j Avg. for Jan.-Jun. ^k Effective Jan. 1, 1978, includes reexports formerly excluded. ^l Less than 500 bales. ^m Based on 490-lb. bales, ⁿ price reflects sales as of the 15th; restated ^o price reflects total quantity purchased and dollars paid for entire month (^p price includes discounts and premiums). ^q Includes data not shown separately. ^r Net-weight (480-lb.) bales. ^s Effective Jan. 1976, specifications for the price formerly designated fine good French combing and staple have been changed as shown above. Effective with the May 1976 SURVEY the foreign wool price is quoted including duty. ^t New series. Apparel (BuCensus)—Annual totals derived from firms accounting for 99% of total output of these items; current monthly estimates, from smaller sample. Monthly data for 1975, adjusted to annual totals, are available. Coats exclude all fur, leather, and raincoats. Suits omit garments purchased separately as coordinates. Except for the year 1974, earlier monthly data are available, except for suits. Prices (USD, BLS)—Data not available prior to 1976. ^u Effective Apr. 1979 SURVEY, data include 600 additional firms; comparable data back to Jan. 1977 will be shown later. ^v Avg. for Jan.-Apr.; June-Dec. ^w Avg. for sales prior to Apr. 1, 1979.

Unless otherwise stated in footnotes below, data through 1974 and descriptive notes are as shown in the 1975 edition of BUSINESS STATISTICS

Table with columns for years 1977, 1978, and 1979 (Jan-Apr), and rows for APPAREL—Con. including Men's apparel cuttings (Suits, Coats, Trousers, etc.) with values in thousands of units or dollars.

TRANSPORTATION EQUIPMENT

Large table with columns for years 1977, 1978, and 1979 (Jan-Apr), and rows for AEROSPACE VEHICLES, MOTOR VEHICLES (NEW) (Passenger cars, Trucks and buses), and RAILROAD EQUIPMENT (Freight cars, etc.).

Footnotes explaining symbols for revised, preliminary, and annual total data, and providing details for railroads (AAR) and motor vehicle registrations.

Footnotes explaining symbols for production, factory sales, and States, and providing details for motor vehicle manufacturers and imports.

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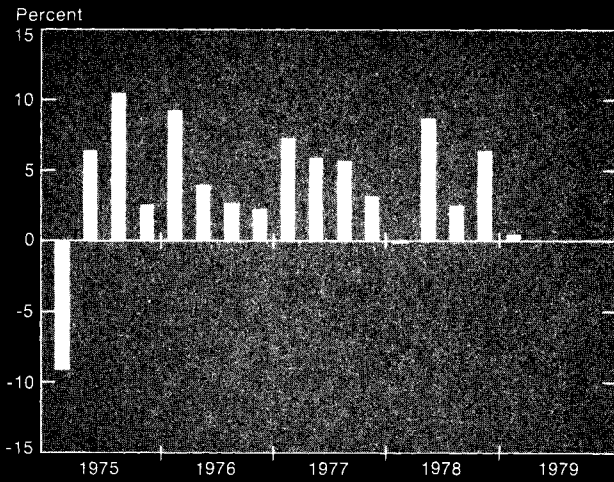
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 U.S. DEPARTMENT OF COMMERCE

Second Class Mail
 209

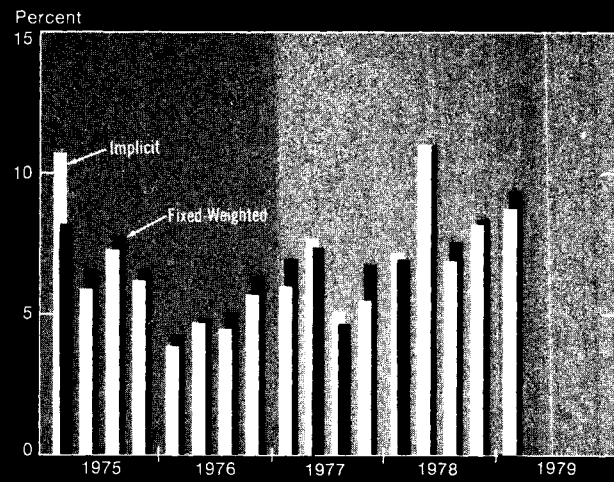
In the first quarter

- Real GNP increased $\frac{1}{2}$ percent
- GNP fixed-weighted price index increased $9\frac{1}{2}$ percent
- Real disposable personal income increased 3 percent

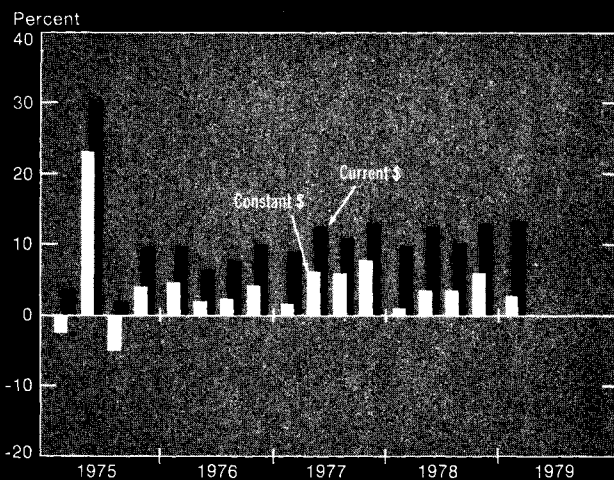
Real GNP



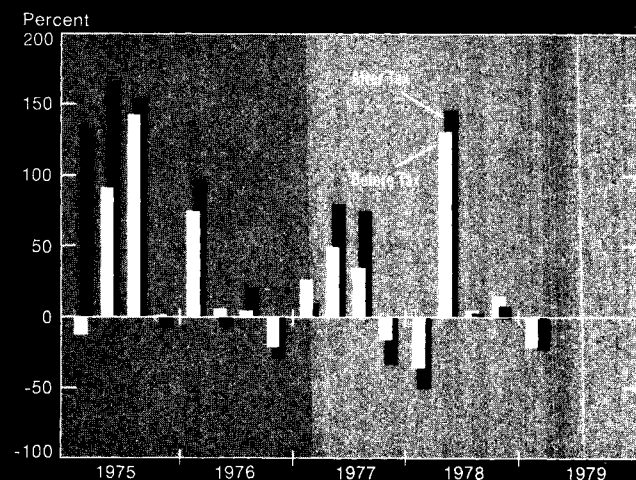
GNP Prices



Disposable Personal Income



Corporate Profits With IVA and CCAAdj



Percent change from preceding quarter seasonally adjusted at annual rates.