

Reconciling divergent trends in real income

*Growth rates in real per capita income
and real family income diverged
between 1970 and 1984 because the concepts
and components of the two series
reflected economic, social,
and demographic changes in different ways*

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The real incomes of American families have not grown very much since the early 1970's. Rather, they have varied with the swings in the business cycle, and the steady increases so evident in the 1960's have been absent. But the real incomes of *individual* Americans have continued to rise. While they too were affected by the economic slowdowns, real incomes of persons have pushed upward as they did in the 1960's. The question is: Why did these trends in real incomes diverge over the last decade and a half?

Family income data are collected every year in the Current Population Survey (CPS), conducted by the Bureau of the Census. Aggregate personal income is measured each month by the Commerce Department's Bureau of Economic Analysis (BEA), and can easily be converted into a per capita income series.¹ (Income data for individuals are also collected in the CPS and a per capita series from that survey is published by the Bureau of the Census.) Both the CPS family income data and the BEA personal income data are used extensively by economists for assessing the Nation's economic well-being. The difference in their trends in recent years is disturbing and raises questions as to what has happened to real incomes.

This article first discusses these divergent trends within

the context of the economic setting and components from which they emerged. We then examine the concepts underlying each measure of real income and conclude with a reconciliation of the two. (A reconciliation of the BEA per capita series is also presented.) A technical appendix with tables is found at the end of the article.

The setting and the trends

The 1970's and early 1980's were years of significant economic, social, and demographic change. The recessions during this period caused millions of workers to lose jobs. Inflation eroded incomes, with particularly strong price increases occurring during the recessions. Along with these economic developments, profound social and demographic changes, begun years before, continued and intensified. Women joined the labor force in record numbers; the incidence of single-parent families increased as the divorce rate soared; the birth rate dropped further and population growth slowed relative to the 1960's; and the baby-boom generation flooded the labor market and sought its place in society. Because of these changes and a weak economy, governments struggled to help the poor, the unemployed, the medically needy, and others. Personal and family earnings were, therefore, frequently supplemented by transfer payments, such as unemployment insurance, aid to families with dependent children, and food stamps. Many of these changes affected BEA personal income and CPS family income differ-

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ently and caused their trends to diverge.

The divergence can be best observed when the BEA personal income series is converted into a per capita series. As shown in chart 1 and table 1, both the real BEA per capita income series and the real CPS family income series rose at an average annual rate of slightly more than 3.0 percent between 1960 and 1970.² In sharp contrast, real BEA per capita income continued to grow moderately, at a 1.8-percent rate, during the next 14 years while real CPS mean family income showed little growth—only 0.3 percent a year.

Differences in the levels of these two income series can be expected, of course, because one relates to the entire population and the other only to families. In 1984, for example BEA per capita income was \$13,145 and CPS mean family income was \$31,052. But differences in these series' trends of the magnitude that occurred in the 1970–84 period are unsettling, especially after they behaved so similarly during the 1960's.

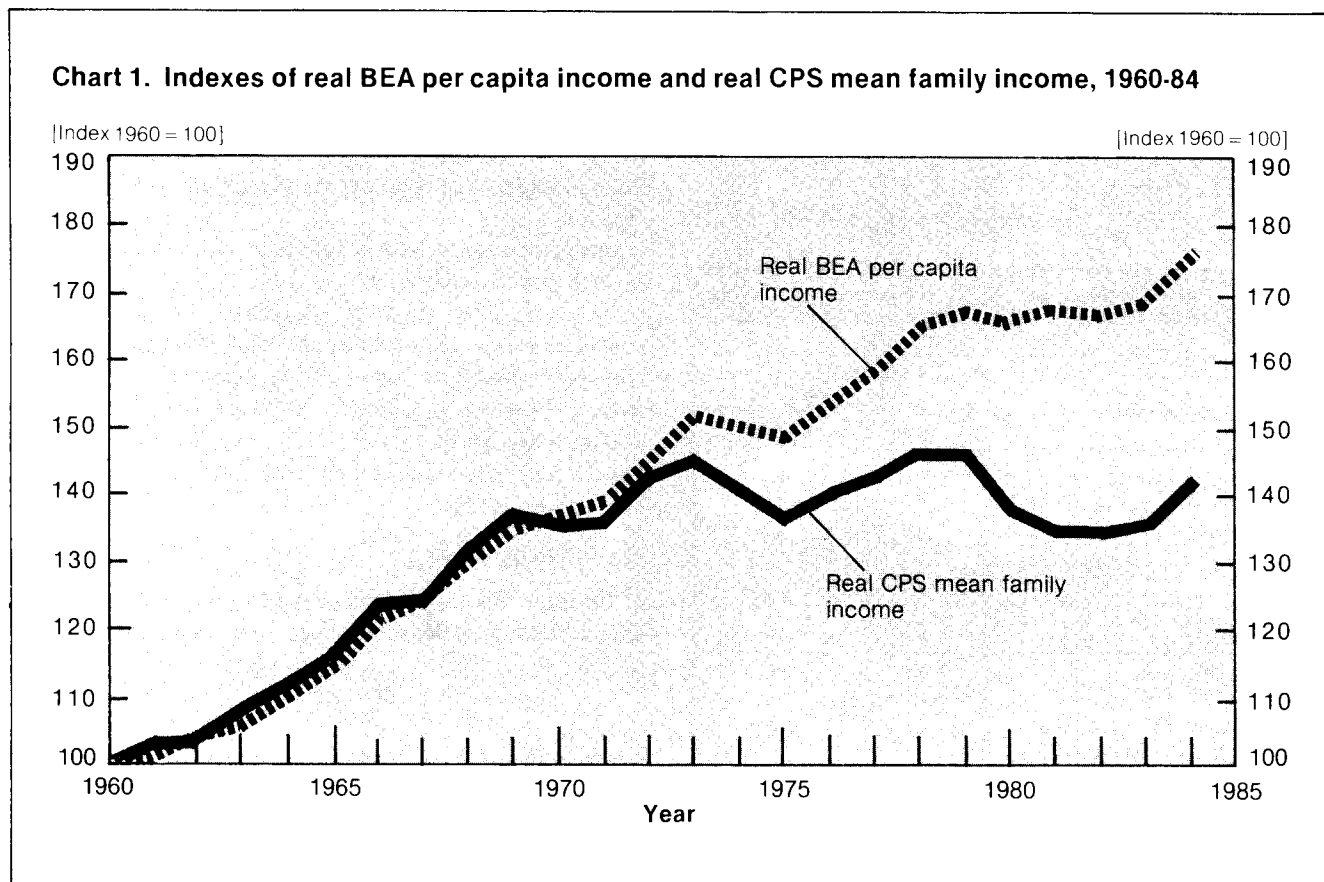
Concepts and components

To understand why these real income measures diverged, it is important to understand the concepts behind them. As explained below, each measure has similar components, but conceptual differences exist between them.

Aggregate income. A major difference between the BEA and CPS income concepts is that BEA personal income relates to income from all sources, while CPS income relates only to money income.

The BEA series is developed from a variety of government statistics, the most important being the Federal tax records of the U.S. Department of the Treasury, the insurance files of the Social Security Administration, and the State unemployment records collected by the U.S. Department of Labor. Personal income comprises wages and salaries, including cash and in-kind payments; other labor income such as employer contributions to private pension, welfare, and workers' compensation funds; proprietors' income; the income from rental properties; dividends and interest; and government and business transfer payments (Social Security, food stamps, corporate cash prizes, and so forth). The sum of all these items minus the amounts paid by individuals for old age, survivors, disability, and health insurance (OASDHI), government retirement, and other social programs equals BEA's aggregate personal income.³

The CPS series is based on a sample of about 60,000 households designed to represent all households in the country. Each March, Census Bureau interviewers ask household respondents about their money income in the previous year. Important nonmoney income items excluded from the CPS



series but included in the BEA series are wages received in-kind, food stamps, medicare and medicaid, the net rental value of owner-occupied homes, goods produced and consumed at home, and various fringe benefits provided by employers, such as health insurance and pension plans.⁴ Most of the other income items reported in the BEA data are also collected in the CPS—money wages and salaries, self-employment income, interest and dividends, rental income, Social Security, cash transfer payments, and so on—but because this information is obtained from a sampling of households, a certain amount of income underreporting occurs.⁵

Price deflators. Another important conceptual difference between the BEA real income series and the CPS series concerns the price deflators used to convert nominal incomes into real incomes.⁶

CPS family income is converted into real dollars using the Consumer Price Index (CPI) produced by the Bureau of Labor Statistics. The CPI is obtained through direct price collection and measures price changes for a fixed market basket of goods and services (established in the 1972–73 period) that represents the average expenditures of urban consumers. BEA personal income is deflated by the implicit price deflator for personal consumption expenditures, hereafter referred to as the PCE Deflator. The weights for the commodities priced in this index are obtained in the period for which the index is to be computed. The PCE Deflator, unlike the CPI, is obtained by dividing current consumer expenditures by real, or constant dollar, expenditures. (To deflate current consumer expenditures, the BEA uses price indexes from the CPI for 85 of the 115 commodities included in the PCE Deflator.)

During the 1970's, many analysts suggested that the CPI

Table 2. Changes in components of BEA personal income and CPS family income estimates, 1960–70 and 1970–84

Year or period	Aggregate income (billions of dollars)		Income recipients (thousands)		Income deflator	
	BEA personal income	CPS family income	BEA population estimate	CPS family estimate	PCE Deflator (1982=100)	Consumer Price Index (1967=100)
1960	\$ 409.4	\$ 283.6	180,760	45,539	32.9	88.7
1970	831.8	580.0	205,089	52,227	42.9	116.3
1984	3,111.9	1,947.1	236,731	62,706	108.2	311.1
Average annual percent change: ¹						
1960–70	7.1	7.2	1.3	1.4	2.7	2.7
1970–84	9.4	8.7	1.0	1.3	6.6	7.0

¹ See text footnote 2.

was overstating the inflation rate when compared to the PCE Deflator. It was true that the homeownership component of the CPI (which consisted of house prices, mortgage interest, and the cost of maintaining a house) was very sensitive to the activity in the housing market and the wildly fluctuating mortgage interest rates. After a review of its pricing of homeownership, BLS concluded that its approach had investment and consumption aspects which were inconsistent with the principle that the CPI should focus only on current consumption. BLS therefore began experimenting with a rental equivalence approach—one similar to the one used in the PCE Deflator—and eventually adopted it beginning with publication of the January 1983 CPI.

Income recipients. The income recipients, of course, are different in the BEA per capita income and the CPS family income series. One relates to the population and the other to families.

BEA per capita income is calculated using an annual estimate of population from the CPS. This annual estimate represents averages of quarterly population estimates and includes inmates of institutions and military personnel overseas or living on post in the United States. In the family income measure, an estimate of the number of families is obtained through the CPS. Families are defined as a group of two or more persons related by birth, marriage, or adoption who reside together.

Reconciling trends

The BEA and CPS real income measures are constructed similarly. In general, they can be expressed as:

$$\bar{Y} = \frac{Y}{N \times D}$$

where \bar{Y} is real mean income; Y is aggregate income; N is number of recipients; and D is the price deflator. Differences in the growth rates of the components in both real income measures were responsible for the divergent trends in real income. Indeed, it will be shown that these differ-

Table 1. Reconciliation of trends in real BEA per capita income and in real cps income measures, 1960–70 and 1970–84

Series and reasons for differences	Average annual rate of change (in percent) ¹	
	1960–70	1970–84
Real BEA per capita income	3.2	1.8
Real CPS family income	3.1	0.3
Total difference	0.1	1.5
Percentage points of difference due to varying growth rates in:		
Aggregate incomes	-0.1	0.8
Number of recipients	0.1	0.3
Price deflators	0.1	0.4
Real BEA per capita income	3.2	1.8
Real CPS per capita income	3.1	1.4
Total difference	0.1	0.4
Percentage points of difference due to varying growth rates in:		
Aggregate incomes	0.0	0.1
Number of recipients	0.0	-0.1
Price deflators	0.1	0.4

¹ See text footnote 2.

ences approximately equal the overall trend differences between the measures.⁷ (See the appendix for a description of the reconciliation method.)

As indicated, the difference in annual growth rates in the per capita and family income series in the 1970–84 period was 1.5 percentage points. Based on the reconciliation method used in this article, about half of the trend difference, or 0.8 percentage points, was caused by different rates of growth in the aggregate incomes used in each series. Another 0.4 percentage points was the result of differential growth rates in the price deflators—the CPI and PCE Deflator—of the series. And the remaining difference of 0.3 percentage points was due to different growth rates in population and in number of families. (See table 1.) These differences are examined in detail below.

Aggregate incomes in the BEA per capita series and the CPS family income series grew at about the same average annual rate in the 1960's, but between 1970 and 1984, the BEA aggregate rose by 9.4 percent a year, compared to an 8.7-percent growth rate in the CPS aggregate (table 2). Two factors may have been responsible for the faster growth in BEA aggregate income. First, nonmoney income (such as food stamps, medicare, medicaid, and certain fringe benefits) grew rapidly in recent years, and much of the growth occurred in nonfamily households. (As mentioned earlier, nonmoney income is included under the BEA income concept, but excluded in the CPS concept.) Second, BEA aggregate income growth was also boosted by the maturing of the baby-boom generation. Many of the individuals from this group have not married, preferring to live alone or with other unrelated individuals. (The number of unrelated individuals age 25 to 34 grew from 1.8 million in 1970 to 7.3 million by 1984.) Their income is included in the BEA aggregate, but excluded from the CPS family income aggregate.

Table 2 shows that both the PCE Deflator and CPI measured inflation at the same annual rate during the 1960's—2.7 percent. Over the 1970–84 period, however, the CPI recorded a slightly faster increase in consumer prices than did the PCE Deflator, with the largest annual differences occurring in the late 1970's and early 1980's. The home-ownership component of the CPI was greatly affected by the activity in the housing and money markets, and analysts have identified this component as responsible for the disparate inflation rates.⁸ Consequently, use of the PCE Deflator

in the BEA series would, other things equal, have less of an eroding effect on income than would the CPI in the CPS family income series.

Differences in the rates of growth of the Nation's population and families also affected the trends. As presented in table 2, the BEA estimate of population growth and CPS estimate of growth in numbers of families were very similar in the 1960–70 period—about 1.3 to 1.4 percent. But between 1970 and 1984, the number of families continued to grow by about 1.3 percent a year while population growth slackened to a 1.0-percent rate.

BEA and CPS per capita income. Income data are also collected for individuals in the CPS, and this information is published at the same time as the family income data.⁹ The level of CPS real per capita income is slightly lower than the BEA estimate (as shown in appendix table A-3) because the CPS aggregate income estimate is less inclusive than the BEA estimate. Both series exhibited similar trends in the 1960's but then diverged slightly toward the end of the 1970–84 period. As shown in table 1, the trend difference was 0.1 percentage points a year between 1960 and 1970, but then widened to 0.4 points annually between 1970 and 1984. According to the reconciliation methodology used in this article, all of the difference in the growth rates of these two series was caused by the different price deflators. As mentioned earlier, the CPI rose much faster than the PCE Deflator at the end of the 1970's and beginning of the 1980's.

THE DIVERGENT TRENDS in real BEA per capita income and real CPS family income between 1970 and 1984 are reconcilable. Each measure reflected the economic, social, and demographic changes of the period to the extent that its concepts and components allowed. And this illustrates an important point: During times of rapid economic, social, and demographic changes, a single income measure may give a less than complete picture of what has happened because of the way in which it is constructed. In the case just discussed, a global measure of real income indicated that real incomes were rising in the 1970's and 1980's, while a narrower measure showed little growth taking place. Once the concepts and components of each measure were understood, however, it could be shown that both trends were compatible. □

—FOOTNOTES—

¹ BEA publishes a series on per capita “disposable” income (personal income minus tax and nontax payments, divided by the population). The population estimates used in that series were used in deriving the per capita personal income series discussed in this article. Statistics on per capita personal income have been published before. For example, see *Social Indicators III* (Bureau of the Census, December 1980), pp. 474–75.

² The average annual rates of change in this report have been calculated by the following formula:

$$r = \ln \frac{P_1}{P_0} \div N \times 100$$

where \ln is the natural logarithm of the ratio; P_1 is a number at the end of some time interval; P_0 is a number at the beginning of the interval; N is the number of years in the interval; and r is the average annual rate of percent change.

³ For a thorough discussion of the BEA income concept, see *Business Statistics 1979* (U.S. Department of Commerce, Bureau of Economic Analysis, 1981).

⁴ For a full discussion of the CPS money income concept, see *Money Income of Households, Families, and Persons in the United States: 1983*, Current Population Reports, Series P-60, No. 146 (Bureau of the Census,

1985), pp. 207-19.

⁵ In 1983 (the last year for which such data are available), the CPS collected 90.1 percent of an independent estimate of aggregate income adjusted to the CPS money income concept. See *Money Income of Households*, p. 219.

⁶ The discussion in this section is based on two articles: Jack E. Triplett, "Reconciling the CPI and the PCE Deflator," *Monthly Labor Review*, September 1981, pp. 3-15; and Robert Gillingham and Walter Lane,

"Changing the treatment of shelter costs for homeowners in the CPI," *Monthly Labor Review*, June 1982, pp. 9-14.

⁷ The same methodology was used by the author in reconciling trends in real per capita disposable income and real net spendable earnings. See Paul Ryscavage, "Two divergent measures of purchasing power," *Monthly Labor Review*, August 1979, pp. 25-30.

⁸ Triplett, "Reconciling the CPI and PCE Deflator," p. 4.

⁹ *Money Income of Households*, p. 121.

APPENDIX: Reconciliation method

The method used to reconcile the trends in real BEA per capita income and real CPS mean family income proceeds as follows. Let the change in real BEA per capita income be defined as:

$$\frac{\bar{Y}_1}{\bar{Y}_0} = \frac{\frac{Y_1}{N_1 \times D_1}}{\frac{Y_0}{N_0 \times D_0}}$$

where in periods 0 and 1, \bar{Y} equals real per capita income, Y the aggregate personal income, N the population of recipients, and D the implicit price deflator for personal consumption expenditures. This expression can then be written as:

$$\frac{\bar{Y}_1}{\bar{Y}_0} = \frac{Y_1}{Y_0} \times \frac{N_0}{N_1} \times \frac{D_0}{D_1}$$

Table A-1. Components of the real BEA personal income per capita series, 1960-84

Year	Real BEA per capita income (1982 dollars)	BEA per capita income	BEA aggregate personal income (billions)	BEA population ¹ (thousands)	PCE Deflator (1982=100)
1960	6,884	2,265	409.4	180,760	32.9
1961	6,961	2,318	426.0	183,742	33.3
1962	7,165	2,429	453.2	186,590	33.9
1963	7,314	2,516	476.3	189,300	34.4
1964	7,594	2,658	510.2	191,927	35.0
1965	7,978	2,840	552.0	194,347	35.6
1966	8,327	3,056	600.8	196,599	36.7
1967	8,625	3,243	644.5	198,752	37.6
1968	8,964	3,523	707.2	200,745	39.3
1969	9,298	3,812	772.9	202,736	41.0
1970	9,455	4,056	831.8	205,089	42.9
1971	9,586	4,304	894.0	207,692	44.9
1972	10,013	4,676	981.6	209,924	46.7
1973	10,480	5,198	1,101.7	211,939	49.6
1974	10,323	5,657	1,210.1	213,898	54.8
1975	10,272	6,081	1,313.4	215,981	59.2
1976	10,631	6,655	1,451.4	218,086	62.6
1977	10,924	7,297	1,607.5	220,289	66.7
1978	11,370	8,141	1,812.4	222,629	71.6
1979	11,554	9,036	2,034.0	225,106	78.2
1980	11,452	9,917	2,258.5	227,732	86.6
1981	11,581	10,956	2,520.9	230,087	94.6
1982	11,493	11,493	2,670.8	232,376	100.0
1983	11,637	12,091	2,836.4	234,579	103.9
1984	12,149	13,145	3,111.9	236,731	108.2

¹ Includes members of the Armed Forces living abroad.

Table A-2. Components of the real CPS mean family income series, 1960-84

Year	Real cps mean family income (1984 dollars)	CPS mean family income	CPS aggregate family income (billions)	Families (thousands)	Consumer Price Index (1967 = 100)
1960	\$21,840	\$ 6,227	\$ 283.6	45,539	88.7
1961	22,468	6,471	300.4	46,418	89.6
1962	22,903	6,670	313.9	47,059	90.6
1963	23,741	6,998	332.7	47,540	91.7
1964	24,567	7,336	351.8	47,956	92.9
1965	25,362	7,704	373.7	48,509	94.5
1966	26,869	8,395	413.2	49,214	97.2
1967	27,380	8,801	441.0	50,111	100.0
1968	28,871	9,670	491.5	50,823	104.2
1969	29,968	10,577	545.6	51,586	109.8
1970	29,708	11,106	580.0	52,227	116.3
1971	29,707	11,583	617.3	53,296	121.3
1972	31,346	12,625	686.5	54,373	125.3
1973	31,839	13,622	749.9	55,053	133.1
1974	30,986	14,711	819.4	55,698	147.7
1975	30,002	15,546	874.4	56,245	161.2
1976	30,782	16,870	956.7	56,710	170.5
1977	31,305	18,264	1,045.0	57,215	181.5
1978	31,987	20,091	1,161.3	57,804	195.4
1979	31,934	22,316	1,328.9	59,550	217.4
1980	30,220	23,974	1,445.8	60,309	246.8
1981	29,509	25,838	1,576.6	61,019	272.4
1982	29,475	27,391	1,681.6	61,393	289.1
1983	29,826	28,608	1,774.1	62,015	298.4
1984	31,052	31,052	1,947.1	62,706	311.1

Taking the natural logarithms of each side yields the following equation:

$$\ln \frac{\bar{Y}_1}{\bar{Y}_0} = \ln \frac{Y_1}{Y_0} + \ln \frac{N_0}{N_1} + \ln \frac{D_0}{D_1}$$

and when the deflator and recipient components are inverted for the purpose of the reconciliation, the equation becomes:

$$\ln \frac{\bar{Y}_1}{\bar{Y}_0} = \ln \frac{Y_1}{Y_0} - \ln \frac{N_1}{N_0} - \ln \frac{D_1}{D_0}$$

The same procedure is used with real CPS family income, and for the purposes of this description, components are notated in the same, but lower case, letters. That is, \bar{y} equals mean family income, y the aggregate family income, n the number of families, and d the Consumer Price Index (CPI). Consequently, the difference in growth rates between real

Table A-3. Components of the real cps per capita income series, 1960-84

Year	Real cps per capita income (1984 dollars)	CPS per capita income	CPS aggregate income (billions)	CPS population ¹	Consumer Price Index (1967 = 100)
1960	\$ 6,204	\$ 1,769	\$ 320.6	181,252	88.7
1961	6,528	1,880	345.3	183,682	89.6
1962	6,569	1,913	357.1	186,695	90.6
1963	6,738	1,986	394.0	189,400	91.7
1964	6,989	2,087	400.6	191,967	92.9
1965	7,275	2,210	428.8	194,013	94.5
1966	7,569	2,365	463.2	195,855	97.2
1967	7,666	2,464	488.2	198,120	100.0
1968	8,154	2,731	546.6	200,139	104.2
1969	8,520	3,007	608.0	202,189	109.8
1970	8,498	3,177	652.0	205,214	116.3
1971	8,764	3,417	699.9	204,840	121.3
1972	9,358	3,769	777.6	206,302	125.3
1973	9,679	4,141	861.1	207,949	133.1
1974	9,362	4,445	931.5	209,572	147.7
1975	9,298	4,818	1,017.3	211,140	161.2
1976	9,618	5,271	1,120.4	212,566	170.5
1977	9,916	5,785	1,238.9	214,159	181.5
1978	10,277	6,455	1,383.9	215,935	195.4
1979	10,257	7,168	1,599.6	223,160	217.4
1980	9,816	7,787	1,754.0	225,242	246.8
1981	9,680	8,476	1,927.2	227,375	272.4
1982	9,663	8,980	2,061.7	229,587	289.1
1983	9,954	9,548	2,214.5	231,938	298.4
1984	10,328	10,328	2,417.4	234,066	311.1

¹ The population estimates are as of March of the following year. They represent the civilian noninstitutional population plus the Armed Forces personnel living off post or with their families on post in the United States.

BEA per capita income and real CPS mean family income is:

$$\text{DIFFERENCE} = \ln \frac{\bar{Y}_1}{Y_0} - \ln \frac{\bar{y}_1}{y_0}$$

or

$$\text{DIFFERENCE} = \ln \frac{Y_1}{Y_0} - \ln \frac{N_1}{N_0} - \ln \frac{D_1}{D_0} - \ln \frac{y_1}{y_0} + \ln \frac{n_1}{n_0} + \ln \frac{d_1}{d_0}$$

The terms in the above expression can be rearranged to define the following effects, all of which approximately add to the difference in growth rates between the real income measures:

$$\text{Aggregate income effect} = \ln \frac{Y_1}{Y_0} - \ln \frac{y_1}{y_0}$$

$$\text{Recipient effect} = - \ln \frac{N_1}{N_0} + \ln \frac{n_1}{n_0}$$

$$\text{Deflator effect} = - \ln \frac{D_1}{D_0} + \ln \frac{d_1}{d_0}$$

Appendix tables A-1, A-2, and A-3 contain the basic data to which this reconciliation method was applied.