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The Sources and Methods Used in the Creation of the Levy Institute Measure of Economic Well-Being for the United States, 1959–2013

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ABSTRACT

This paper documents the sources of data used in the construction of the estimates of the Levy Institute Measure of Economic Wellbeing (LIMEW) for the years 1959, 1972, 1982, 1989, 1992, 1995, 2000, 2001, 2004, 2007, 2010, and 2013. It also documents the methods used to combine the various sources of data into the synthetic dataset used to produce each year's LIMEW estimates.

KEYWORDS: Levy Institute Measure of Economic Wellbeing (LIMEW); Statistical Matching; Synthetic Datasets

JEL CLASSIFICATIONS: D31; C10; H23; I30

1. INTRODUCTION

The information required for constructing the Levy Institute Measure of Economic Well-Being (LIMEW) is not available in any single microdata file.[1] At a very basic level, our empirical strategy in estimating the LIMEW can be described as starting with a large microdata file with income and demographic characteristics, and then adding on the supplementary information, either via statistical matching or other imputation techniques, to estimate the various components of economic resources that households have potential access to. The key technique we use for statistical matching is described briefly in the next section (section 2). Details regarding individual matches and assessment of the quality of matches have already been provided elsewhere (Rios-Avilla 2014; Masterson 2010; Wolff, Zacharias, and Masterson 2009). The empirical strategies involved in constructing the core synthetic file for 1959 and 1972 are sufficiently different from each other and from the later years to warrant separate descriptions (sections 3 and 4). The subsequent section (section 5) discusses the procedures followed for 1982 forward, years for which our methodology has been kept consistent across years except for changes due to survey redesign. Estimates of public consumption were derived in a relatively uniform fashion for all the years and hence they are discussed separately in the next section (section 6). The wealth definitions and long-run rates of return used in the study are presented in the final section (section 7). Due to limitations of space, our focus is on detailing the crucial steps involved in constructing the estimates rather than on the minutiae.

2. STATISTICAL MATCHING

The microdata files are combined to create the core synthetic file using constrained statistical matching. The basic idea behind the technique is to transfer information from one survey ("donor file") to another ("recipient file"). Information available in the donor file is missing in the recipient file but necessary for research purposes. Each individual record in the recipient file is matched with a record in the donor file, where a match represents a similar record, based on the several common variables in the both files. The variables are hierarchically organized to create

[1] For details about the conceptual basis and the construction of the LIMEW, see Wolff and Zacharias (2007b)

the matching cells for the matching procedure. Some of these variables are considered as strata variables (categorical variables that we consider to be of the greatest importance in designing the match). For example, if we use sex and employment status as strata variables, this would mean that we would match only individuals of the same sex and employment status. Within the strata, we use a number of variables of secondary importance as match variables.

The matching is performed on the basis of the estimated propensity scores derived from the strata and match variables. In this derivation, a penalty weight is assigned to the distance function according to the size and ranking of the coefficients of strata variables. For every recipient in the recipient file, an observation in the donor file is matched with the same or nearest-neighbor values of propensity scores without replacement. This process is done based on a constrained match such that the weighted total population in the recipient and donor files are identical. The quality of the match is evaluated by comparing the marginal and joint distributions of the variable of interest in the donor file and the statistically matched file.[2]

3. 1959

Our basic file is the 1-in-100 national random sample of the population that consists of 579,000 household and 1,780,000 person records, drawn from the 1960 Census (Ruggles et al. 2008). The file, abbreviated commonly as "IPUMS" (Integrated Public Use Microdata Series), contains detailed information on demographic characteristics (as of 1960) and money income (received during 1959). Additional information required to construct the core synthetic file was obtained from the following nationally representative surveys via statistical matching with the IPUMS: Consumer Expenditure Survey 1960–61 (CES), consisting of 13,745 consumer units (US Department of Labor, Bureau of Labor Statistics 1980); Survey of Financial Characteristics of Consumers 1962 (SFCC), with a sample size of 2,557 households;[3] Individual Tax Model File

[2] For a technical description and results of our matching algorithm, see Kum and Masterson (2010). For documentation of the statistical matches used in the production of the LIMEW estimates for 1992 and 2007, see Masterson (2010); for 2010, see Rios-Avila (2014); for 2013, see Rios-Avila (forthcoming). Details of statistical matches for other years may be furnished upon request.

[3] Details on the survey can be found at: http://www.federalreserve.gov/pubs/oss/oss2/scfindex.html

1960 (ITM), which contains a sample of 101,920 tax returns;[4] and two time-use surveys: Americans' Use of Time 1965–66, with a sample size of 2,001 individuals, and the Time Use in Economic and Social Accounts 1975–76, with a sample size of 2,406 individuals.[5] The major steps involved in constructing the LIMEW by adding supplementary information are shown in table 1.

Table 1. Construction of the LIMEW, 1959

Line No.	Component	Source
1	Earnings	IPUMS
2	Money income other than earnings	
3	Property income	Statistical matching of IPUMS and CES
4	Government cash transfers	
5	Other money income	
6	Money income (MI): Sum of lines 1 and 2	IPUMS
7	*Less*: Property income (line 3) and Government cash transfers (line 4)	
8	*Equals*: Base money income	
9	*Plus*: Income from wealth	Statistical matching of IPUMS and SFCC
10	Annuity from nonhome wealth	
11	Imputed rent on owner-occupied housing	
12	*Less*: Taxes	
13	Income taxes	Statistical matching of IPUMS and ITM; *IncTaxCalc* program; and NIPA
14	Payroll taxes	
15	Property taxes	Statistical matching of IPUMS and SFCC (for home values); and NIPA (for taxes)
16	*Plus*: Cash transfers	Same as line 4 above; and NIPA for relevant aggregates
17	*Plus*: Noncash transfers	IPUMS; statistical matching of IPUMS and CES 1960–61; administrative data; and NIPA (for amounts)
18	*Plus*: Public consumption	IPUMS and others (see section 5)
19	*Plus*: Household production	Statistical matching of IPUMS and time-use surveys of 1965 and 1975
20	*Equals*: LIMEW	

Each of the steps described in the table are discussed briefly below.

[4] The general description of the file can be found at: http://www.nber.org/~taxsim/gdb/. We obtained the data from the National Archives: http://www.archives.gov/ (Department of the Treasury. Internal Revenue Service. Office of Compliance Research. Statistics of Income Division. 1984).

[5] We used the version of the 1965 file compiled by American Heritage Time Use Study (AHTUS), release 1 (May 2006), created at the Centre for Time Use Research (Fisher et al. 2006). We created the 1975 file by combining the AHTUS and the original study files described in Juster et al. (1992).

Lines 3 through 5: Statistical matching with the CES was performed to determine the proportions in which money income other than earnings (line 2) was distributed between its three components (lines 3 through 5) for each household in the IPUMS with a nonzero amount for money income other than earnings. The proportions—imputed from the statistical matching—were utilized to calculate the dollar amount of income from each source.

Lines 9 through 11: Statistical matching with the SFCC was conducted to obtain the amounts of assets and liabilities for each household in the IPUMS. Values of assets (other than homes) and liabilities were "aged" back from their 1962 levels to 1959 levels by deflating each asset and liability with their respective rate of return. Home values were deflated to the 1959 levels by the percent change in the median home price between 1959 and 1962. Data on rates of return for assets (other than homes) was obtained from the Federal Reserve (see section 6) with two exceptions. The interest rate on time and saving deposits (a component of liquid assets) was not available from the Federal Reserve. We therefore used the estimate from Gray (1964). Also, the Federal Reserve does not have any data for the period 1959–62 for calculating the rates of return on retirement assets. We assumed that they earned the same rate of return as financial assets, for which data was available (see section 6).

Lifetime annuities (including annuitized payments on debts) were calculated based on the demographic information available in the IPUMS (age, sex, and race of the head and spouse of wealth-holding families), life expectancy tables for 1959 (differentiated by age, sex, and race—obtained from the *Statistical Abstract* 1962), and long-term rates of return by asset type. The aggregate amount of imputed rent on owner-occupied housing for 1959 (reported in the national accounts, NIPA table 7.12, line 209) was distributed among households according to the gross value of homes.

Lines 12 through 15: Statistical matching with the ITM was conducted to obtain the amounts of capital gains, capital losses, and deductions for each potential tax unit in the IPUMS. This information was utilized in conjunction with other relevant information in the synthetic file (including information derived from the statistical matches with the CES and SFCC) to construct the variables necessary for determining income and payroll tax payments. The actual amounts of

taxes were calculated using the *IncTaxCalc* program (developed by Jon Bakija [2007] at Williams College), which incorporates detailed information regarding the tax regime in 1959 with respect to federal and state income taxes. Income and payroll taxes were aligned with their respective national accounts aggregates. The NIPA amount of property taxes on owner-occupied homes in each state was distributed among homeowners according to the gross value of homes.

Lines 16 through 17: The statistical match with the CES allowed us to determine four cash transfers: Social Security, unemployment compensation, veterans' benefits, and public assistance. They comprised 94 percent of all government transfers in 1959, as reported in the national accounts (NIPA table 3.12, "Government social benefits"). Additional imputations were done for some noncash transfers (e.g., medical assistance) reported in the national accounts, based on household/individual characteristics in the IPUMS and a variety of administrative sources.

Line 18: See section 5.

Line 19: The 1965 time-use survey included only the nonelderly, urban adult (age 19+) population living in households in which at least one adult was employed. For individuals in the IPUMS within the same universe, a statistical match was conducted with the time-use survey to impute weekly hours of household production. For the elderly and the nonurban population (as well as individuals in urban households in which no adult was employed), an unconstrained statistical match was performed with the 1975–76 time-use survey to impute weekly hours of household production.

The hourly wage rate for private household workers was estimated from the March Current Population Survey (CPS) surveys of 1962, 1963, and 1964 that contained information regarding weekly hours, weeks worked in the previous year,[6] and wages earned in the previous year.[7] We

[6] Weeks worked in the previous year are reported in intervals in the March CPS prior to 1976. Unicon Research Corporation (http://www.unicon.com/) has converted this variable into a quasi-continuous variable by assigning for each interval a point estimate based on pooling together data from a few March CPS surveys from 1976 onwards. We used these point estimates in our calculations.

[7] Hourly wages could not be calculated from the IPUMS because both weekly hours and weeks worked are reported in intervals in the file. Even if these variables were reported as actual values, the IPUMS would not be a desirable

pooled together data from three years because in any single year the number of observations for private household workers was quite small (roughly 1,000). The question regarding hours worked in the March CPS pertains to hours worked in the previous week. Typically, a substantial proportion (36–39 percent) of private household workers who reported positive wages during the previous year were not working during the reference week, reflecting the fact that the majority of them were part-year workers. To avoid the bias that would creep into the wage calculation if we were to treat them as not having worked last year, we imputed weekly hours for them using the predictive mean matching variant of the multiple imputation technique. Observations with missing values were grouped according to the weeks worked in the preceding year, and ordinary least squares (OLS) estimates for weekly hours were estimated for each group. The independent variables used in the regression were: age, age squared, and dummies for sex, race, marital status, full-time worker, rural residence, and regions. Five replicates were computed for each observation and their average was assigned as the final value. The initial estimate of the hourly wage rate was calculated by dividing annual wage income with the annual hours worked (weekly hours of work multiplied by weeks worked). The final estimate was obtained by "deflating" the nominal hourly wage for each year (i.e., 1961, 1962, and 1963) back to the 1959 level on the basis of the observed rate of change in the nominal wage and calculating the pooled average. Since we did not have any information on the rate of change in the nominal wage between 1959 and 1961, we assumed that it was the same as that observed between 1961 and 1963.

Two variables required for constructing the performance index (educational attainment and household income) were available directly in the IPUMS. The final variable, time availability, was constructed by transforming the weekly hours of market work reported in the IPUMS in interval form into a continuous variable and then subtracting the resulting value from 112.[8] Transformation of the weekly hours of market work variable into a continuous variable was required only for those who performed market work in 1959 and, among them, for those who

source for estimating the hourly wage for private household workers. A large proportion of private household workers are part-year workers, which, in turn, means that there will be a large proportion of workers who report zero for hours worked last week in a survey. Additionally, it is a relatively small occupational group, hence, using a single survey might not result in a sufficient number of observations.

[8] The number 112 is obtained by subtracting 56 from the total hours in a week (i.e., 158). We assumed that the physically available hours in a week are limited by the requirement that eight hours per day are needed for rest and personal care.

worked fewer than 40 hours a week.[9] The transformation involved two steps. First, we pooled together the data from the March CPS for 1962, 1963, and 1964, which contained actual values (rather than intervals) for hours worked last week. In the next step, we stacked the CPS data and the IPUMS. Those who worked fewer than 40 hours a week were split into cells by the weeks worked and weekly hours intervals. The observations from the IPUMS were treated as having missing values for the actual weekly hours. We imputed weekly hours for them using the predictive mean matching variant of the multiple imputation technique, following a procedure identical to that described in the previous paragraph.

4. 1972

Our basic datafile is a special version of the 1973 March CPS file that was assembled by the Social Security Administration. This file contains, in addition to the variables in the standard file, information on tenure (own or rent home), income amounts reported on the tax returns, type of tax return filed, number of exemptions, etc. The sample consists of 44,899 household and 135,893 person records (Social Security Administration 2001). The file, abbreviated as "CPS" below, contains detailed information on demographic characteristics (as of 1973) and money income (received during 1972). Additional information required for constructing the core synthetic file was obtained from the following nationally representative surveys via statistical matching with the CPS: Consumer Expenditure Survey 1972–73 (CES), consisting of 19,975 consumer units (US Deptartment of Labor, Bureau of Labor Statistics 1973);[10] Augmented Individual Income Tax Model File 1972 (AIITM), containing a sample of 106,581 tax returns (Social Security Administration 1972);[11] and the time-use survey, Time Use in Economic and Social Accounts 1975–76, containing a sample of 2,406 individuals (Juster et al. 1992).[12] The major steps involved in constructing the LIMEW by adding supplementary information are shown in table 2.

[9] Those who reported working 40 or more hours last week were treated as having worked 40 hours.
[10] We purchased the computer file from the Bureau of Labor Statistics (BLS).
[11] We obtained the data from the National Archives: http://www.archives.gov/
[12] We created the 1975 file by combining the AHTUS and the original study files.

Table A2. Construction of LIMEW, 1972

Line No	Component	Source
1	Earnings	CPS
2	Money income other than earnings	
3	Property income	
4	Government cash transfers	
5	Other money income	
6	Money income (MI): Sum of lines 1 and 2	
7	*Less*: Property income (line 3) and government cash transfers (line 4)	
8	*Equals*: Base money income	
9	*Plus*: Income from wealth	Statistical matching of CPS with AIITM and CES
10	Annuity from nonhome wealth	
11	Imputed rent on owner-occupied housing	
12	*Less*: Taxes	
13	Income taxes	Statistical matching of CPS and AIITM; *IncTaxCalc* program; and NIPA
14	Payroll taxes	
15	Property taxes	Statistical matching of IPUMS and SFCC (for home values); and NIPA (for taxes)
16	*Plus*: Cash transfers	Same as line 4, above; and NIPA for relevant aggregates
17	*Plus*: Noncash transfers	Administrative data; NIPA (for amounts); and statistical matching of CPS and CES
18	*Plus*: Public consumption	CPS and others (see section 5)
19	*Plus*: Household production	Statistical matching of CPS and time-use survey of 1975
20	*Equals*: LIMEW	

Each of the steps described in the table are discussed briefly below:

Lines 9 through 11: The major problem in estimating LIMEW for 1972 was the absence of a survey of household wealth. Amounts of principal nonhome assets were estimated from a statistical match with AIITM. Home values and the outstanding amounts of mortgage and consumer debt were estimated from a statistical match with the CES.

Statistical matching with AIITM was conducted to calculate the amounts of nonhome assets. The match allowed us to determine the dividends, interest, and business-type income or loss[13] for each potential tax-filing unit in the CPS. An initial estimate of benchmark aggregate amounts for assets yielding such incomes was constructed from the flow of funds (table B.100). The benchmarks for stocks and interest-bearing assets (government and corporate bonds, savings

[13] This group includes: income/loss from unincorporated businesses, partnerships, S-corporations, farms, and rental real estate.

accounts, etc.) were adjusted downward by certain percentages.[14] The percentage involved here is simply the percentage by which the survey-based aggregate falls short of the aggregate calculated from the flow of funds data. This step was taken to facilitate comparability of levels with the other years. The percentages were obtained by dividing the aggregates for stocks and interest-bearing assets obtained from the 1983 Survey of Consumer Finances (SCF) with their flow of funds counterparts in 1983.[15] The adjusted benchmarks for stocks and interest-bearing assets and the (unadjusted) benchmark for equity in unincorporated business were distributed among households according to the distributions of incomes. Specifically: corporate stock was distributed according to dividends; interest-bearing assets were distributed according to interest income; and equity in unincorporated business was distributed according to the absolute value of business income and loss. The three assets together accounted for 78 percent of all financial assets reported on the household balance sheet according to the flow of funds data.

Statistical matching with the CES file provided an initial estimate of the distribution of home values. The final estimate was obtained by adjusting the home values reported in 1973 by a set of deflation factors that reflect the change in median home values between 1972 and 1973 by region and location (a combination of urban/rural status and population). The match also yielded estimates of mortgage interest and principal payments. We imputed the number of payments made by each mortgage-paying household via a statistical match with the 1970 IPUMS, which contained a variable that indicates how many years ago the household moved into the present housing unit. The length of the mortgage was assumed to be 30 years. We also assumed that the contract interest rate for a mortgage-paying household was the same as the average national mortgage interest rate in the year in which they moved into their house.[16] Given the length of

[14] The other items of the household balance sheet estimated here are known to diverge from their national balance sheet aggregates only in a trivial manner (e.g., homes) or due to inherent differences in concept (e.g., business equity); see Wolff (1987).

[15] The estimate for stocks and interest-bearing assets were, respectively, 12 percent and 54 percent, i.e., the aggregates calculated from the survey data fell short of the flow of funds aggregates by these percentages.

[16] The year that the family moved into the housing unit and the corresponding mortgage rate could take the following values in the sample:

Year	**Interest rate (in percent)**
1972	7.40
1971	7.56
1970	8.22
1968–69	7.28

mortgage, number of mortgage payments, current total mortgage payment (sum of interest and principal payments), and the interest rate, using the standard amortization formula we could calculate the outstanding mortgage balance for each mortgage-paying household. The estimated aggregate mortgage debt turned out to be about 3 percent higher than the value of home mortgages reported in the flow of funds data. As discussed previously for stocks and interest-bearing assets, the benchmark for aggregate mortgage debt was also obtained by deflating the flow of funds aggregate by a certain percentage. The latter was calculated by dividing the aggregate mortgage debt obtained from the 1983 SCF with its flow of funds counterpart in 1983.[17] The benchmark amount determined in this fashion was distributed according to the distribution of mortgage debt.

Finally, total consumer debt held by the household sector, as reported in the flow of funds table (table B.100), was also subjected to a similar adjustment procedure. In this case the percentage was calculated by dividing the aggregate consumer debt obtained from the 1983 SCF with its flow of funds counterpart in 1983.[18] The adjusted benchmark amount was distributed among households according to the distribution of nonmortgage interest payments. The latter was also obtained from the statistical match with the CES.

Lifetime annuities (including annuitized payments on debts) were calculated based on the demographic information available in the CPS (age, sex, and, race of the head and spouse of wealth-holding families), life expectancy tables for 1972 (differentiated by age, sex, and race;

Year	Interest rate (in percent)
1963–67	6.04
1953–62	5.34
1952 or earlier	4.50

The interest rate for the years between 1951 and 1960 are the weighted sum of Federal Housing Administration (FHA) and conventional contract rates from Guttentag and Beck (1970), tables C-1 and C-2. Weights used are the shares of FHA and conventional mortgages for nonfarm, single-family homes in their combined total. The shares were calculated from the *Economic Report of the President 2008* (2008); table B75 downloaded from: http://www.gpoaccess.gov/eop/tables08.html). For the years 1961 and 1962, we used the unweighted average of contract rates (FHA series) on new and existing homes published in the *Federal Reserve Bulletin* (Board of Governors of the Federal Reserve System 1966). For the years between 1963 and 1972, we used the contract rate on conventional mortgages available at the Federal Housing Finance Board website (http://www.fhfb.gov/). These rates pertain to single-family, nonfarm homes.

[17] The estimated percentage for mortgage debt was 23 in 1983.

[18] The estimated percentage for consumer debt was 28 in 1983.

obtained from the *Statistical Abstract* 1974), and long-term rates of return by asset type. The aggregate amount of imputed rent on owner-occupied housing for 1972 (reported in the national accounts, NIPA table 7.12, line 209) was distributed among households according to the gross value of homes.

Lines 12 through 15: Statistical matches with the CES and AIITM described above also provided information for the estimation of tax payments. Deductions for each potential tax unit in the CPS (property taxes, mortgage interest payment, medical expenditures, etc.) were obtained from the statistical match with the CES. This information, in conjunction with information available in the CPS, was utilized to conduct a statistical match with AIITM to obtain the amounts of capital gains and capital losses. The variables obtained from the statistical matches were utilized together with other relevant information in the synthetic file to construct the variables necessary for determining income and payroll tax payments. The actual amounts of taxes were calculated using the *IncTaxCalc* program (Bakija 2007), which incorporates detailed information regarding the tax regime in 1972 with respect to federal and state income taxes. Income and payroll taxes were aligned with their respective national accounts aggregates. Property taxes on owner-occupied homes obtained from the statistical match with the CES were aligned to the NIPA total.

Lines 16 through 17: Government cash transfers received under Social Security, unemployment compensation, veterans' benefits, public assistance, and workers compensation are identified in the CPS. We aligned them with their appropriate NIPA benchmarks. These cash transfers comprised 72 percent of all government transfers in 1972, as reported in the national accounts (NIPA table 3.12, "Government social benefits"). The statistical match with the CES allowed us to determine the value of food stamps received by households. Additional imputations were done for some noncash transfers (most importantly Medicare and Medicaid) reported in the national accounts, based on household/individual characteristics in the CPS and a variety of administrative sources.

Line 18: See section 5.

Line 19: Hours of household production were obtained via a statistical match with the 1975–76 time-use survey.[19] We calculated the hourly wage rate for private household workers from the 1971 May CPS because it included a special module on this occupational group. The hourly wage rate was "aged" forward to 1972 by using the percent change between 1971 and 1972 in the hourly wage of private household workers. Two variables required for constructing the performance index (educational attainment and household income) were available directly in the CPS. The final variable, time availability, was constructed by utilizing the information regarding hours and weeks worked in the CPS.

5. 1982 THROUGH 2013

From 1982 forward, the core structure of the synthetic data has been consistent in terms of the data sources and methodology, with few changes and adjustments due to redesigns in the data sources. Our main data source is the public-use data files developed by the US Bureau of the Census from the CPS's Annual Demographic Supplement (ADS), currently known as the Annual Social and Economic Supplement (ASEC) of the CPS, which is collected in March of every year. This is the most comprehensive source of annual information regarding a number of key demographic characteristics (as of the survey year), household income, and receipt of noncash transfers (as of the previous calendar year). All households within these surveys were used for the analysis.[20]

Additional information required to construct the core synthetic file was obtained via statistical matching of the CPS-ASEC/ADS with the SCF to collect data on assets, liabilities, and wealth, and with the Americans' Use of Time Project (AUTP) and American Time Use Survey (ATUS) to collect data regarding time use on household production. Table 3 provides a summary of the data used to construct the LIMEW's synthetic dataset for each year.

[19] See note 12 for the details regarding the survey.

[20] In 2014, the CPS went through a redesign of its income questions, which in this year were asked to three-eighths of the total sample. To maintain consistency within the year captured in 2014, we use five-eighths of the sample, which is consistent with the information collected up to this point in time. This accounts for the decline in the number of in households used in 2014 compared to previous years.

Table 3. Datasets Used for the Construction of the LIMEW: 1982–2013

LIMEW Year	Recipient Dataset	Time-Use Data	Wealth Data
1982	ADS 1983 (59,026)	AUTP 1985 (5,358)	SCF 1983 (4,262)
1989	ADS 1990 (59,804)	AUTP 1985 (5,358)	SCF 1989 (3,143)
2000	ASEC 2001 (78,000)	ATUS 2003 (20,720)	SCF 2001 (4,442)
2004	ASEC 2005 (76,367)	ATUS 2004 (13,973)	SCF 2004 (4,519)
2007	ASEC 2008 (75,813)	ATUS 2007 (12,248)	SCF 2007 (4,417)
2010	ASEC 2011 (75,148)	ATUS 2010 (13,260)	SCF 2010 (6,482)
2013	ASEC 2014 (51,466)	ATUS 2013 (11,385)	SCF 2013 (6,015)

Note: Number of households available in each dataset is shown in parenthesis. Each column indicates the data source and year when the data was collected.

The major steps involved in constructing the LIMEW by adding supplementary information are shown in table 4.

Table 4. Construction of the LIMEW: 1982–2013

Line No	Component	Source
1	Earnings	CPS-ASEC/ADS
2	Money income other than earnings	
3	Property income	
4	Government cash transfers	
5	Other money income	
6	Money income (MI): Sum of lines 1 and 2	
7	*Less*: Property income (line 3) and government cash transfers (line 4)	
8	*Equals*: Base money income	
9	*Plus*: Income from wealth	Statistical matching of CPS-ASEC/ADS with SCF
10	Annuity from nonhome wealth	
11	Imputed rent on owner-occupied housing	
12	*Less*: Taxes	
13	Income taxes	CPS-ASEC/ADS and NIPA
14	Payroll taxes	
15	Property taxes	
16	*Plus*: Cash transfers	Same as line 4 above; and NIPA for relevant aggregates
17	*Plus*: Noncash transfers	CPS-ASEC/ADS; administrative data; and NIPA
18	*Plus*: Public consumption	CPS-ASEC/ADS and others (see section 6)
19	*Plus*: Household production	Statistical matching of CPS-ASEC/ADS and time-use surveys (AUTP and ATUS)
20	*Equals*: LIMEW	

Each of the steps described in the table are discussed briefly below.

Lines 9 through 11: Statistical matching with SCF was conducted to obtain the amounts of assets and liabilities for each household in the CPS-ASEC/ADS. Values of assets (other than homes) and liabilities were "aged" back from their 1983 to 1982 levels and 2001 to 2000 levels by deflating each asset and liability with their respective rate of return. Home values were deflated to the 1982 and 2000 levels by the percent change in the national median home price between the survey and previous year. No changes were made to the asset values or home values for other years. Lifetime annuities (including annuitized payments on debts) were calculated based on the demographic information available in the CPS-ASEC/ADS (age, sex, and race of the head and spouse of wealth-holding families), life expectancy tables (differentiated by age, sex, and race; obtained from the *Statistical Abstract*, various years), and long-term rates of return by asset type. Long-term rates are obtained by averaging returns from the earliest data available

to the latest data up to the year of the LIMEW, in this case up to 2013. The aggregate amount of imputed rent on owner-occupied housing (reported in NIPA, table 7.12) was distributed among households according to the gross value of homes.

Lines 12 through 15: All taxes have imputed values in the CPS-ASEC/ADS and were aligned with their NIPA counterparts by distributing for each tax the discrepancy between the NIPA and CPS aggregate among households according to the share of each household in the survey aggregate.

Lines 16 through 17: Transfers for which actual or imputed amounts are reported in the CPS-ASEC/ADS are aggregated across recipients and compared against the benchmarks. Any discrepancy between the CPS-ASEC/ADS total and the NIPA benchmark for a given transfer payment is distributed across recipients according to the distribution of that payment in the CPS-ASEC/ADS. Transfers that are recorded in the ADS have NIPA amounts that make up roughly 90 percent of all transfers reported in the NIPA table 3.12, "Government social benefits." Additional imputations were carried out for some noncash transfers (e.g., the nutritional program known as Women, Infants, and Children [WIC], payments to nonprofit organizations providing social benefits to households, etc.) reported in the national accounts based on household/individual characteristics in the CPS and a variety of administrative sources.

Line 18: See section 6.

Line 19: Hours of household production were obtained via a statistical match with the time-use surveys. We calculated the hourly wage rate for private household workers from the annual file that was created by merging the CPS's monthly outgoing rotations files. The wage rate was defined as usual weekly earnings divided by usual weekly hours of work. The variables required for constructing the performance index (educational attainment, time availability, and household income) were available directly in the CPS-ASEC/ADS. The final value of household production is given by total hours of household production (at the household level) multiplied by the wage rate of the substitution cost and multiplied by the performance index.

6. PUBLIC CONSUMPTION

Estimates of public consumption by households were constructed in three steps: (1) obtaining total expenditures by function and level of government; (2) allocating total expenditures between the household sector and other sectors of the economy; and (3) distributing expenditures allocated to the household sector among households.

Expenditure by Function and Level of Government

The expenditure category used here is government consumption expenditures and gross investment (the same as that on the product side of the NIPA). To group expenditures according to purpose, we adopted the functional classification in NIPA with minor modifications.

We distributed the NIPA aggregate of state and local expenditures for each function among the states using the interstate distribution of these expenditures in the Annual Survey of Government Finances (ASGF), or the Census of Governments, conducted by the US Bureau of the Census. Care was taken to ensure that the expenditure concept and the groupings of the functions in the Census Bureau data conform as closely as possible to the NIPA expenditure and function concepts.

Allocation of Expenditures to the Household Sector

We started by constructing a schema of detailed functions by level of government (federal versus state and local).[21] Then we grouped these functions into three categories:

- The first involved activities that do not expand the potential amenities available to the household sector. General public service, national defense, law courts, and prisons are prominent examples.
- The second category included functions that are assumed to expand amenities directly only to the household sector, such as income security and recreation and culture.

[21] The detailed functional schema is outlined in Wolff and Zacharias (2007a).

- The third category consisted of functions that can potentially serve both the household and nonhousehold sectors, such as economic affairs and housing and community services.

Costs incurred in the performance of these functions are allocated to the household sector in accordance with the extent that they are "responsible" in generating such costs. Our judgment regarding the extent of responsibility is based on the available empirical information, as much as possible, and is updated whenever new information is available. A prominent example of this type of function is highways (included under economic affairs), where approximately 60 percent of expenditures were estimated to occur on behalf of households.

Distribution of Allocated Expenditures among Households

After determining government expenditures allocated to the household sector (i.e., "public consumption") by function, we distributed them among households. We attempted to follow the same principles of direct usage and cost responsibility that were employed in splitting total government expenditures between the household and nonhousehold sectors. Two major categories of public consumption are distributed among households: those distributed equally across persons (such as public health and hospitals, police, and fire) and those distributed according to household- or person-level characteristics (such as elementary and secondary education, highways).

The second group of expenditures account for the bulk of public consumption (nearly three-quarters). The person- or household-level characteristics used in the distribution procedures and their corresponding functions are listed below:

- *Amount and type of income*: agriculture.
- *Type of income received (including receipt of noncash transfers)*: public housing; administrative costs of Medicare, disability, retirement income (Social Security), welfare and social services; and unemployment compensation.
- *Shares in consumption expenditures*: energy; pollution control and abatement; postal service; liquor stores; water supply; and sewerage and sanitation.

- *Enrollment in public educational institutions*: education.
- *Patterns of vehicle ownership and transportation usage*: transportation and parking.
- *Employment status*: occupational safety and health.

Information on the type and amount of income, as well as the employment status of individuals, is obtained directly from the primary data file (such as the IPUMS or ADS). All other characteristics were imputed to individuals or households in the primary sample from information gathered from external sources.

7. WEALTH AND RATES OF RETURN

1959 and 1982 through 2013

We divide net worth into two components. The first is the gross value of owner-occupied housing and its corresponding liability, mortgage debt on owner-occupied housing. The remainder, "nonhome wealth," equals the sum of: (1) other real estate owned by the household and net equity in unincorporated businesses; (2) cash and demand deposits, time and savings deposits, certificates of deposit, money market accounts, and the cash surrender value of life insurance plans; (3) government bonds, corporate bonds, foreign bonds, other financial securities, corporate stock and mutual funds, and equity in trust funds; and (4) the cash surrender value of defined-contribution pension plans, including IRAs, Keogh, and 401(k) plans; (5) less other (nonhome) debt such as auto and credit card loans.

The total real rate of return of each nonhome wealth component is the average of annual rates over a relatively long period of time, varying from 14 to 50 years, depending on the asset (see table 5). The total rate-of-return data we use are inclusive of both the capital gains and the income generated by the assets. The average rate of return by asset type was estimated from the most current data on asset holdings published by the Federal Reserve in the "Flow of Funds

Accounts" for the United States and financial market information included in the "Economic Report of the President."[22]

Table 5. Long-Term Average Rates of Return (in percent)

	Nominal	Real	Period
Real estate and business	6.60	2.54	1960–2013
Liquid assets	4.87	0.61	1965–2013
Financial assets	7.11	3.03	1960–2013
Pension assets	5.67	2.79	1986–2013
Mortgage debt	0.00	-3.81	1960–2013
Other debt	0.00	-3.81	1960–2013
Inflation rate (CPI-U)	3.81		

Notes:
Real rate of return = (1+Nominal rate)/(1+Inflation rate)-1
Real estate and business: Holding gains (taken from the Flow of Funds table R.100) divided by equity in noncorporate business (taken from the Flow of Funds table B.100).
Liquid assets: The weighted average of the rates of return on checking deposits and cash, time and saving deposits, and life insurance reserves. The weights are the proportion of these assets in their combined total (calculated from the Flow of Funds table B.100). The assumptions regarding the rates of return are: zero for checking deposits, the rate of return on a one-month CD (taken from the table H.15, "Selected Interest Rates," published by the Federal Reserve and available at: http://www.federalreserve.gov/releases/h15/data.htm) for time and saving deposits, and one plus the inflation rate for life insurance reserves.
Financial assets: The weighted average of the rates of return on open market paper, Treasury securities, municipal securities, corporate and foreign bonds, corporate equities, and mutual fund shares. The weights are the proportion of these assets in total financial assets held by the household sector (calculated from the Flow of Funds table B.100). The assumption regarding the rate of return on open market paper is that it equals the rate of return on one-month finance paper (taken from the table H.15, "Selected Interest Rates" published by the Federal Reserve and available at: http://www.federalreserve.gov/releases/h15/data.htm). The data for the rates of return on other assets are taken from the "Economic Report of the President." The assumptions regarding Treasury securities, municipal securities, corporate and foreign bonds, and corporate equities are, respectively, average of Treasury security yields, high-grade municipal bond yield, average of corporate bond yields, and annual percent change in the S&P 500 Index. Mutual fund shares are assumed to earn a rate of return equal to the weighted average of the rates of return on open market paper, Treasury securities, municipal securities, corporate and foreign bonds, and corporate equities. The weights are the proportions of these assets in the total financial assets of mutual funds (calculated from the Flow of Funds table L.123).
Pension assets: Net acquisition of financial assets (taken from the Flow of Funds table F.119c) divided by total financial assets of private defined-contribution plans (taken from the Flow of Funds table L.119c).
Inflation rate: Calculated from the CPI-U published by Bureau of Labor Statistics.

[22] The Flow of Funds data are available at: http://www.federalreserve.gov/releases/z1/Current/. The 2005 "Economic Report of the President" is available at: https://www.gpo.gov/fdsys/browse/collection.action?collectionCode=ERP. Details on the data taken from the flow of funds, including series identifiers, are available from the authors upon request.

1972

The nonhome wealth definition used in 1972 was different from that used in the other years because there was no survey on household wealth for that year. The nonhome wealth for 1972 was calculated as the sum of: (1) equity in real estate (other than owner-occupied homes) and unincorporated businesses; (2) interest-bearing assets that consists of time and savings deposits, certificates of deposit, money market accounts, government bonds, corporate bonds, foreign bonds, and other financial securities;[23] and (3) corporate stock; (4) less consumer debt.

Given the difference in the wealth definition, the rates of return used in the 1972 annuity calculation also had to be different for interest-bearing assets and stocks. These were calculated using the same sources of data and methodology described above, with the requisite modifications. The resulting long-run real rates of return for interest-bearing assets and stocks were, respectively, 2.04 percent and 3.24 percent.

[23] The individual components of interest-bearing assets could not be estimated separately.

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