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Household Wealth, Public Consumption and Economic Well-Being in the United States*

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INTRODUCTION

Conventional measures of economic well-being have come under criticism for focusing exclusively on money income and for not incorporating the appropriate concept of money income. The most most widely used official measure for poverty and income inequality in the United States is an income concept that is gross of taxes, a measure that is hard to justify as reflecting the purchasing power of individuals or households (Citro and Michael 1995: 206-7). Since the 1980s, the agency in charge of the official measure, the U.S. Bureau of the Census, developed imputed income values for major types of noncash transfers--although these values are not included in the official measure of income--in recognition of the fact that such transfers have grown to become the major chunk of

transfer payments (U.S. Bureau of the Census 1993). At present, there appears to be a consensus that the measures used for assessing the level and distribution of economic well-being need to rely on a better definition of money income and include items not reckoned as part of money income (The Canberra Group 2001).

The aim of this paper is to contribute to the effort of developing comprehensive measures of economic well-being (Smeeding and Weinberg 2001; Wolff and Zacharias 2003). We examine two factors that are central to economic well-being in modern capitalist economies--household wealth and public consumption. Annual property-type income (interest, dividends and rent) included in the usual definition of money income may not be an adequate measure of the economic advantage derived from the ownership of assets. The Canberra Group (2001) adds rent from owner-occupied housing, whereas Smeeding and Weinberg (2001) adds the return on equity in owner-occupied housing and net realized capital gains.

Similarly, restricting attention to government transfer payments in considerations of economic well-being ignores government expenditures for the provisioning of public amenities (such as highways) that have a substantial influence on the standard of living. The Canberra Group (2001) recommends including some items (e.g. education) of public expenditure. The Office for National Statistics in the U.K. issues an annual publication assessing the effects of taxes, transfers, and some items of public expenditure on household income (Lakin 2002: 43-46). Admittedly, there are serious conceptual and measurement problems involved in integrating wealth and public expenditures into a measure of economic well-being. It also appears that there is no single "correct" solution to many of these problems. The general approach and particular methods deployed here represent one way of approaching this set of issues.

In developing the approach and methods, we have relied on two strands of literature. The first one--relating to household wealth--follows a lineage of studies that have attempted to develop measures of economic well-being that combine net worth and income. These studies have used such combined measures to examine inequality, the extent and duration of poverty among different demographic groups and the economic well-being of the elderly (Caner and Wolff 2002; Lerman and Mikesell 1988; Moon 1977; Weisbrod and Hansen 1968). The second strand of literature has addressed the questions of how the size distribution of personal income or the functional distribution of income is affected by government expenditures (Gillespie 1965; Ruggles and O'Higgins 1981; Shaikh and Tonak 1999). Both questions were pursued to shed light on the ultimate distribution of actual (or ex post) economic well-being across income classes or social classes, after accounting for taxation and government spending. Due to limitations of space, we will restrict our attention here to government expenditures on goods and services, ignoring transfer payments and taxes.

Our focus is on the United States. Although the U.S. is currently undergoing a period of tardy economic growth, its macroeconomic performance during the 1980s and the 1990s was exceptional among the advanced capitalist nations. It was hailed by many as the model for the rest of the world to follow. We have chosen to study 1989 and 2000 because they can be considered as the terminal years of the last two economic expansions in the United States.

The remainder of the paper has the following structure. We first describe the main sources of data and concepts of wealth and government expenditures used in the study (Section 2). This is followed by a discussion of how we incorporate wealth into a combined income-net

worth measure of economic well-being (Section 3). The allocation of government expenditures to the household sector and the distribution of such expenditures among households are discussed in the subsequent section, along with its distributional implications (Section 4). The effects of the incorporation of wealth and government expenditures on the overall distribution of economic well-being, as measured by standard inequality indices, are discussed next (Section 5). The final section concludes by outlining the limitations of the study and directions of future research.

1. DATA AND CONCEPTS

Our empirical strategy is to begin with the public-use datafiles developed by the U.S. Bureau of the Census from the Current Population Survey's Annual Demographic Supplement (ADS). In 1989, this survey included roughly 59,941 households while, for 2000, we have a sample of about 78,054 households. The survey is the most comprehensive source of information that is available annually regarding household income, housing tenure, receipt of noncash transfers and a number of key demographic characteristics of U.S. households.

However, the ADS does not collect any information on household wealth. Therefore, we integrated information from the Federal Reserve Board's Surveys of Consumer Finances (SCF) for 1989 and 2001 into the ADS. The SCF is the premier survey on household wealth in the United States, conducted every three years. Completed interviews in the SCF amount to 3,143 and 4,449 households, respectively for 1989 and 2001. The integration of the datafiles was performed using statistical matching, with the objective of obtaining for each household record in the ADS the most appropriate portfolio from the SCF on the basis of household characteristics.

The principal wealth concept used here is marketable wealth (or net worth), which is defined as the current value of all marketable or fungible assets less the current value of debts. Total assets are defined as the sum of: (1) the gross value of owner-occupied housing; (2) other real estate owned by the household and net equity in unincorporated businesses; (3) cash and demand deposits, time and savings deposits, certificates of deposit, money market accounts and the cash surrender value of life insurance plans; (4) government bonds, corporate bonds, foreign bonds, and other financial securities, corporate stock and mutual funds, equity in trust funds; (5) the cash surrender value of pension plans, including IRAs, Keogh, and 401(k) plans. Total liabilities are the sum of: (1) mortgage debt, and (2) other debt (such as auto loans).

This measure reflects wealth as a store of value and therefore a source of potential consumption. Such a measure best reflects the level of well-being associated with a family's holdings. Thus, only assets that can be readily converted to cash without compromising current consumption (that is, "fungible" ones) are included. As a result, consumer durables are excluded here. Also excluded are the value of future Social Security benefits individuals may receive upon retirement (usually referred to as "Social Security wealth"), and the value of retirement benefits from private pension plans ("pension wealth"). Even though these funds are a source of future income to households, they are not in their direct control and cannot be marketed.

Just as in the case of wealth, the ADS also does not contain information regarding the use of public amenities or consumption expenditures (such as attendance in public educational institutions or use of highways). Unlike the case of household wealth, there is no single comprehensive source of information that can be relied upon to remedy the gap. We

therefore had to impute usage patterns on households in the ADS, based on summary information from other surveys. For example, we used information from the National Personal Transportation Survey (conducted by the U.S. Bureau of Transportation Statistics) to impute shares of vehicle miles traveled by households in each Census division and income bracket.

The definition of government expenditures used here is the same as the one that appears on the product side of the U.S. National Income and Product Accounts (NIPA): government consumption expenditures and gross investment. This definition has several advantages given the focus of our study: It is more comprehensive than the ones used in government budget documents; it excludes transfer payments; and, it avoids double-counting intergovernmental transfers by recording expenditures at the level of government at which the expenditure is incurred.

In order to allocate government expenditures to the households and distribute it among households, it is essential to have expenditures grouped according to purpose. We have adopted here the functional classification given in the U.S. NIPA, with minor modifications as noted later.

Since the disparities in state and local expenditures that exist across U.S. states could possibly have effects on the distribution of economic well-being, we distributed the NIPA aggregate of state and local expenditures among the states. This distribution was accomplished using the Annual Survey of Government Finances (the primary source for annual NIPA estimates for state and local expenditures) conducted by the U.S. Bureau of the Census for 1989 and 2000. Our strategy was to use the Annual Survey of Government Finances (ASGF) to determine the proportions in which the total state and local expenditure given in the NIPA for each function (such as education) is divided among the states. Care was taken to ensure that the expenditure concept formed from the ASGF and the grouping of the ASGF functions conforms as close as possible to the NIPA expenditure and function concepts.

2. HOUSEHOLD WEALTH

The most common technique of combining income and wealth into a single measure of household well-being is to convert the stock of wealth into a flow and add that flow to current income.¹ The income flow generated by wealth can be computed either as a lifetime annuity or a bond coupon. We incorporate household net worth by adding to money income the imputed rent from owner-occupied housing and the lifetime annuity value of non-home net worth.

Our approach differs from the standard approach in two significant ways. First, we distinguish between home and non-home wealth. Housing is a universal need and owning a house frees the owner from the obligation of paying rent, leaving that much more resources for spending on other needs. Hence, benefits from owner-occupied housing are reckoned in terms of the replacement cost of the services derived from it, i.e. a rental equivalent.²

We impute rent for owner-occupied housing by distributing the total amount of imputed rent in the GDP to homeowners in the ADS, based on the values of their houses.³ Formally, imputed rent can be expressed as $IR_i = (h_i/H) * IR$, where IR_i and h_i are the imputed rental income and the value of house, respectively, of household i , while IR and

H are the weighted sums of the same over households. ⁴ On average, imputed rent was 5.6% and 5.4% (respectively) of the value of the house in 1989 and in 2000.

Another difference in our approach is that we take into account the differences in portfolio composition of non-home wealth by computing the lifetime annuity as the weighted average of annuity flows generated by individual non-home wealth components and using portfolio shares of these six components as weights. The lifetime annuity amount calculated is such that (i) it is the same for all remaining years of the younger spouse's life⁵ and (ii) brings wealth down to zero at the end of the expected lifetime. Formally, the annuity value of non-home wealth can be written as the product of (1x6) and (6x1) vectors:

$A_i = [f_i(r_j, race_i, sex_i, age_i)] * [W_j]$. Each element f_i of the first vector gives the annuity flow that household i would receive each year if it held \$1 in wealth component j . This amount is a function of the real total rate of return on the non-home wealth component, r_j , and of the race, sex and age of the younger spouse. Multiplying this factor, f_i , by the total amount of money held in the j^{th} component, W_j , gives us the total annuity generated by this component. We obtain data on annual total real rate of return, r_j , to each non-home wealth component j over a forty-year period (1960-2000 if possible). The average rates of return over the same period are shown in Table 1. The rationale for employing this method, instead of using the rate of return in an arbitrarily chosen year, is that the annuity value estimated this way is a better indicator of the resources available to the household on a sustainable basis over its lifetime. The total rate of return data we use are inclusive of the incomes generated by the assets, therefore, in order to avoid double counting, we net out from the total income measure any property income already included in money income.

Once estimation is done in the SCF for imputed rent and the annuity on non-home wealth, we assign values of these to the households in the ADS using statistical matching. Each household record in the SCF is matched with a household record in the ADS, where a match represents a similar unit. The strata variables used in the matching procedure are the race of the household head (white vs. non-white), the homeownership status of the household (owns or buying vs. rents), the family type (married couples, single males, single females) and age of the household head (age difference within a range of two, five, ten or more). Within these strata, records are matched by minimizing a distance function based on the education and occupation of the household head, and total income and size of the household.

After the matching, the ADS money income is combined with the imputed income flows from wealth to form "Wealth Adjusted Income"(WI) measure for household i as:

$$WI_i = \text{Money Income}_i + \text{Imputed Rent}_i + \text{Annuity}_i - \text{Property Income}_i.$$

Summary measures of household net worth based on the matched dataset are presented in Table 2. Some well-known features of the distribution of household wealth are maintained by our matching procedure: Owner-occupied housing represents an important part of wealth for the majority of households. About 65% of households either entirely own or are buying their homes. Approximately 90% of households have liquid assets, such as bank accounts; however, the amounts invested in liquid assets are usually small; the median household has \$4,500-\$5,000 in liquid assets (not shown). The ownership of real estate, unincorporated businesses and financial assets is less prevalent than homes.

Both the mean and the median net worth increased between 1989 and 2000, however, the mean increased faster than the median did, hinting at growing inequality. The increase in mean net worth between 1989 and 2000 was dominated by the increase in the value of financial assets and retirement assets. In the case of retirement assets, this rise was due to an increase in both the holding rate and the mean holdings. The increase in mortgage debt, both in the ownership rate and in the mean value for those who owe mortgage debt, is also noteworthy.

Table 3 presents the mean and median values of money income, imputed rent, annuities from non-home wealth, property income and our wealth adjusted income measure. We use the Census Bureau definitions for money income and property income. The mean and median values of imputed rent are close, reflecting the widespread ownership of houses. In contrast, the ownership of non-wealth is more concentrated, as indicated by the gaps between the mean and median values of annuities and property income. Our wealth adjusted income measure is about 30% higher than the traditional income measure. The magnitudes of mean imputed rent, property income and annuities relative to mean money income appear to be stable over time. The annuity component is about 25 percent of money income on average, and is remarkably greater than property income, which we replace.

In sum, our method of representing the economic advantage derived from the ownership of wealth produces a quite different picture of well-being. The level of economic well-being for the median household is bound to be higher by our measure. Moreover, comparing changes between the two years, it is striking that median wealth adjusted income grew faster than median money income.

3. PUBLIC CONSUMPTION

The standard approach to combining government expenditure and individual income is to consider the appropriate amounts of expenditures as "a component of those individuals' real income and additive to their money income" (Gillespie, 1965:131). We present our analogous estimates later on in the paper. In this section, our focus is on public consumption as such and its distribution along the household income ladder.

An important distinction between our approach to public consumption and the traditional studies on the distribution of expenditure benefits (see, for example, Musgrave, Case and Leonard 1974) is that we do not consider all public consumption as augmenting the consumption possibilities of the households. Public consumption is conceptualized as occurring in three main sectors: household, business and government. For example, highways are used directly by individuals for personal purposes, by commercial trucks for transporting merchandise and by government vehicles for transporting troops.

The traditional approach assumes (on the basis of specific propositions regarding the character of the state and the functioning of a capitalist economy) that public consumption in the non-household sectors ultimately somehow *benefits* the household sector and the household sector alone.⁶ Hence the *costs* involved in providing such public consumption are considered as incurred on behalf of households or individuals. In contrast, we make no assumptions regarding the benefits from public consumption; our assumptions are about the direct usage (actual or potential) of public amenities by entities⁷ in different sectors. Government expenditures incurred in the provision of such amenities are considered as the cost of providing them to the relevant entities.

The difference between the two approaches may be brought into sharper relief in the following manner. Let $\mathbf{G}$ be a diagonal matrix that contains along its principal diagonal government expenditures on different functions numbered 1,2,..., p . We next specify a matrix $\mathbf{A}$ which has 3 columns corresponding to the three sectors of the economy and p rows. The household sector's column, for example, contains the shares of that sector in the direct usage of each of the public amenities afforded by the expenditures on p different functions. The amounts of government expenditures incurred on behalf of different sectors can then be stacked in a matrix $\mathbf{B}$, calculated as:

$$\mathbf{B} = \mathbf{GA} \quad (1)$$

The traditional approach entails the assumption that $\mathbf{A}$ is in fact a sum vector while we postulate that:

$$0 \leq a_{ij} \leq 1 \text{ with at least some } a_{ij} \text{ s.t. } 0 < a_{ij} < 1 \quad (2)$$

$$\sum_j a_{ij} = 1, j = h, b, g \rightarrow \text{the three sectors.} \quad (3)$$

The rationale for our approach may be made clear by its application to the functions of government expenditures as found in today's NIPA for the United States, rather than in purely abstract terms.⁸ Our data allowed us to construct a schema consisting of 44 functions. Allocation of expenditures between the household and other sectors was done on the basis of a set of assumptions regarding these functions. In Table 4, we group the functions into 9 major functions and summarize the results derived from the assumptions regarding the household column in $\mathbf{A}$.⁹

Two types of assumptions are at work here. One involves the designation of a particular function as involving activities that do not expand the potential amenities available to the household sector at all or as expanding only that sector's potential amenities. General public service, National defense, Law courts and Prisons (the last two are included under Public order and safety) are the prominent examples of functions that are assumed to provide no directly useable services to the household sector. They constitute social overheads that serve the purpose of keeping the ship of state afloat. Social overheads are obviously necessary for households and individuals to exercise command over the necessities and conveniences of life, but they do not inherently constitute a part of the objects over which such command is exercised. In contrast, functions such as elementary and secondary education (included under Education) or income security are assumed to directly expand amenities available only to the household sector.¹⁰

The second type of assumption concerns functions that can potentially serve the household and non-household sectors. Costs incurred in the performance of these functions (under Economic affairs and Housing and community services) are allocated to the household sector in accordance with the extent of its "responsibility" in generating such costs. We made judgments regarding the extent of responsibility, as far as possible, on the basis of available empirical information. A prominent example of this type of function is highways (included under Economic affairs) where we estimated that about 60 percent of expenditures were incurred on behalf of households. Our estimates were based on the 1997 Federal Highway Administration study that calculated costs per mile and miles traveled by vehicle type.

However, a certain degree of arbitrariness is unavoidable in dealing with some functions that can serve the household and non-household sectors. An example, is Police and Fire (included under Public order and safety), encompassing activities presumably performed in the protection to persons and property. They play a dual role in that they constitute a social overhead and provide direct services to the household sector. We have therefore arbitrarily allocated half of these expenditures to the household sector.¹¹

In sum, our assumptions regarding **A** led us to allocate to the household sector about 43 percent and 51 percent of total government expenditures, respectively, in 1989 and 2000. The increase in this proportion is primarily a reflection of the falling share of expenditures devoted to national defense during this period. The roughly 8 percentage points increase in the expenditures allocated to the household sector was accompanied by a reduction in total government expenditures, as a proportion of the GDP, in 2000 as compared to 1989 (18 percent as compared to 20 percent).

In order to avoid cumbersome sentences, we define "public consumption" as the total government expenditure allocated to the household sector. Once public consumption under different functions was determined, we proceeded to distribute it among households. This operation can be described in general terms as follows (c.f. Reynolds and Smolensky 1977: 27, equation (3-1)). Let **B^h** be a diagonal matrix that has along its principal diagonal the *m* positive entries from the household column in **B**. A matrix **D**, similar to **A** is specified next which has *m* rows and as many columns as there are households (or groupings of households into income deciles or quintiles). A given column of **D** shows the shares that the household has in the direct usage (potential or actual) of each of the public amenities afforded by the allocated expenditures on *m* different functions. The elements of **D** satisfy the following conditions:

$$0 \leq d_{ij} \leq 1 \quad (4)$$

$$\sum_{j=1}^m d_{ij} = 1 \quad (5)$$

The amounts distributed to the households for the different functions can then be arranged in a matrix **F**, derived as:

$$\mathbf{F} = \mathbf{B}^h \mathbf{D} \quad (6)$$

In distributing public consumption among households, we attempted to follow, as much as possible, the same principles of direct usage and cost responsibility that was employed in splitting total government expenditures between the household and non-household sectors. The problem becomes more complex now because we need household-level information on a number of variables that simply are not available in our main data source, the ADS. Various assumptions had to be necessarily made, just as in previous studies.

There are two major categories of public consumption to be distributed among households: those distributed equally across persons and those distributed according to household-level or person-level characteristics. The amounts for the two categories and their shares in the total public consumption are shown in Table 5. The table also shows the biggest individual functions (in terms of expenditures) included under the two categories and their respective shares in total expenditure.

The first class of expenditures pertains to functions that we consider, at least in principle, as equally available to all individuals. Of course, the actual patterns of utilization of these public amenities are bound to vary according to a number of individual or household characteristics. However, we consider these functions as an universal in-kind benefit, in contrast to, say, Medicare or Food Stamps, which are available only to specific segments of the population.

An alternative to distribution on an equal per capita basis in the case of these expenditures would be distribution according to income. Such an approach could be taken on the rationale that utility derived from this type of public amenities is "complementary to those derived from private goods" or that they reflect "the recipients' evaluation of social goods, based on the hypothesis that income and price elasticities of demand for social goods are equal, in which case application of a 'Lindahl pricing rule'¹² calls for a proportional benefit tax." (Musgrave, Case and Leonard, 1974:290-1). However, given that we do not attempt to ascertain the benefits from public consumption, this route was not taken by us.

The second class of expenditures--those distributed according to characteristics--account for the bulk of the public consumption (nearly three-quarters in both years). The person-level or household-level characteristics used in the distribution procedures and the functions corresponding to them 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 on relevant items*: Energy, Pollution control and abatement, Postal service, Liquor stores, Water supply, 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 employment status of individuals was obtained directly from the ADS. All other characteristics were imputed to individuals or households in the ADS sample from information gathered from external sources.¹³

As an example of the imputation methods used, let us consider the case of elementary and secondary education expenditures incurred at the state and local levels of government--by far the largest item of expenditures to be distributed among households. The ADS allows us to identify those between the ages of 5 and 18, who can be considered as the relevant subset of the population. However, the ADS does not identify the children enrolled in public schools. Therefore, we used the decennial censuses of 1990 and 2000 to estimate public school enrollment rates by state and household income decile. Assuming that the enrollment rates in the ADS are the same as in the decennial census allows us to fix the total number of children ("control total") attending public schools in each income decile within a state. From the group of children in each income decile, children are picked randomly till the control total is reached. Once this operation is completed for children in each income class and state, we obtain the estimated distribution of children attending public schools in the ADS by state and income decile. The state and local expenditures for each state are then split equally among those imputed to be attending public schools in that state.

The results obtained regarding the distribution of public consumption across households in different deciles of household money income (estimated **F** with income deciles as columns) is shown in Table 6. Average household public consumption (measured in 2000 dollars) was about \$8,241 in 2000, about 16 percent higher than it was in 1989. The percentage increase was identical to that observed for average household income, thus leaving the ratio of public consumption to household income unchanged at 0.14. However, this picture of stability vanishes once we look at households in different deciles of income and across different functions.

First, in both years studied, mean public consumption increases with income decile. This holds true of public consumption distributed on an equal per capita basis, reflecting the fact that household size increases with income decile. The positive correlation between public consumption and income decile can also be observed in the case of public consumption distributed on the basis of characteristics, with the exception of the top decile in 1989 where it is slightly lower than the mean level in the ninth decile. The major functions under this category of public consumption displays a mixed picture regarding the correlation between public consumption and income decile: Economic Affairs and Education generally shows a positive correlation; the correlation is negative for Income Security and Health, with the exception that in the latter case there is a jump in the mean level from the lowest decile to the next. Finally, Housing and Community Services is the only function (at this level of aggregation) that shows a change in the distributional pattern between 1989 and 2000. The 1989 pattern is roughly U-shaped, while in 2000, after a decline from the first to the third, it stays generally flat across deciles.

Why does public consumption increase with income? As was already noted, in the case of "Public consumption A" this is purely a reflection of the fact that the number of persons in a decile grows as we move up the income ladder (see Table 6). In the case of "Public consumption B," the positive correlation is driven by the distribution of expenditures on education and economic affairs.

As far as education expenditures are concerned, the key variables are the distribution of school-age children and expenditures per child across income deciles.¹⁴ Our results (derived on the basis of the assumptions regarding imputing public school attendance and distribution of education expenditures described earlier) showed that neither per-pupil expenditures across income deciles nor the differences in the mean number of school-going age children per household across income deciles in households with children in public schools could account for the observed correlation between income decile and education expenditure. What appears to be decisive is the distribution of school-age children across income deciles for all households: the lower deciles have a disproportionate number of households without school-age children and the proportion of households with school-age children increases with income decile (see Table 7). The reason why we find insignificant disparities in per pupil expenditures across income deciles in our data might well be due to the fact that we could not take into disparities that exist within a state.¹⁵

Economic affairs encompass a number of functions, all of which are distributed on the basis of characteristics that tends to be positively correlated with income. The majority of expenditures under Economic affairs are incurred for transportation. The principal mode of transportation in the U.S., namely highways, is used more intensely (measured by the shares in highway miles driven) as we move up the income ladder, although it declines a bit at the very top (see Table 6). The other major mode of transportation, air, is

characterized by a usage pattern that is concentrated in the upper deciles and it thus contributes to the positive correlation. Functions that are distributed on the basis of shares in consumption expenditures by income class--energy, pollution control, postal service, and part of economic affairs--happens to be dominated by items for which higher income groups generally have higher shares in consumption expenditure.

In contrast to what we observe in terms of mean levels, when expressed as a percentage of money income, public consumption falls steadily as we move up the income deciles because the disparity in mean money income across deciles is far greater than the disparity in public consumption. If one adopts this ratio, in the usual manner, as indicating the "relative importance" of public consumption to households in different income deciles, certain interesting patterns emerge as shown in Figure 1.

The households in the top income decile experienced the fastest growth in both money income *and* public consumption between 1989 and 2000. It appears that at the tails of the distribution, the bottom and top two deciles, money income grew faster than public consumption while at the middle the opposite pattern prevailed. As a result, the relative importance of public consumption declined for the households at the tails of the distribution and increased for those in the middle.

4. INEQUALITY

An important motivation behind developing more comprehensive measures of economic well-being than money income is to further the understanding of the distribution of well-being. Indeed, it may be argued, although we do not share this view here, that alternative measures are of little value if they yield the same picture of economic inequality. We address this issue here by examining the overall distribution of three measures: money income, wealth adjusted income (WI) and public consumption adjusted income (PCI).

As shown in Table 8, the distribution of well-being changes considerably when money income is adjusted for wealth or public consumption. The distribution of WI is less equal than the distribution of money income. In contrast, the distribution of PCI is more equal than the distribution of money income. In the case of WI, the share of the top decile increases from 29% to 37% in 1989 and from 32% to 41% in 2000. The shares of all other deciles decline slightly. In the case of PCI, there is an increase in the shares of the first through the sixth or seventh deciles (depending on the year) and a decrease in the shares of the upper deciles.

The measures of overall inequality also reveal that the distribution of well-being is sensitive to the measure of well-being used. As depicted in Figures 2 and 3, in 1989, the Gini coefficient increases from 0.42 to 0.50 when income is adjusted for wealth. For the same year, it decreases to 0.38 when income is adjusted for public consumption. For the year 2000, we observe a similar trend for the Gini coefficient. It increases from 0.45 to 0.53 when we adjust for wealth and decreases to 0.41 when we adjust for public consumption.

Our estimates of the Atkinson index, also shown in Figures 2 and 3, display the same pattern. We select three different values for the inequality aversion parameter, e in the Atkinson index; 0.25, 0.50 and 0.75, as in U.S. Census Bureau (2000). A characteristic of this index is that the closer the e parameter is to zero, the more sensitive the index becomes to the changes in the upper end of the distribution. In the case of wealth, since the major

effect of adjusting for wealth on the income distribution is seen in the top of the distribution, we observe bigger increases in the value of the Atkinson index as e gets closer to zero. In the case of public consumption, the opposite is true. We observe bigger drops in the value of the index for bigger values of e .

How significant are the changes in the level of inequality? One way to answer this question is to compare the magnitudes of these changes to historical trends observed for the U.S. The Census Bureau reports that the Gini coefficient was very stable during 1993-98; it varied only from 0.454 to 0.459. During the period 1967-92 when "the shape of the household income distribution changed dramatically" (U.S. Census Bureau 2000:3), it changed from 0.399 to 0.434. During the same period, the Atkinson index (with $e=0.50$) changed from 0.143 to 0.160 (U.S. Census Bureau 2000:9). Judging by this yardstick, it appears that the picture of inequality changes "dramatically" if the conventional measure is adjusted for wealth or public consumption.

5. CONCLUSIONS

The level and distribution of economic well-being is substantially affected by household wealth and public consumption. Measures of economic well-being that incorporates these determinants of well-being therefore display significant differences from the widely used official measure of gross money income (Table 9). It appears that the mean values of all three measures of income have changed at the same rate between 1989 and 2000. However, there are differences at the median. When we adjust income for wealth or for public consumption, we observe a higher growth rate of well-being at the median. Although the time trend in inequality is not affected by the incorporation of wealth or public consumption, the extent of the change in inequality is (see Table 10). In fact, the inequality of income adjusted for wealth or public consumption increases somewhat less over the 1989-2000 period than money income alone.

However, a fuller picture of economic well-being can be obtained only if other determinants are also taken into account. In particular, the analysis of public consumption and wealth reported here needs to be supplemented by accounting for taxes and government noncash transfers. Non-market production, especially, household production, is also crucial to economic well-being. A measure that incorporates these additional determinants along with wealth, public consumption and money income is the ideal yardstick against which the adequacy of the official money income measure should be compared.

In our future work, we intend to analyze intertemporal changes in inequality using different measures of economic well-being. We also plan to study the distribution of well-being across key demographic groups, such as racial groups and types of households, in the U.S, using alternative measures. Distributional analyses continue to be as challenging and interesting today as it was at the time of the founding of our discipline.

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Table 1: Average annual rates of return by asset type, for the period 1960- 2000.				
			Nominal Return	Real Return
Assets	Real Estate and Businesses	(1)	6.68%	2.12%
	Liquid Assets	(2)	5.48%	0.97%
	Financial Assets	(3)	8.39%	3.75%
	Retirement Assets	(4)	5.59%	1.07%
Debts	Mortgage Debt		0.00%	-4.28%
	Other Debt		0.00%	-4.28%
<i>Rate of Inflation (CPI-U average)</i>			4.47%	
*: Real rate of return = $(1 + \text{Nominal}) / (1 + \text{Inflation}) - 1$ Sources: (1) Holding gains on unincorporated business equity as a percent of the asset value in the previous year, using data from the Flow of Funds Accounts, Tables B.100 and R.100. (2) The figure is a weighted average of the interest rates on checkable deposits and currency, time and savings deposits and life insurance reserves, where the weights are the stocks of each asset held by the household sector. The stock information comes from Table B.100 in the Flow of funds Accounts, lines 11, 12 and 27 respectively. The interest rates assigned are zero, average interest rate on 1-month CDs (Board of Governors of the Federal Reserve System, 2003a) and CPI-U plus 1%, respectively. (3) The figure is a weighted average of the interest rates on open market paper, U.S. government securities, municipal securities, corporate and foreign bonds, corporate equities and mutual fund shares, where the weights are the stocks of each asset held by the household sector. The stock information comes from Table B.100, lines 15,16, 21, 22, 24 and 25 respectively (Board of Governors of the Federal Reserve System, 2003b). The rates are the interest rate on 1-month financial paper (Board of Governors of the Federal Reserve System, 2003a), the average interest rate on U.S. government securities with maturities varying from 3 months to 30 years, the interest rate on high-grade municipal bonds, average annual rate of change in the S&P 500 index and the average rate of return on non-money market mutual funds (which is an average of interest rates on U.S. government securities, municipal securities, corporate and foreign bonds and corporate equities) (Council of Economic Advisers 2002). (4) Holding gains (defined as the change in the value of assets minus net acquisitions) divided by the value of assets in the previous year, for private pension funds, defined contribution plans. Source: Tables F.119 and L.119 (Board of Governors of the Federal Reserve System, 2003b).				

Table 2: Summary Results: Net Worth (in 2000 dollars), its Asset and Debt Components and Ownership Rates						
		Mean			Ownership Rates (%)	
		1989	2000	Change	1989	2000
1	Net Worth	273,807	352,535	29%	100.00	100.00
2	<i>Assets</i>					
3	Owner-occupied Housing	97,682	122,258	25%	64.29	67.72
4	Real Estate and Businesses	116,313	104,268	-10%	41.14	33.45
5	Liquid Assets	34,475	34,595	0%	87.51	91.80
6	Financial Assets	46,990	90,891	93%	46.52	46.01
7	Retirement Assets	17,412	53,483	207%	36.47	51.11
8	<i>Debts</i>					
9	Mortgage Debt	26,048	39,945	53%	39.63	44.73
10	Other Debt	13,017	13,014	0%	65.89	65.29
	Memo items:					
11	<i>Median Household Wealth</i>	60,409	72,781	20%	100.00	100.00
12	<i>Household Money Income</i>	49,571	57,140	15%	100.00	100.00
Notes: The figures in the "Mean" column are for the entire sample, and not just for those who own the wealth component. In all tables, we use CPS household weights. The values of net worth components in year 2000 are computed by applying the rates of return in year 2000, adjusted for inflation, to the values of components in the 2001 matched file. Source: Authors' calculations using Survey of Consumer Finances (SCF) data matched with CPS data, 1989 and 2001.						

Table 3: Money Income, Imputed Rent, Annuities from Non-Home Wealth, Property Income and Wealth Adjusted Income in 1989 and 2000 (in 2000 dollars): Means, Medians and Means as a percentage of Mean Money Income.								
	Median			Mean			Mean as % of Mean Money Income	
	1989	2000	Change	1989	2000	Change	1989	2000
Money Income	40,167	42,000	5%	49,570	57,140	15%	100	100
Imputed Rent	2,861	3,523	23%	5,030	5,743	14%	10	10
Annuities	25	28	12%	12,471	13,949	12%	25	24
Property Income	167	50	-70%	3,558	3,319	-7%	7	6
Wealth Adjusted Income	44,344	48,191	9%	63,514	73,514	16%	128	129
Source: Authors' calculations using SCF data matched with CPS data, 1989 and 2001.								

Table 4. Government consumption and gross investment expenditures by function (in billions of current dollars): total expenditure and, the amount and share (in percent) allocated to the household sector.

Function	1989			2000		
	Total	Allocated	Household share	Total	Allocated	Household share
General public service	88	0	0%	172	0	0%
National defense	363	0	0%	374	0.00	0%
Public order and safety	92	24	26%	203	53.50	26%
Economic affairs	161	92	57%	278	166.24	59%
Housing and Community Services	23	16	69%	28	19.34	68%
Health	57	57	100%	92	92.70	100%
Recreation and culture	13	13	100%	25	25.20	100%
Education	270	245	90%	511	469.42	91%
Income security	29	29	100%	63	63.80	100%
Total government expenditures	1100	479	44%	1751	890	51%

Source: Authors' calculations based on NIPA, Annual Survey of Government Finances and supplementary data.

Table 5. Classification of public consumption expenditures according to distribution method: total expenditure (in billions of current dollars) and share (in percent) of total expenditure allocated to the household sector.					
		1989		2000	
		Amount	Share	Amount	Share
Public consumption		479	100 %	890	100 %
A .	Distributed equally	131	27 %	240	27 %
	Police and Fire	24	4%	53	5%
	Public health and hospitals	54	11%	88	10%
	Other	52	11%	98	11%
B .	Distributed by characteristics	347	72 %	649	73 %
	Highways	43	9%	77	8%
	Elementary and secondary education	204	42%	397	44%
	Other	99	20%	175	19%
Source: Authors' calculations based on NIPA, Annual Survey of Government Finances and supplementary data.					

Table 6. Distribution of household public consumption by household income decile (all dollar amounts are in 2000 dollars)											
1989											
	Lowest	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Top	All
Public consumption	6,166 <i>103.9%</i>	5,929 <i>45.0%</i>	5,931 <i>29.4%</i>	6,306 <i>22.9%</i>	6,631 <i>18.7%</i>	7,014 <i>15.9%</i>	7,604 <i>14.1%</i>	8,088 <i>12.2%</i>	8,885 <i>10.5%</i>	8,559 <i>6.2%</i>	7,122 <i>14.4%</i>
Public consumption A	1,341 <i>22.6%</i>	1,449 <i>11.0%</i>	1,607 <i>8.0%</i>	1,734 <i>6.3%</i>	1,836 <i>5.2%</i>	1,971 <i>4.5%</i>	2,098 <i>3.9%</i>	2,226 <i>3.4%</i>	2,399 <i>2.8%</i>	2,485 <i>1.8%</i>	1,919 <i>3.9%</i>
Public consumption B	4,825 <i>81.3%</i>	4,480 <i>34.0%</i>	4,324 <i>21.4%</i>	4,573 <i>16.6%</i>	4,795 <i>13.5%</i>	5,043 <i>11.5%</i>	5,507 <i>10.2%</i>	5,862 <i>8.9%</i>	6,486 <i>7.7%</i>	6,073 <i>4.4%</i>	5,204 <i>10.5%</i>
Economic affairs	528 <i>8.9%</i>	628 <i>4.8%</i>	796 <i>3.9%</i>	875 <i>3.2%</i>	1,027 <i>2.9%</i>	1,112 <i>2.5%</i>	1,163 <i>2.2%</i>	1,139 <i>1.7%</i>	1,377 <i>1.6%</i>	1,382 <i>1.0%</i>	1,005 <i>2.0%</i>
Housing and Community Services	295 <i>5.0%</i>	288 <i>2.2%</i>	227 <i>1.1%</i>	213 <i>0.8%</i>	210 <i>0.6%</i>	196 <i>0.4%</i>	199 <i>0.4%</i>	224 <i>0.3%</i>	265 <i>0.3%</i>	270 <i>0.2%</i>	239 <i>0.5%</i>
Health	47 <i>0.8%</i>	69 <i>0.5%</i>	65 <i>0.3%</i>	56 <i>0.2%</i>	52 <i>0.1%</i>	45 <i>0.1%</i>	43 <i>0.1%</i>	43 <i>0.1%</i>	44 <i>0.1%</i>	48 <i>0.0%</i>	51 <i>0.1%</i>
Education	2,564 <i>43.2%</i>	2,500 <i>19.0%</i>	2,647 <i>13.1%</i>	3,022 <i>11.0%</i>	3,237 <i>9.1%</i>	3,535 <i>8.0%</i>	4,005 <i>7.4%</i>	4,370 <i>6.6%</i>	4,713 <i>5.6%</i>	4,318 <i>3.1%</i>	3,498 <i>7.1%</i>
Income Security	1,390 <i>23.4%</i>	996 <i>7.6%</i>	589 <i>2.9%</i>	407 <i>1.5%</i>	270 <i>0.8%</i>	155 <i>0.4%</i>	97 <i>0.2%</i>	87 <i>0.1%</i>	87 <i>0.1%</i>	56 <i>0.0%</i>	410 <i>0.8%</i>
<i>Memo items:</i>											
Schools	2,364 <i>39.8%</i>	2,322 <i>17.6%</i>	2,427 <i>12.0%</i>	2,725 <i>9.9%</i>	2,923 <i>8.3%</i>	3,153 <i>7.2%</i>	3,622 <i>6.7%</i>	3,864 <i>5.8%</i>	4,024 <i>4.8%</i>	3,318 <i>2.4%</i>	3,078 <i>6.2%</i>
Highways	297 <i>5.0%</i>	394 <i>3.0%</i>	542 <i>2.7%</i>	612 <i>2.2%</i>	742 <i>2.1%</i>	795 <i>1.8%</i>	810 <i>1.5%</i>	790 <i>1.2%</i>	809 <i>1.0%</i>	695 <i>0.5%</i>	649 <i>1.3%</i>
Mean income	5,935	13,183	20,200	27,546	35,410	43,979	53,833	66,139	84,463	138,568	49,436
Mean household size	1.9	2.0	2.2	2.4	2.5	2.7	2.9	3.0	3.2	3.2	2.6
<i>Notes:</i> (1) Figures in italics indicate mean public consumption as a percentage of mean income (2) Public Consumption A refers to public consumption that is distributed equally across persons. (3) Public Consumption B refers to public consumption that is distributed according to characteristics.											

Table 6 (continued) Distribution of household public consumption by household income decile (all dollar amounts are in 2000 dollars)											
2000											
	Lowest	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Top	All
Public consumption	6,221 <i>97.4%</i>	6,465 <i>43.5%</i>	7,148 <i>31.5%</i>	7,419 <i>24.3%</i>	7,987 <i>20.4%</i>	8,503 <i>17.4%</i>	9,246 <i>15.4%</i>	9,647 <i>13.0%</i>	9,727 <i>10.1%</i>	10,551 <i>5.6%</i>	8,241 <i>14.4%</i>
Public consumption A	1,465 <i>22.9%</i>	1,647 <i>11.1%</i>	1,846 <i>8.1%</i>	2,012 <i>6.6%</i>	2,145 <i>5.5%</i>	2,314 <i>4.7%</i>	2,471 <i>4.1%</i>	2,590 <i>3.5%</i>	2,655 <i>2.8%</i>	2,756 <i>1.5%</i>	2,174 <i>3.8%</i>
Public consumption B	4,756 <i>74.5%</i>	4,818 <i>32.4%</i>	5,302 <i>23.4%</i>	5,407 <i>17.7%</i>	5,842 <i>14.9%</i>	6,188 <i>12.7%</i>	6,775 <i>11.3%</i>	7,057 <i>9.5%</i>	7,072 <i>7.4%</i>	7,795 <i>4.1%</i>	6,067 <i>10.6%</i>
Economic affairs	517 <i>8.1%</i>	669 <i>4.5%</i>	871 <i>3.8%</i>	962 <i>3.2%</i>	1,153 <i>2.9%</i>	1,228 <i>2.5%</i>	1,287 <i>2.1%</i>	1,297 <i>1.7%</i>	1,321 <i>1.4%</i>	2,123 <i>1.1%</i>	1,132 <i>2.0%</i>
Housing and Community Services	212 <i>3.3%</i>	177 <i>1.2%</i>	165 <i>0.7%</i>	147 <i>0.5%</i>	147 <i>0.4%</i>	150 <i>0.3%</i>	156 <i>0.3%</i>	164 <i>0.2%</i>	164 <i>0.2%</i>	167 <i>0.1%</i>	165 <i>0.3%</i>
Health	43 <i>0.7%</i>	56 <i>0.4%</i>	48 <i>0.2%</i>	43 <i>0.1%</i>	36 <i>0.1%</i>	30 <i>0.1%</i>	28 <i>0.0%</i>	25 <i>0.0%</i>	24 <i>0.0%</i>	26 <i>0.0%</i>	36 <i>0.1%</i>
Education	2,617 <i>41.0%</i>	2,870 <i>19.3%</i>	3,364 <i>14.8%</i>	3,633 <i>11.9%</i>	3,999 <i>10.2%</i>	4,430 <i>9.1%</i>	5,052 <i>8.4%</i>	5,379 <i>7.2%</i>	5,405 <i>5.6%</i>	5,358 <i>2.8%</i>	4,171 <i>7.3%</i>
Income Security	1,368 <i>21.4%</i>	1,045 <i>7.0%</i>	854 <i>3.8%</i>	622 <i>2.0%</i>	506 <i>1.3%</i>	350 <i>0.7%</i>	253 <i>0.4%</i>	192 <i>0.3%</i>	158 <i>0.2%</i>	121 <i>0.1%</i>	563 <i>1.0%</i>
<i>Memo items:</i>											
Schools	2,366 <i>37.1%</i>	2,613 <i>17.6%</i>	3,028 <i>13.3%</i>	3,282 <i>10.7%</i>	3,635 <i>9.3%</i>	4,002 <i>8.2%</i>	4,563 <i>7.6%</i>	4,814 <i>6.5%</i>	4,754 <i>4.9%</i>	4,529 <i>2.4%</i>	3,724 <i>6.5%</i>
Highways	332 <i>5.2%</i>	455 <i>3.1%</i>	647 <i>2.9%</i>	746 <i>2.4%</i>	897 <i>2.3%</i>	884 <i>1.8%</i>	922 <i>1.5%</i>	888 <i>1.2%</i>	758 <i>0.8%</i>	688 <i>0.4%</i>	714 <i>1.3%</i>
Mean income	6,387	14,877	22,696	30,534	39,106	48,846	60,170	74,423	96,183	188,176	57,113
Mean household size	1.7	2.0	2.2	2.4	2.5	2.7	2.9	3.0	3.1	3.2	2.6
<i>Notes:</i>											
(1) Figures in italics indicate mean public consumption as a percentage of mean income											
(2) Public Consumption A refers to public consumption that is distributed equally across persons.											
(3) Public Consumption B refers to public consumption that is distributed according to characteristics.											

Table 7. Factors affecting the distribution of school expenditures						
Income decile	Households with children in public schools				All households	
	Mean number of children		Per-pupil expenditure		Mean number of children	
	1989	2000	1989	2000	1989	2000
Lowest	1.76	1.81	6,209	7,436	0.40	0.33
Second	1.83	1.83	6,305	7,558	0.39	0.36
Third	1.83	1.82	6,033	7,357	0.42	0.43
Fourth	1.80	1.77	6,107	7,334	0.47	0.47
Fifth	1.79	1.78	6,099	7,398	0.51	0.52
Sixth	1.73	1.78	6,067	7,319	0.55	0.58
Seventh	1.75	1.75	6,248	7,455	0.62	0.64
Eighth	1.77	1.80	6,317	7,448	0.66	0.68
Ninth	1.77	1.80	6,302	7,396	0.69	0.68
Top	1.74	1.79	6,227	7,229	0.60	0.69
<i>All</i>	<i>1.77</i>	<i>1.79</i>	<i>6,200</i>	<i>7,386</i>	<i>0.53</i>	<i>0.53</i>
Source: Authors' calculations						

Table 8: The Change in the Shares of Deciles When Wealth or Public Consumption is Added to Income, 1989 and 2000:

Decile	1989			2000		
	Income	WI	PCI	Income	WI	PCI
Shares of Deciles in Total Income, WI and PCI						
Lowest	1.20%	1.00%	1.70%	1.09%	0.94%	1.80%
Second	2.70%	2.40%	3.20%	2.57%	2.24%	3.50%
Third	4.10%	3.60%	4.60%	3.91%	3.39%	5.00%
Fourth	5.50%	4.90%	6.10%	5.19%	4.53%	6.20%
Fifth	7.20%	6.20%	7.50%	6.83%	5.79%	7.50%
Sixth	8.80%	7.70%	9.10%	8.41%	7.22%	8.60%
Seventh	10.80%	9.60%	10.90%	10.35%	8.91%	10.20%
Eighth	13.40%	11.80%	13.20%	12.80%	11.19%	12.10%
Ninth	17.30%	15.80%	16.80%	16.53%	14.85%	15.40%
Top	29.10%	37.10%	26.90%	32.33%	40.95%	29.70%
<i>All households</i>	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Source: Authors' calculations.						
Note: WI : Wealth Adjusted Income; PCI : Public Consumption Adjusted Income						

**Table 9: Money Income, Wealth Adjusted Income and Public Consumption Adjusted Income:
Mean and Median in 1989 and 2000.**

	Median			Mean		
	1989	2000	Change	1989	2000	Change
Money Income	40,001	42,000	5%	49,436	57,113	16%
Wealth Adjusted Income	44,344	48,191	9%	63,514	73,514	16%
Public Consumption Adjusted Income	47,141	54,156	15%	56,558	65,354	16%

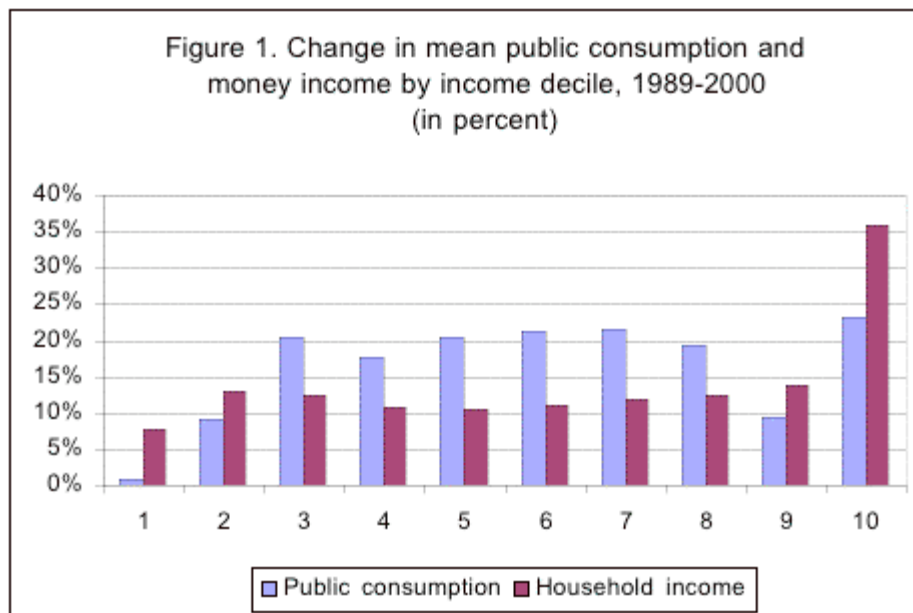
Source: Authors' calculations.

Table 10: Gini coefficients for Money Income, Wealth Adjusted Income and Public Consumption Adjusted Income: 1989 and 2000.

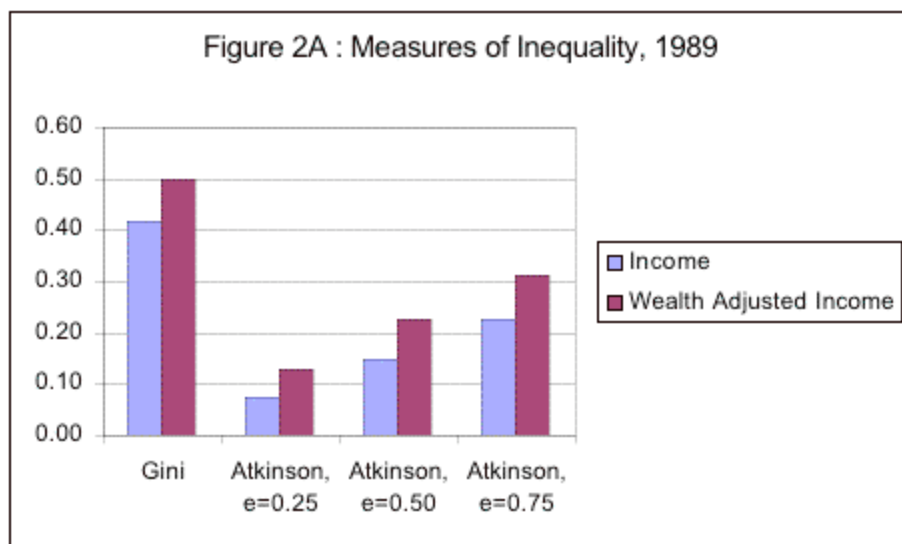
	Gini coefficient		Point Change
	1989	2000	
Money Income	0.4184	0.4515	0.0330
Wealth Adjusted Income	0.5005	0.5284	0.0279
Public Consumption Adjusted Income	0.3849	0.4114	0.0265

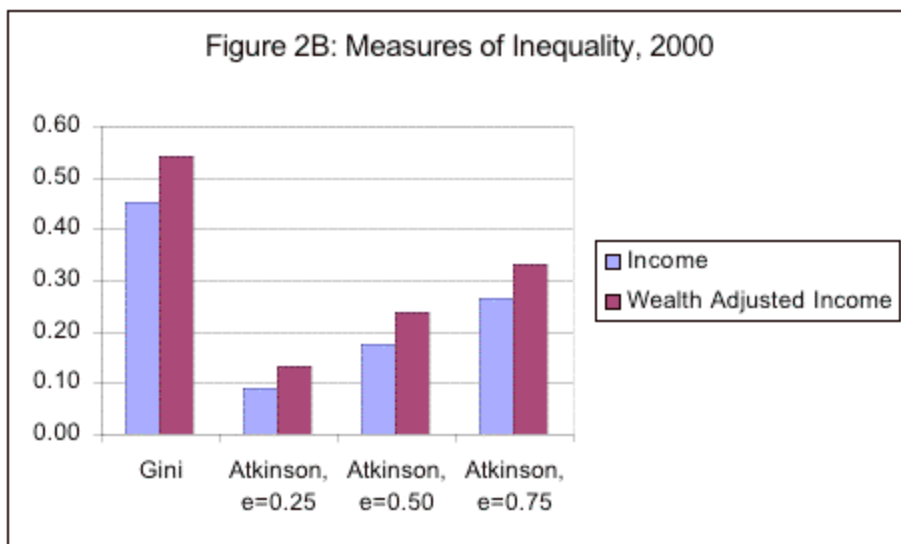
Source: Authors' calculations.

Figure 1: Change in mean public consumption and money income by income decile, 1989-2000 (in percent)



Figures 2A-2B: The effects of adding wealth on inequality measures: 1989 and 2000.

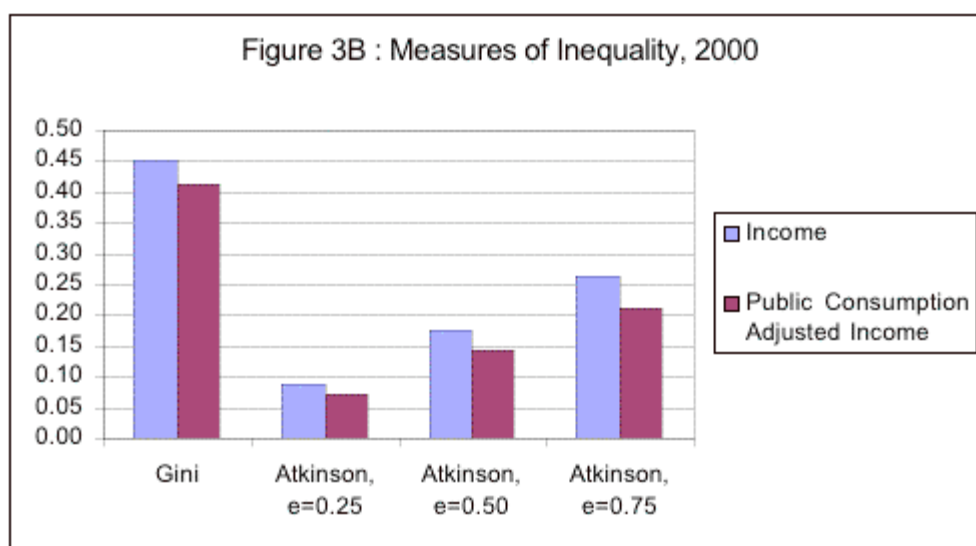
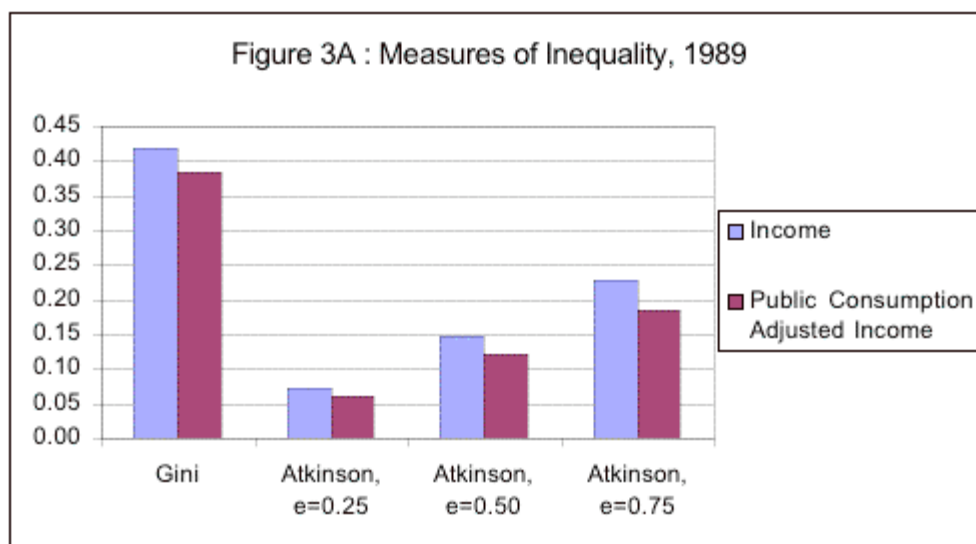




Source: Authors' calculations using SCF data matched to CPS data, 1989 and 2000.

Figures 3A-3B: The effects of adding public consumption on inequality measures:

1989 and 2000



Source: Authors' calculations.

NOTES:

1. Radner and Vaughan (1987) use another approach, which is to construct a two-dimensional criterion, based on both income and wealth, for classifying households into low-status, middle-status, and high-status categories.
2. This is consistent with the recent recommendations of the Canberra Group (2001) and the approach adopted in most national income accounts.
3. The NIPA procedure is to assign each unit of owner-occupied housing a rental equivalent on the basis of actual market rents paid on a tenant-occupied unit of similar value. (See NIPA table 8.21, line 172 for the estimated imputed rent.)
4. An alternative would be to use a "foregone returns" approach. It posits that by tying up their financial resources in acquiring a home, the owners are foregoing the returns that they could have earned by investing the same in financial assets. Estimates are already available in the CPS for imputed return to equity in owner-occupied housing.
5. Information on remaining lifetimes comes from the tables on vital statistics. (See Table 93: Expectation of Life and Expected Deaths, by Race, Sex and Age: 1999, U.S. Census Bureau, Statistical Abstract of the United States: 2002.)
6. For example, in the case of highways, it is usually asserted on the assumption of perfectly competitive markets that business use of highways always translates into lower consumer prices. Similarly, it is assumed, on the basis of an explicitly or implicitly formulated liberal theory of the capitalist state, that expenditures on elected officials are ultimately incurred on behalf of all individuals.
7. The term "entities" seem preferable to agents or individuals because the constituent elements of the business and government sectors may be best understood in this manner.
8. For a discussion of the United Nations guidelines of functional classification and its comparison with the methods used in the U.S. by the U.S. Bureau of Economic Analysis, see Galbraith, 2000.
9. We ignore the other two sectors in this paper.
10. If one were to consider the "benefits" of education or income security expenditures, additional considerations necessarily come into play: externalities as discussed in the usual neoclassical fashion is the most common approach. An alternative, proposed by James O'Connor, would be to analyze these expenditures in terms of the "accumulation" and "legitimization" functions of the capitalist state (O'Connor (1973) 2002). According to this approach, for example, a portion of expenditures on income security will have to be allocated to non-recipients also (see Peppard 1975). However, our assumptions are regarding direct usage and cost-responsibility rather than "benefits" as discussed in the two approaches.
11. A full discussion of the treatment of individual government functions within the framework employed here is available in the unpublished manuscript "The Levy Institute Measure of Economic Well-Being." Edward N. Wolff and Ajit Zacharias, October 2002.
12. In this instance, the "pricing rule" is that the marginal tax rate applicable to an individual ("the price of public good") should equal marginal benefit (utility)--assumed to be increasing with income-- derived by that individual from public expenditure. This is a specific case of the general principle of "just taxation" originally proposed by Erik Lindahl in which each individual bears a tax burden that is equal to his marginal utility derived from public expenditure.
13. A full discussion of the imputation procedures is available in the unpublished manuscript "The Levy Institute Measure of Economic Well-Being." Edward N. Wolff and Ajit Zacharias, October 2002.
14. We disregard higher education expenditures here since primary and secondary school expenditures account for the bulk of total education expenditures.
15. The public-use version of the ADS did not contain a variable identifying the county of residence in 1989; a county variable is available for 2000, but only for 60 percent of household records.