Measuring social welfare in the National Accounts

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We define measures of social welfare in terms of social welfare functions and show how to incorporate these measures into systems of national accounts. Our measure of potential social welfare is based on personal consumption expenditures. Actual social welfare depends on the distribution of these expenditures over the population. Inequality depends on the difference between actual and potential social welfare. We illustrate the implementation of these measures of social welfare by incorporating them into the U.S. National Income and Product Accounts and the Integrated Macroeconomic Accounts for the United States.

Introduction

At the Conference on Research in Income and Wealth in April 2004, Jorgenson, J. Steven Landefeld, William D. Nordhaus, and their co-authors proposed *A New Architecture for the U.S. National Accounts* ([1]). The initial step in implementing the new architecture was the Integrated Macroeconomic Accounts for the United States, developed by the Bureau of Economic Analysis (BEA) and the Board of Governors of the Federal Reserve System (FRB) ([2]). These accounts were intended to link the U.S. National Income and Products Accounts (NIPAs) to the System of National Accounts (SNA) used internationally. In this paper we employ the Integrated Macroeconomic Accounts as the starting point for measuring social welfare ([3]).

Our measure of potential social welfare is based on personal consumption expenditures. The concept of personal consumption expenditures is the same in the Integrated Macroeconomic Accounts and the NIPAs. Actual social welfare depends on the distribution of consumption over the population and we refer to this as the *standard of living*. Our measure of *inequality* depends on the difference between potential and actual social welfare ([4]). We illustrate the implementation of these measures of social welfare by incorporating them into the Integrated Macroeconomic Accounts and the NIPAs ([5]).

In September 2009 Joseph E. Stiglitz, Amartya K. Sen, and Jean-Paul Fitoussi presented *The Report by the Commission on the Measurement of Economic Performance and Social Progress* to the former President of France, Nicolas Sarkozy ([6]).The *Report* called for a shift in the focus of economic measurement from production toward 'people's well-being'. The *Report* contained twelve specific recommendations, including the use of consumption, income, and wealth, rather than production, for this purpose.

The recommendations of the Stiglitz-Sen-Fitoussi Report are complementary to those of the nearly contemporaneous 2008 System of National Accounts (2009) as well as the closely related European System of Accounts 2010 (2013) ([7]). Both accounting systems include concepts of consumption, income, and wealth.

In response to the Stiglitz-Sen-Fitoussi Report the OECD has established two international expert groups. The International Expert Group on Micro Statistics on Household Income Consumption and Wealth is chaired by the Australian Bureau of Statistics and will develop new international standards and guidelines for microeconomic data on income, consumption, and wealth ([8]). The International Expert Group on Disparities in the National Accounts is chaired by Eurostat and will consider the role of

([1]) Jorgenson, Landefeld,and Nordhaus (2006), eds., *A New Architecture for the U.S. National Accounts*, Chicago, University of Chicago Press.

([2]) Albert M. Teplin, Rochelle Antoniewicz, Susan Hume McIntosh, Michael Palumbo, Genevieve Solomon, Charles Ian Mead, Karin Moses, and Brent Moulton (2006), 'Integrated Macroeconomic Accounts for the United States: Draft SNA-USA,' in Jorgenson, Landefeld, and Nordhaus (2006), eds., pp. 471-540.

([3]) Plans for developing these accounts are discussed by Marco Cagetti, Elizabeth Holmquist, Lisa Lynn, McIntosh, and David Wasshausen (2014), 'The Integrated Macroeconomic Accounts of the United States,' in Jorgenson, Landefeld, and Paul Schreyer (2014), eds., Measuring Sustainability and Progress, Chicago, University of Chicago Press.

([4]) For more details see Jorgenson (1990), 'Aggregate Consumer Behavior and the Measurement of Social Welfare,' *Econometrica*, Vol. 58, No. 5, September, pp. 1007-1040, Slesnick (1998), 'Empirical Approaches to the Measurement of Welfare,' *Journal of Economic Literature*, Vol. 36, No. 4, December, pp. 2108-2165, and Jorgenson and Slesnick (2014), 'Measuring Social Welfare in the U.S. National Accounts,' in Jorgenson, Landefeld, and Schreyer (2014), eds.

([5]) See Jorgenson (1997b), 'Measuring Social Welfare', *The MIT Press*, Cambridge and Slesnick (2001), 'Consumption and Social Welfare: Living Standards and Their Distribution in the United States', *Cambridge University Press*, Cambridge.

([6]) Stiglitz, Sen, and Fitoussi (2010), *Mismeasuring Our Lives: Why GDP Doesn't Add Up*, the New Press, New York. See: http://www.stiglitz-sen-fitoussi.fr/en/index.htm.

([7]) United Nations (2009), '2008 System of National Accounts', New York, United Nations. See: http://unstats.un.org/unsd/nationalaccount/sna2008.asp Eurostat (2013), 'European System of Accounts', Luxembourg, European Union. See: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code= KS-02-13-269

([8]) Organisation for Economic Co-operation and Development (2013a), Framework for Statistics on the Distribution of Household Income, Consumption, and Wealth, Paris, Organisation for Economic Co-operation and Development, and Organisation for Economic Co-operation and Development (2013b), Guidelines for Micro Statistics on Household Wealth, Paris, Organisation for Economic Co-operation and Development.

distributional statistics in the national accounts ([9]).

The new architecture for the U.S. national accounts includes a clear distinction between production and welfare, a key concern of the Stiglitz-Sen-Fitoussi Report. By augmenting personal consumption expenditures with its distribution over the population, we are able to incorporate measures of the cost and standard of living and inequality into the NIPAs without altering the accounting structure or conceptual framework of the accounts. Similarly, by including output, as measured by the gross domestic product (GDP), and input, as measured by gross domestic income (GDI), we can incorporate measures of output, input, and productivity in the national accounts, as pointed out in Chapters19 and 20 of the 2008 SNA. This also requires no change in the accounting structure or the conceptual framework of the NIPAs.

In Section 2 we introduce measures of individual and social welfare. Our measures of individual welfare incorporate three types of information. Personal consumption expenditures represent the size of the household budget. We express the household's consumption in constant prices. We then divide real consumption by household size. Finally, we express individual welfare as the logarithm of real consumption per capita, so that increments of individual welfare are equal to proportional increases in consumption. These features are commonly employed in the literature on consumer behavior.

We consider a class of social welfare functions that combines the mean of individual welfare with a measure of dispersion that gives additional weight to equity considerations. We emphasize that the validity of social welfare evaluations depends on the normative conditions of horizontal and vertical equity, as well as information on consumer preferences. To illustrate these ideas we consider two limiting cases of our class of social welfare functions. A utilitarian social welfare function depends only on the mean of individual welfare and gives minimum weight to equity. An egalitarian social welfare function incorporates a measure of dispersion that gives maximum weight to equity.

In Section 3 we summarize the new architecture for the U.S. national accounts. We link our measure of welfare to personal consumption expenditures and our measure of production to the GDP in the NIPAs. In Section 4 we present measures of inequality and the standard of living that include the distribution of personal consumption expenditures over the population. We incorporate these measures of social welfare into the Integrated Macroeconomic Accounts and the NIPAs. While the Consumer Price Index (CPI) produced by Bureau of Labor Statistics (BLS) can be interpreted as a measure of the cost of living, the CPI is not included in the NIPAs. The Bureau of the Census generates official statistics on the standard of living, poverty, and inequality. However, these statistics are not integrated with the NIPAs. In Section 5 we discuss possible extensions of the national accounts to include measures of subjective well-being and nonmarket activities.

At a conceptual level our welfare measures are consistent with the 2008 SNA, the ESA 2010, and the proposals of the Stiglitz-Sen-Fitoussi Report. We conclude by recommending that national statistical agencies in Europe and around the world experiment with the implementation of welfare measures within the ESA 2010 and the 2008 SNA. This can be done without changing the accounting structure or the conceptual framework of these accounting systems. The availability of properly constructed welfare measures is essential for addressing concerns about the possible confusion between measures of output, such as GDP, and measures of welfare, such as the standard of living.

([9]) Maryse Fesseau, Florence Wolff, and Maria Liviana Mattonetti (2013), 'A Cross-Country Comparison of Household Income, Consumption and Wealth between Micro Sources and National Accounts Aggregates,' OECD Statistics Working Paper. See: http://www.oecd-ilibrary.org/economics/a-cross-country-comparison-of-household-income-consumption-and-wealth-between-micro-sources-and-national-accounts-aggregates_5k3wdjrnh7mv-en. Fesseau and Mattonetti (2013), 'Distributional Measures Across Household Groups in a National Accounts Framework: Results from an Experimental Cross-Country Exercise on Household Income, Consumption, and Saving,' OECD Statistics Working Paper. See: http://www.oecd-ilibrary.org/economics/distributional-measures-across-household-groups-in-a-national-accounts-framework_5k3wdjqr775f-en.

Measuring individual and social welfare

Introduction

Despite the exclusion of social welfare from the national accounts, welfare measurement is well-established in both economic theory and economic statistics. Sen's (1970) magisterial *Collective Choice and Social Welfare* was a crucial turning point in the theory of social choice ([10]). Sen greatly broadened the scope of welfare measurements by mapping out alternatives to the traditional assumptions of ordinal measures of individual welfare that are not comparable among individuals. This led to an explosion of research on 'possibility theorems' during the following decade, summarized and extended by Kevin W. S. Roberts (1980) ([11]).

Statistical measures of inequality based on social welfare functions have been proposed by Anthony B. Atkinson and Serge C. Kolm ([12]). These measures have been widely employed in economic statistics, for example, by Atkinson and Andrea Brandolini (2010) ([13]). The social welfare functions were given a rigorous foundation in the theory of social choice summarized by Roberts (1980).

Following the elaboration of new conceptual possibilities for welfare measurement, we developed an econometric methodology to eliminate an important gap between the theory of social choice and measures of welfare used in economic statistics. This arises from the fact that surveys of consumer expenditures are based on households rather than individuals. Our approach to welfare measurement is summarized in Jorgenson's (1990) Presidential Address to the Econometric Society, Slesnick's (1998) survey article in the *Journal of Economic Literature,* Slesnick's (2001) book, and Jorgenson and Slesnick (2014).

Aggregation and social welfare

Econometric models of consumer behavior have long been used in measuring individual welfare ([14]). The challenge we faced was to extend this approach to social welfare. Aggregation over individuals is the key to social welfare measurement. Jorgenson, Lawrence J. Lau and Thomas M. Stoker (1997) showed how to recover models of individual consumer demand that underlie their model of aggregate consumer demand. In Jorgenson and Slesnick (1984) we derived cardinal measures of individual welfare that are interpersonally comparable from these models of individual demand. We introduced the normative assumptions employed by Roberts (1980) and aggregated our measures of individual welfare to obtain a measure of social welfare ([15]).

Our final step was to convert individual and social welfare into money measures appropriate for the national accounts, using the individual expenditure function introduced by Lionel W. McKenzie (1957) and the social expenditure function originated by Robert A. Pollak (1981) ([16]). These conceptual tools made it possible for us to develop a 'dashboard' of detailed measures of social welfare, as later recommended by Stiglitz, Sen, and Fitoussi (2010). We developed measures of welfare for groups within the population and showed how to aggregate them into overall measures of social welfare.

([10]) Sen (1970), *Collective Choice and Social Welfare*, San Francisco, Holden-Day.

([11]) For a summary of the framework used for our social welfare measures, see: Roberts (1980), 'Possibility Theorems with Interpersonally Comparable Welfare Levels,' *Review of Economic Studies*, Vol. 47, No. 147, January, pp. 409-420.

([12]) Atkinson (1970), 'On the Measurement of Inequality,' *Journall of Economic Theory*, Vol. 2, No. 3, September, pp. 244-263. Kolm (1969), 'The Optimal Production of Social Justice,' in Julius Margolis and Henri Guitton, eds., Public Economics, London, Macmillan, pp. 145-200.

([13]) Atkinson and Brandolini (2010), 'On Analyzing the World Distribution of Income,' *World Bank Economic Review*, Vol. 24, No. 1, January, pp. 1-37.

([14]) See Angus Deaton and John Muellbauer (1980), 'Economics and Consumer Behavior', Cambridge, *Cambridge University Press*, UK, Chapter 9, pp. 214-240, and Slesnick (1998).

([15]) Jorgenson, Lau, and Stoker, 'The Transcendental Logarithmic Model of Aggregate Consumer Behavior,' *The MIT Press*, Ch. 8 in Dale W. Jorgenson (1997a), Aggregate Consumer Behavior, Cambridge, MA, pp. 203-356. Jorgenson and Slesnick (1984), 'Aggregate Consumer Behavior and the Measurement of Inequality,' Review of Economic Studies, Vol. 51, No. 3, July, pp. 369-392.

([16]) McKenzie (1957), 'Demand Theory without a Utility Index,' *Review of Economic Studies*, Vol. 24, No. 65, June, pp. 185-189. Pollak (1981), 'The Social Cost of Living Index,' *Journal of Public Economics*, Vol. 15, No. 3, June, pp. 311-336.

Household equivalence scales

Our empirical research used observations on households from the Consumer Expenditure Survey (CEX), conducted by BLS on a quarterly basis since 1980 ([17]). An important feature of the CEX, like other consumer expenditure surveys, is that observations are available for households, but not for individuals. To generate interpersonal comparisons based on households, we employed a long-established concept in economic statistics, household equivalence scales ([18]).

The concept of household equivalence scales has been used to establish family needs for income support programs and assess the cost of additional children. We derived household equivalence scales econometrically from household expenditure functions. These household equivalence scales, like traditional scales, depend on the demographic characteristics of households. Unlike traditional scales, our household equivalence scales also depend on prices faced by households.

The introduction of household equivalence scales into the measurement of social welfare bridged the gap between the economic theory and economic statistics. The conceptual basis for this link was established by Arthur Lewbel (1989) in a paper on the economic theory of household equivalence scales ([19]). Lewbel began by clarifying the role of aggregation over households in deriving cardinal measures of individual welfare that are interpersonally comparable.

Lewbel demonstrated that household equivalence scales can be identified under the assumptions that these scales are independent of household welfare, depending only on household characteristics and prices. These are precisely the assumptions employed in our household equivalence scales. Using the possibility theorems summarized by Roberts (1980), Lewbel combined these household equivalence scales with cardinal measures of individual welfare to obtain measures of individual welfare that are cardinal and interpersonally comparable, using Jorgenson and Slesnick (1984, 1987) as an illustration.

Social welfare functions

In Jorgenson and Slesnick (2014) we present money measures of individual and social welfare. We assume that household expenditures are allocated to maximize a household welfare function. As demonstrated by Pollak (1981), the household behaves in the same way as an individual maximizing a utility function. We treat households as individuals in measuring social welfare. All subsequent references to individuals are to households considered as consuming units.

In order to implement money measures of individual and social welfare empirically, we require individual welfare functions that reflect the preference orderings of individual consuming units ([20]). We represent these orderings by real-valued individual welfare functions. For this purpose we employ an updated version of the econometric model of consumer behavior in the U.S. presented by Jorgenson and Slesnick (1987) ([21]). Our measure of social welfare is based on preferences over social states by all individuals. We represent a social ordering by means of a real-valued social welfare function, defined on the distribution of individual welfare over the population.

To represent social orderings in a form suitable for measuring social welfare we consider a class of social welfare functions incorporating a notion of horizontal equity. We require that individuals with identical individual welfare functions enter the social welfare functions in the same way. We also incorporate a notion of vertical equity by requiring that the social welfare functions are equity-regarding in the sense of Peter J. Hammond (1977). This imposes a version of Hugh Dalton's (1920) princi-

([17]) In 2013 BLS approved a redesign of the CEX proposed by the Gemini Project. For details see: http://www.bls.gov/cex/geminiproject.htm#news

([18]) See Jorgenson and Slesnick (1987), 'Aggregate Consumer Behavior and Household Equivalence Scales,' *Journal of Business and Economic Statistics*, Vol. 5, No. 2, April, pp. 219-232. 'Alternative approaches to household equivalence scales are summarized' by Slesnick (2001), pp. 88-121, and OECD (2013a), pp. 152-157.

([19]) Lewbel (1989), 'Household Equivalence Scales and Welfare Comparisons,' *Journal of Public Economics*, Vol. 39, No. 3, August, pp. 377-391.

([20]) Implementation of measures of individual and social welfare is discussed by Slesnick (2001), pp. 201-214, and Jorgenson and Slesnick (2014).

([21]) This model was updated by Slesnick (2001), p. 96.

ple of transfers: A transfer from a household with a higher welfare level to a household with a lower welfare level that does not reverse their relative positions must increase the level of social welfare ([22]).

Our system of aggregate demand functions is obtained by summing over individual demand systems. These individual demand systems are estimated from cross section data on quantities consumed, total expenditure, and attributes of households such as demographic characteristics. The aggregate quantities consumed depend on the attributes and total expenditure of individual consuming units through summary statistics of the joint distribution of the total expenditure and attributes. We refer to the restrictions on individual consumer behavior required to obtain a model of aggregate consumer behavior that depends only on summary statistics as exact aggregation restrictions.

We exploit the exact aggregation restrictions in constructing cardinal measures of individual welfare and defining interpersonal comparability in terms of household equivalence scales.

We combine cardinal and interpersonally comparable measures of individual welfare with assumptions on horizontal and vertical equity to obtain a class of social welfare functions. We consider two limiting cases of these social welfare functions. We first consider a 'utilitarian' social welfare function that reduces to an average of welfare levels over all consuming units. This gives the least possible weight to equity considerations. We then augment the mean of individual welfare with a measure of dispersion that gives additional weight to equity considerations. We consider the limiting case that gives the greatest weight to equity and refer to this as the 'egalitarian' social welfare function. We present measures of social welfare for both utilitarian and egalitarian social welfare functions in order highlight the role of normative considerations in social welfare measurements.

Measuring welfare in the National Accounts

Introduction

We next consider the measurement of social welfare in the national accounts. The first issue to be addressed is, why incorporate welfare into the national accounts? The advantages stem from the accuracy and reliability of estimates carried out within a system of national accounts. In addition, the results can be reported with other estimates from the national accounts on a regular basis – annually, quarterly, or even monthly.

An important advantage of measuring welfare within the national accounts is the establishment of international standards like those that underlie the 2008 SNA and ESA 2010. The resulting uniformity of methods is essential for international comparability.

As an illustration, the World Bank's estimates of poverty and inequality are valuable in comparing economic performance and social progress across countries ([23]). These estimates are based on hundreds of micro-economic data sets for different countries providing information on income and consumption for individuals and households. The estimates also incorporate purchasing power comparisons of production in the World Bank's International Comparisons Project ([24]).

The 2008 SNA rules out a welfare interpretation of the national accounts. However, systems of satellite accounts, such as environmental accounts, are often given a welfare interpretation ([25]). Based on experience with the 2008 SNA and ESA 2010 and their

([22]) Dalton (1920), 'The Measurement of the Inequality of Income,' *Economic Journal*,Vol 30, No. 119, September, pp. 361-384, and Hammond (1977), 'Dual Interpersonal Comparisons of Utility and the Economics of Income Distribution,' *Journal of Public Economics*, Vol. 7, No. 1, February, pp. 51-71.

([23]) See Shaohua Chen and Martin Ravallion (2013), 'More Relatively-Poor People in a Less Absolutely-Poor World,' *Review of Income and Wealth*, Vol. 59, Issue 1, pp. 1-28.

([24]) World Bank (2008), 'Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program', Washington, DC, World Bank. See: http://siteresources.worldbank.org/ICPEXT/Resources/ICP_2011.html

([25]) See 2008 SNA (2009), Ch. 2, pp. 12-13, and Ch. 29, pp. 534-538. This issue will be discussed in more detail below.

predecessors, the incorporation of welfare measures into the national accounts will require lengthy international consultations.

In August 2008, four years after the meeting of the Conference on Research in Income and Wealth devoted to the new architecture, Jorgenson presented an update of the prototype system of national accounts he had developed with Landefeld. The occasion was Jorgenson's Richard and Nancy Ruggles Memorial Lecture to the 30th General Conference of the International Association for Research on Income and Wealth ([26]).

Jorgenson linked the new architecture to the Integrated Macroeconomic Accounts developed by the BEA and the FRB. Jorgenson presented GDP as a measure of production and personal consumption expenditures as a measure of potential social welfare.

Income and product

The Domestic Income and Product Account for the new architecture is presented in Table 1. We show how the concepts of Gross Domestic Product and Gross Domestic Income are derived from the concepts used in the NIPAs. The key innovation in the new architecture is the inclusion of prices and quantities of capital services for all productive assets in the U.S. economy. Our imputations for capital services are not available in the NIPAs and represent important components of input and output in the new architecture. The measures of output, input, and productivity conform to the standards presented in the Schreyer's (2001) *OECD Productivity Manual* ([27]).

Table 1 begins with Gross Domestic Product, as defined in the NIPAs, and makes a series of adjustments to bring the definition into conformity with the new architecture. The first step is to add imputations for flows of capital services excluded from the NIPAs. These include the services of durables generated by households and institutions and the services of durables, structures, inventories, and land generated by governments. Consumption of fixed capital on these assets must be eliminated in order to avoid double counting. Finally, taxes included in capital services must be added and other indirect taxes eliminated to arrive at the concept of Gross Domestic Product used in the new architecture.

Similarly, Gross Domestic Income in the Factor Outlay account of the new architecture is derived from national income, as defined in the NIPAs. The first step, as before, is to add imputations for capital services not included in the NIPAs. Adjustments for consumption of fixed capital and taxes are required to arrive at the concept of Gross Domestic Income used in the new architecture.

Estimates of capital services like those used in the new architecture are discussed in Chapter 20 of the 2008 SNA:

> *'By … associating estimates of capital services with the standard breakdown of value added, the contributions of both (labor) and capital to production can be portrayed in a form ready for use in the analysis of productivity in a way entirely consistent with the accounts of the SNA ([28]).'*

Jorgenson concluded that the Domestic Income and Product Account of the new architecture is consistent with the 2008 SNA at a conceptual level. The volume measure of input is a quantity index of capital and labor services, while the volume measure of output is a quantity index of investment and consumption goods. Productivity is the ratio of output to input.

The process that led to the 2008 SNA was formally initiated by the United Nations Statistical Commission in March 2004, almost simultaneously with development of the new architecture for the U.S. national accounts. Issues related to the measurement of capital were assigned to an Expert Group, designated Canberra II after the site of the initial meeting in Canberra, Australia. The incorporation of the price and quantity of capital services into the 2008 SNA was recommended by the Canberra II Expert Group and approved by the United Nations Statistical Commission at its February-March 2007

([26]) Jorgenson (2009), 'A New Architecture for the U.S. National Accounts', *Review of Income and Wealth*, Vol. 55, No. 1, pp. 1-42.

([27]) Schreyer (2001), 'Measuring Productivity', Paris, Organisation for Economic Co-operation and Development.

([28]) 2008 SNA (2009), Ch. 20, p. 415.

meeting. Schreyer, then head of national accounts at the OECD, prepared an OECD Manual ([29]) on *Measuring Capital.* Schreyer's *Manual* provided detailed recommendations on methods for the construction of prices and quantities of capital services.

An interpretation of output, input, and productivity can be provided by the production possibility frontier introduced by Jorgenson (1966) ([30]):

$$Y(I,C) = AX(K,L),$$

Gross Domestic Product in constant prices Y consists of outputs of investment goods I and consumption goods C. These products are components of Gross Domestic Product and are produced from capital services K and labor services L. The factor services are components of Gross Domestic Income in constant prices X and are augmented by multifactor productivity A.

Under the assumption that product and factor markets are in competitive equilibrium, the share-weighted growth of outputs is the sum of the share-weighted growth of inputs and growth in multifactor productivity:

$$\overline{w}_I \Delta I + \overline{w}_C \Delta \ln C = \overline{v}_K \Delta \ln K + \overline{v}_L \Delta \ln L + \Delta \ln A,$$

where w and v denote average shares of the outputs and inputs, respectively, in the value of GDP.

Table 3 presents the sources of U.S. economic growth during 1948-2010 and various sub-periods. For the period as a whole the contribution of capital services accounted for 51.6 percent of economic growth. Labor services contributed 31.6 percent, while multifactor productivity growth contributed only 19.0 percent. The first sub-period ends with the business cycle peak in 1973. After strong output and productivity growth in the 1950s, 1960s and early 1970s, the growth of GDP dropped from 3.95 percent from 1948-1973 to only 2.68 percent from 1973 through 1995.

A powerful resurgence in U.S. economic growth began in 1995 but ended abruptly in 2000 with the dot-com crash. U.S. economic growth surged to 4.14 percent during the period 1995-2000. This reflected the investment boom of the late 1990s, as businesses, households, and governments poured resources into plant and equipment, especially computers, software, and communications equipment. After the dot-com crash in 2000 GDP growth slowed to 2.87 percent per year and the relative importance of investment in information technology declined sharply.

The results presented in Table 3 highlight the importance of the new architecture. In the absence of an integrated production account the analysis of sources of economic growth would have had to rely on a mixture of estimates from different sources, combined with estimates of missing information, such as growth in labor input per hour worked. Different analysts could readily produce conflicting interpretations of events such as the spurt in productivity growth after 1995 and the collapse of output and productivity growth during the Great Recession.

The Domestic Income and Product Account of the new architecture has been disaggregated to the level of 65 industries by Susan Fleck, Steven Rosenthal, Matthew Russell, Erich Strassner, and Lisa Usher (2014) ([31]). Jorgenson, Mun S. Ho, and John D. Samuels (2014) have extended this industry-level account to cover the period 1947-2010, using the methodology of Jorgenson, Ho and Kevin J. Stiroh (2005) ([32]). Jorgenson and Schreyer (2013) have shown how to integrate the industry-level production account of Jorgenson, Ho, and Samuels (2014) into the 2008 SNA ([33]).

Industry-level production accounts have been incorporated into the national accounts in five European countries, Australia, Canada, and the United

([29]) Schreyer (2009), 'Measuring Capital', Paris, Organisation for Economic Co-operation and Development.

([30]) Jorgenson, 'The Embodiment Hypothesis,' *Journal of Political Economy*, Vol. 74, No. 1, February, pp. 1-17.

([31]) Fleck, Rosenthal, Russell, Strassner, and Usher (2014), 'A Prototype BEA-BLS Industry-Level Production Account for the United States,' Jorgenson, Landefeld, and Schreyer (2014), eds. For data covering 1998-2010, see: http://www.bea.gov/industry/pdf/Prototype%20BEA-BLS%20Industry-Level%20Production%20Account%20for%20the%20United%20States%201998-2010_Final.pdf

([32]) Jorgenson, Ho, and Samuels (2014), 'A Prototype Industry-Level Production Account for the United States, 1947-2010,' *Journal of Policy Modeling*, Vol. 36, No. 3, May-June.

([33]) Jorgenson and Schreyer (2013), 'Industry-Level Productivity Measurement and the 2008 System of National Accounts,' *Review of Income and Wealth*, Vol. 59, No. 6, pp. 185-211.

States. The EU KLEMS project has developed systems of production accounts for the economies of 25 of the 28 European Union (EU) member states ([34]). For major EU countries this project includes accounts for 72 industries, covering the period 1970-2005. The World KLEMS Initiative will extend the EU KLEMS framework to important developing and transition economies, including Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia, Turkey, and Taiwan ([35]).

Income and expenditures

We employ the Domestic Income and Expenditures Account presented in Table 2 in measuring individual and social welfare in the new architecture. The starting point for the income side of this account is Gross Domestic Income from the Income and Production Account described above. This is adjusted to include production taxes and the surplus of government enterprises and exclude subsidies, as defined in the NIPAs. Adding receipts from the rest of the world and eliminating payments, including taxes and transfers, to the rest of the world, generates Gross Income. Our final step is to subtract our imputation for depreciation to generate Net Income in the new architecture.

In the new architecture Domestic Expenditures are defined as the sum of personal consumption expenditures, government consumption expenditures, and net investment expenditures. The definition of personal and government consumption expenditures in the NIPAs must be adjusted to include flows of capital services that are excluded from the NIPAs. Gross investment is reduced by depreciation to obtain the concept of net investment in the new architecture. Consumption and investment expenditures, as defined in the Income and Expenditures account, must be carefully distinguished from outputs of consumption and investment, as defined in the Income and Product account.

The key accounting identity for the Domestic Income and Expenditures Account is that net income is equal to net expenditures. Net income includes gross income from sales of capital and labor services from the Domestic Income and Product Account, less depreciation. Net income also contains net receipts from the rest of the world, including taxes and transfers. Net expenditures are the sum of personal consumption expenditures, government consumption expenditures, and net investment expenditures.

Economic growth creates opportunities for both present and future consumption.

These opportunities are generated by expansion in the supply of capital and labor services, augmented by changes in the level of living:

$$Z(C,I) = BW(L,N),$$

Net Domestic Expenditures in constant prices Z consist of consumption expenditures C and investment expenditures I, net of depreciation. These expenditures are generated by Net Incomes in constant prices W, comprising labor incomes L and property incomes N, net of depreciation.

The level of living B must be carefully distinguished from multifactor productivity A. An increase in the level of living implies that for given supplies of the factor services that generate labor and property incomes, the U.S. economy generates greater opportunities for present and future consumption. The share-weighted growth of expenditures is the sum of the share-weighted growth of incomes and growth in the level of living:

$$\Delta \ln C + \overline{w}_I \Delta \ln I = \overline{v}_L \Delta \ln L + \overline{v}_N \Delta \ln N + \Delta \ln B,$$

where w and v denote average value shares for expenditures and incomes, respectively.

Table 4 presents a decomposition of the uses of economic growth for the period 1948-2010. The growth rate of expenditures is a weighted average of growth rates of personal consumption expenditures, government consumption expenditures, and net investment expenditures. The contribution of each

([34]) The EU KLEMS project was completed on June 30, 2008. A summary of the findings is presented by Marcel P. Timmer, Robert Inklaar, Mary O'Mahony, and Bart van Ark (2010), 'Economic Growth in Europe: A Comparative Industry Perspective', Cambridge, *Cambridge University Press*, and Matilde Mas and Robert Stehrer (2012), eds., 'Industrial Productivity in Europe: Growth and Crisis, Cheltenham, UK, Edward Elgar. For current data, see: www.euklems.net/.

([35]) Jorgenson (2012), 'The World KLEMS Initiative,' *International Productivity Monitor*, Fall. See: http://www.csls.ca/ipm/24/IPM-24-Jorgenson.pdf Jorgenson summarizes the prototype industry-level production account for the United States developed by Jorgenson, Ho, and Samuels (2014).

category of expenditures is the growth rate weighted by the relative share. Similarly, the contributions of labor and property incomes are the growth rates weighted by the relative shares. Growth in the level of living is the difference between growth rates of expenditures and incomes.

The growth of expenditures largely reflects the pattern of output growth, but averaged 0.25 percent lower for the period 1948-2010. Strong growth in expenditures during the period 1948-73 was followed by a slowdown after 1973. A sharp revival occurred after 1995, but the boom was followed by another slowdown after 2000 and a collapse after 2005. Personal consumption expenditures, a key component of our measure of potential welfare, greatly predominated as a source of growth in net expenditures.

Standard of living and its cost

Introduction

In this Section we integrate distributional measures for personal consumption expenditures into the U.S. national accounts for the period 1948-2010. Jonathan Fisher, David Johnson, and Timothy Smeeding (2012) provide a detailed survey of the recent literature on the measurement of inequality in consumption and income ([36]). Their estimates of inequality employ data from the Consumer Expenditure Survey (CEX) and cover the period 1984-2010. Other recent and comprehensive studies of welfare measurement based on the CEX include Orazio Attanasio, Eric Hurst, and Luigi Pistaferri (2012), Bruce Meyer and James Sullivan (2009), and Dennis Fixler and Johnson (2014) ([37]).

Egalitarian versus utilitarian

We next implement the approach to normative economics presented in Section 2. Our measure of potential social welfare is personal consumption expenditures from the Domestic Income and Expenditures Account, expressed in constant prices per household equivalent member. Actual social welfare also depends on the distribution of personal consumption expenditures over the population.

We decompose our measure of social welfare into the product of efficiency and equity components. We first determine the maximum level of welfare that can be attained through lump-sum redistributions of aggregate total expenditure. Expenditure must be distributed so as to equalize individual expenditure per capita, so that the social welfare function reduces to average individual welfare. This is our measure of efficiency. We define equity as the ratio of the index of social welfare to this index of efficiency. We present indexes for utilitarian and egalitarian social welfare functions.

In the first column of Table 5 we present personal consumption expenditures for the U.S. in nominal terms for the period 1948-2010. In the second column of Table 5 we present the social cost-of-living index. We divide consumption in nominal terms by the social cost-of-living index to obtain personal consumption expenditures in constant prices of 2005 in the third column.

The social cost-of-living index is defined implicitly by our efficiency index and must be carefully distinguished from the implicit deflator for personal consumption expenditures in the NIPAs. In the fourth column of Table 5 we present the number of household equivalent members of the U.S. population. We divide personal consumption expenditures in real terms by the number of household equivalent members to express real consumption in per capita terms. This results in our measure of potential so-

([36]) See Fisher, Johnson, and Smeeding (2012), 'Inequality of Income and Consumption: Measuring the Trends in Inequality from 1985-2010 for the Same Individuals,' 32nd General Conference, *International Association for Research in Income and Wealth*, Boston, MA, August, pp. 6-9.

([37]) See Attansio, Hurst, and Pistaferri, 'The Evolution of Income, Consumption, and Leisure Inequality in the U.S., 1980-2010,' *NBER Working Paper*, No. 17982, April; Meyer and Sullivan (2009), 'Five Decades of Consumption and Income Poverty,' *NBER Working Paper*, No. 14827, March; Fixler and Johnson (2014), 'Accounting for the Distribution of Income in the U.S. National Accounts in Jorgenson, Landefeld, and Schreyer (2014), eds. This list is illustrative rather than exhaustive.

cial welfare.

In Table 6 we present indexes of the U.S. standard of living for utilitarian and egalitarian social welfare functions. In the first column of Table 6 we present the equity index evaluated for the egalitarian social welfare function. The egalitarian index of the standard of living given in the second column is the product of this equity index and personal consumption expenditures per capita in constant prices from Table 5. Similarly, the utilitarian standard of living presented in the fifth column of Table 6 incorporates the utilitarian equity index in the fourth column, evaluated for the utilitarian social welfare function.

Finally, in the third column of Table 6 we present the egalitarian index of relative inequality. This is defined as the proportional loss in money metric social welfare due to an unequal distribution of household welfare. Like the familiar Gini coefficient, this index of relative inequality lies between zero and one with zero defining perfect equality. We present the utilitarian index of relative inequality in the sixth column of Table 6.

Efficiency and equity

In Table 7 we present average growth rates for personal consumption expenditures in constant prices per household equivalent member, our measure of efficiency, for the postwar period 1948-2010 and for five sub-periods. We also present growth rates of egalitarian and utilitarian measures of equity and the standard of living. The average annual growth rate of efficiency for the period as a whole was 2.16 percent. The average growth rate of the egalitarian measure of the standard of living was 2.34 percent, reflecting a modest gain in equity of 0.17 percent per year. For the utilitarian measure of the standard of living the growth rate was 2.24 percent and the growth rate of equity was only 0.08 percent.

The growth rate of efficiency was highest during the period 1948-1973. Since this is the only period when the growth of equity was positive, the growth rates of the standard of living for both egalitarian and utilitarian measures were also highest. The growth rate of efficiency dropped during the subperiod 1973-1995. Combined with the modest declines in equity, this resulted in a substantial decline in the growth rates of egalitarian and utilitarian measures of the standard of living.

The differences between growth rates of the egalitarian and utilitarian measures of the standard of living illustrate the importance of value judgments in measuring social welfare. However, the qualitative picture is very similar for the two measures. High growth rates during 1948-1973 were followed by lower and relatively stable growth rates for 1973-2005, and by a collapse during the Great Recession period 2005-2010. For both measures the investment boom of 1995-2000 was largely offset by an accelerated decline in equity. Finally, substantial declines in equity contributed to the collapse of the standard of living during the Great Recession.

Conclusion

We recommend that national statistical agencies in Europe and around the world should incorporate measures of individual and social welfare into systems of national accounts within the framework of the ESA 2010 and the 2008 SNA. This process could begin with a satellite system for measuring social welfare that would include the two polar opposite social welfare functions that we have considered. The egalitarian social welfare function gives maximum weight to equity considerations, while the utilitarian social welfare functions gives maximum weight to efficiency.

The satellite system for measuring social welfare could include a breakdown of our measures of social welfare by family size, age of head, region, race, and urban vs. rural residence and gender of head. A breakdown of potential social welfare, our measure of efficiency, would be provided by personal consumption expenditures per household equivalent member. Using data sets on consumption from sources such as the World Bank and the

Luxembourg Income Study, together with prices of consumption from sources like the World Bank's International Comparison Project, the satellite system could provide international comparisons ([38]).

Incorporating normative judgments into the national accounts is a substantial departure from a long tradition. This tradition, as reflected in SNA 2008, excludes normative judgments that are essential for interpreting distributional information. The traditional view is that economists have little to contribute to these judgments. Our view is that the development of the economic theory of social choice and its many applications has made many economists expert in using normative perspectives in the evaluation of economic policy. These perspectives should be reflected in systems of national accounts.

The strengths of the traditional approach to the national accounts could be preserved by presenting distributional information in a satellite system and presenting alternatives like egalitarian and utilitarian measures of equity. Well-established aggregates from the national accounts, such as the GDP and personal consumption expenditures should be retained in the core system of national accounts. These are essential for developing and interpreting distributional information within the framework of the national accounts.

Finally, the boundary of social welfare could be extended to include nonmarket goods and services and measures of subjective well-being. This would be a natural second stage in the implementation of measures of social welfare within the national accounts, since it would require substantial modifications in the conceptual framework for the national accounts. It would be impossible to implement the resulting measures of social welfare within a satellite system that would preserve the core system of national accounts. Measures of output like the GDP and measures of consumption like personal consumption expenditures would have to be replaced by extended measures the output and consumption that incorporate nonmarket sources of information.

A comprehensive review of nonmarket accounts is provided by Katharine B. Abraham and Christopher Mackie (2005, 2006) and their co-authors ([39]). W. Erwin Diewert and Schreyer (2014) provide a model of household production and consumption and an international comparison ([40]). Michael B. Christian (2014) presents human capital accounts for the United States and Gang Liu (2014) gives these accounts for 16 countries, including 15 OECD members ([41]). Nicholas B. Muller, Robert Mendelsohn, and Nordhaus (2011) have constructed a system of environmental accounts for the United States ([42]). Allison B. Rosen and David M. Cutler (2007) have proposed a system of national health accounts for the United States ([43]). Finally, Alan B. Krueger (2009) and his co-authors present a detailed system of National Time Accounting. This includes both market and nonmarket uses of time, combined with evaluations based on measures of subjective well-being ([44]).

([38]) See the following for data from the World Bank: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20202198~menuPK:435055~pagePK:148956~piPK:216618~theSitePK:430367,00.html For data from the Luxembourg Income Study, see: http://www.lisdatacenter.org/.

([39]) Abraham and Mackie (2005), eds., Beyond the Market: Designing Nonmarket Accounts for the United States. Washington, DC, National Academies Press. A summary is provided by Abraham and Mackie (2006), 'A Framework for Nonmarket Accounting,' in Jorgenson, Landefeld, and Nordhaus (2006), eds., pp. 161-192. The conceptual basis for nonmarket accounting is discussed by Nordhaus (2006), 'Principles of National Accounting for Nonmarket Accounts,' in Jorgenson, Landefeld and Nordhaus (2006), pp. 143-160. Abraham (2014), 'Expanded Measures of Economic Sustainability and Welfare,' in Jorgenson, Landefeld, and Schreyer (2014), eds., presents a survey of expanded measures of welfare.

([40]) Diewert and Schreyer (2014), 'Household Production, Leisure, and Living Standards,' in Jorgenson, Landefeld, and Schreyer (2014), eds.

([41]) Christian (2014), 'Human Capital Accounting in the United States: Context, Measurement, and Application,' and Liu (2014), 'Measuring the Stock of Human Capital for International and Intertemporal Comparisons,' in Jorgenson, Landefeld, and Schreyer (2014), eds.

([42]) Muller, Mendelsohn, and Nordhaus (2011), 'Environmental Accounting for Pollution in the United States,' *American Economic Review*, Vol. 100, No. 3, August, pp. 1649-1675. Additional results are given by Muller (2014), 'Towards the Measurement of Net Economic Welfare: Inter-temporal Environmental Accounting in the United States,' in Jorgenson, Landefeld, and Schreyer (2014), eds.

([43]) Rosen and Cutler (2007), 'Measuring Medical Care Productivity: A Proposal for U.S. National Health Accounts,' *Survey of Current Business*, Vol. 87, No. 6, June, pp. 54-58.

([44]) See Krueger (2009), Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being, Chicago, *University of Chicago Press*.

Table 1: Product and Income Account, 2010

Output			
Line	**Product**	**Source**	**Total**
1	Gross Domestic Product (NIPA)	NIPA1.1.5 line1	14 526.5
2	+ Services of consumers' durables	our imputation	1 396.6
3	+ Services of household land(net of BEA estimate)	our imputation	174.6
4	+ Services of durables held by institutions	our imputation	49.9
5	+ Servicesofdurables,structures,land,andinventoriesheldbygovernment	our imputation	500.4
6	+ Private land investment	our imputation	0.0
7	+ Government land and inventory investment	our imputation	-62.6
8	- General government consumption of fixed capital	NIPA3.10.5 line5	278.6
9	- Government enterprise consumption of fixed capital	NIPA3.1line38-3.10.5 line 5	55.4
10	- Federal taxes on production and imports	NIPA3.2 line 4	101.5
11	- Federal current transfer receipts from business	NIPA3.2 line16	48.7
12	- S&L taxes on production and imports	NIPA3.3 line 6	952.6
13	- S&L current transfer receipts from business	NIPA3.3 line18	50.3
14	+ Capital stock tax	-	0.0
15	+ MV tax	NIPA3.5 line28	9.1
16	+ Property taxes	NIPA3.3 line8	430.6
17	+ Severance, special assessments, and other taxes	NIPA3.5 line29,30,31	74.5
18	+ Subsidies	NIPA3.1 line25	57.3
19	- Current surplus of government enterprises	NIPA3.1 line14	-15.7
20	= Gross Domestic Product (New Architecture)		15 685.5
Income			
Line	**Income**	**Source**	**Total**
1	+ Consumption of fixed capital	NIPA5.1 line13	1 874.9
2	+ Statistical discrepancy	NIPA5.1 line26	0.8
3	+ Services of consumers' durables	our imputation	1 396.6
4	+ Services of household land (net of BEA estimate)	our imputation	174.6
5	+ Services of durables held by institutions	our imputation	49.9
6	+ Servicesofdurables,structures,land,andinventoriesheldbygovernment	our imputation	500.4
7	+ National Income Adjustment for Land Investment	our imputation	-62.7
8	- General government consumption of fixed capital	NIPA3.10.5 line5	278.6
9	- Government enterprise consumption of fixed capital	NIPA3.1line38-3.10.5 line5	55.4
10	+ National income	NIPA1.7.5 line16	12 840.1
11	- ROW income	NIPA1.7.5 line2-3	189.4
12	- Sales tax	Product Account	638.9
13	+ Subsidies	NIPA3.1 line25	57.3
14	- Current surplus of government enterprises	NIPA3.1 line14	-15.7
15	= Gross Domestic Income (New Architecture)		15 685.4

Table 2: Domestic Income and Expenditures, 2010

Income			
Line	**Income**	**Source**	**Total**
1	+ Gross income (NIPA)	Product Account	15 685.4
2	+ Production taxes	Product Account	638.9
3	- Subsidies	NIPA3.1 line25	57.3
4	+ Current surplus of government enterprises	NIPA3.1 line14	-15.7
5	= Gross domestic income at market prices		16 251.3
6	+ Income receipts from the rest of the world	NIPA1.7.5 line2	702.9
7	- Income payments to the rest of the world	NIPA1.7.5 line3	513.5
8	- Current taxes and transfers to the rest of the world(net)	NIPA4.1line25	151.6
9	= Gross Income (New Architecture)		16 289.1
10	-Depreciation	our imputation	2 776.3
11	= Net income (New Architecture)		13 512.8
Expenditures			
Line	**Expenditures**	**Source**	**Total**
1	+ Personal consumption expenditures		10 781.1
2	PCE nondurable goods(NIPA)	NIPA2.3.5 line6	2 301.5
3	PCE services(NIPA)	NIPA2.3.5 line13	6 858.5
4	PCE services less space rental value of inst building and nonfarm dwellings	our imputation	5 729.2
5	Services of consumers' durables	our imputation	1 396.6
6	Services of structures and land	our imputation	1 303.9
7	Services of durables held by institutions	our imputation	49.9
8	+ Government consumption expenditures		2 663.9
9	Government consumption nondurable goods	NIPA3.10.5 line8	271.1
10	Government intermediate purchases, durable goods	NIPA3.10.5 line7	75.6
11	Government consumption services total		369.1
12	Government consumption services	NIPA3.10.5 line9	758.1
13	Less sales to other sectors	NIPA3.10.5 line11	389.0
14	Services of durables, structures, land, and inventories held by government	our imputation	500.4
15	Less government enterprise consumption of fixed capital	NIPA3.1line38-3.10.5 line5	55.4
16	Government compensation of employees, excluding force account labor	NIPA3.10.5 line4-10	1 503.1
17	+ Gross national investment	our imputation	2 844.0
	+ Depreciation	our imputation	2 776.3
18	= Net Domestic Expenditures (New Architecture)		13 512.8

Table 3: Contributions to Output and Income, 1948-2010

Output	1948-2010	1948-1973	1973-1995	1995-2000	2000-2005	2005-2010
Gross Domestic Product	3.18	3.95	2.68	4.14	2.87	0.94
Contribution of Consumption	2.29	2.79	1.96	2.33	2.26	1.27
Contribution of Investment	0.89	1.16	0.72	1.81	0.61	-0.33
Income	**1948-2010**	**1948-1973**	**1973-1995**	**1995-2000**	**2000-2005**	**2005-2010**
Gross Domestic Income	2.59	2.93	2.52	3.49	2.05	1.07
Contribution of Capital Services	1.64	1.88	1.40	2.20	1.58	1.05
Contribution of Labor Services	0.95	1.06	1.12	1.29	0.24	0.03
Multifactor Productivity	0.59	1.02	0.16	0.65	0.83	-0.14

Table 4: Contributions to Income and Expenditures, 1948-2010

	Average Annual Growth Rates					
Income	1948-2010	1948-1973	1973-1995	1995-2000	2000-2005	2005-2010
Domestic Income	2.24	2.70	2.15	3.02	1.14	0.68
Contribution of Labor Income	1.08	1.19	1.29	1.48	0.28	0.02
Contribution of Net Property Income	1.16	1.51	0.86	1.54	0.86	0.66
Level of Living	0.74	1.03	0.56	0.90	1.17	-0.46
Expenditures	**1948-2010**	**1948-1973**	**1973-1995**	**1995-2000**	**2000-2005**	**2005-2010**
Net Expenditures	2.99	3.73	2.71	3.91	2.31	0.23
Contribution of Consumption	2.82	3.34	2.44	3.34	2.72	1.50
Contribution of Personal Consumption	2.36	2.69	2.07	3.12	2.45	1.12
Contribution of Government Consumption	0.46	0.65	0.37	0.21	0.27	0.37
Contribution of Net Investment	0.16	0.39	0.27	0.57	-0.42	-1.27

Table 5: Personal Consumption expenditures, 1948-2010

	Personal Consumption Expenditures (billions)	Cost Living Index (2005 = 1.0000)	Real personal Consumption Expenditures (billions of 2005 $)	Number of Household Equivalent Members (millions)	Real personal Consumption Expenditures Equivalent Members (thousands of 2005 $)
1948	176.1	0.1483	1 187.7	247.4	4.80
1949	179.2	0.1472	1 217.8	245.8	4.96
1950	191.3	0.1490	1 284.0	248.1	5.17
1951	210.1	0.1563	1 344.3	250.8	5.36
1952	223.5	0.1597	1 399.8	252.6	5.54
1953	235.8	0.1634	1 443.1	256.1	5.64
1954	244.5	0.1654	1 478.0	262.3	5.63
1955	261.4	0.1678	1 557.9	269.8	5.77
1956	274.8	0.1702	1 614.4	272.4	5.93
1957	290.4	0.1750	1 659.5	276.0	6.01
1958	302.0	0.1783	1 693.6	280.4	6.04
1959	323.2	0.1827	1 768.9	280.2	6.31
1960	337.8	0.1861	1 815.2	290.9	6.24
1961	350.3	0.1883	1 860.0	296.1	6.28
1962	370.1	0.1916	1 932.0	295.2	6.55
1963	388.5	0.1943	1 998.9	295.3	6.77
1964	417.5	0.1982	2 105.8	298.3	7.06
1965	449.8	0.2024	2 221.7	298.1	7.45
1966	486.9	0.2080	2 340.2	299.2	7.82
1967	514.3	0.2130	2 414.4	303.5	7.96
1968	558.6	0.2210	2 528.1	306.5	8.25
1969	606.7	0.2312	2 624.0	309.8	8.47
1970	654.1	0.2417	2 706.2	312.9	8.65
1971	703.6	0.2526	2 785.1	317.6	8.77
1972	771.0	0.2628	2 934.1	320.7	9.15
1973	847.1	0.2755	3 075.2	328.5	9.36
1974	932.2	0.3011	3 095.7	329.5	9.39
1975	1 036.5	0.3265	3 174.3	332.7	9.54
1976	1 156.7	0.3490	3 314.2	335.0	9.89
1977	1 283.0	0.3727	3 442.8	339.0	10.16
1978	1 434.3	0.3985	3 599.6	342.4	10.51
1979	1 599.5	0.4298	3 721.3	350.6	10.61
1980	1 775.2	0.4712	3 767.1	352.0	10.70
1981	1 969.3	0.5153	3 822.0	348.7	10.96

Table 5 (continued)**:** Personal Consumption expenditures, 1948-2010

	Personal Consumption Expenditures (billions)	Cost Living Index (2005 = 1.0000)	Real personal Consumption Expenditures (billions of 2005 $)	Number of Household Equivalent Members (millions)	Real personal Consumption Expenditures Equivalent Members (thousands of 2005 $)
1982	2 118.6	0.5474	3 870.2	344.6	11.23
1983	2 317.9	0.5749	4 031.6	342.5	11.77
1984	2 524.2	0.6008	4 201.5	355.6	11.82
1985	2 720.8	0.6183	4 400.7	360.6	12.20
1986	2 876.0	0.6318	4 551.8	353.1	12.89
1987	3 092.6	0.6545	4 725.3	364.9	12.95
1988	3 344.1	0.6811	4 910.1	375.2	13.09
1989	3 593.7	0.7097	5 063.4	375.3	13.49
1990	3 848.6	0.7412	5 192.6	377.0	13.78
1991	4 025.9	0.7671	5 248.3	388.5	13.51
1992	4 270.7	0.7902	5 404.2	385.3	14.03
1993	4 491.3	0.8057	5 574.3	389.1	14.32
1994	4 759.0	0.8248	5 770.0	393.8	14.65
1995	5 001.9	0.8422	5 939.2	410.9	14.45
1996	5 295.4	0.8631	6 135.4	411.6	14.91
1997	5 588.1	0.8794	6 354.7	422.0	15.06
1998	5 888.7	0.8835	6 665.1	423.3	15.75
1999	6 267.9	0.8955	6 999.2	435.0	16.09
2000	6 720.3	0.9150	7 344.9	445.2	16.50
2001	7 020.8	0.9270	7 573.4	449.8	16.84
2002	7 312.7	0.9376	7 799.5	453.8	17.19
2003	7 662.7	0.9534	8 036.9	460.8	17.44
2004	8 086.0	0.9731	8 309.7	467.8	17.76
2005	8 620.1	1.0000	8 620.1	472.0	18.26
2006	9 118.1	1.0245	8 900.1	476.6	18.67
2007	9618.3	1.0535	9 130.1	481.4	18.97
2008	10 008.0	1.0894	9 186.6	489.5	18.77
2009	10 019.0	1.1062	9 057.5	496.1	18.26
2010	10 383.1	1.1273	9 210.4	501.6	18.36
Average Annual Growth (%)	6.47	3.22	3.25	1.12	2.13

Table 6: Standard of living, 1948-2010

	Egalitarian			Utilitarian		
	Standard of living (thousand of 2005 $)	Equity Index (2005 = 1.000)	Relative Inequality Index	Standard of living (thousand of 2005 $)	Equity Index (2005 = 1.000)	Relative Inequality Index
1948	2.56	0.881	0.4658	3.58	0.941	0.2538
1949	2.64	0.880	0.4666	3.69	0.940	0.2547
1950	2.84	0.905	0.4516	3.92	0.955	0.2423
1951	2.94	0.904	0.4517	4.06	0.955	0.2422
1952	3.05	0.906	0.4504	4.20	0.956	0.2418
1953	3.07	0.899	0.4548	4.25	0.951	0.2454
1954	3.07	0.897	0.4559	4.25	0.950	0.2463
1955	3.14	0.896	0.4570	4.35	0.948	0.2476
1956	3.27	0.911	0.4475	4.50	0.957	0.2403
1957	3.31	0.907	0.4500	4.56	0.955	0.2425
1958	3.34	0.912	0.4471	4.59	0.957	0.2404
1959	3.64	0.952	0.4229	4.91	0.981	0.2219
1960	3.75	0.990	0.3998	4.97	1.003	0.2045
1961	3.77	0.990	0.3997	5.00	1.003	0.2044
1962	3.96	0.999	0.3944	5.23	1.008	0.2004
1963	4.13	1.006	0.3900	5.43	1.012	0.1973
1964	4.33	1.013	0.3859	5.69	1.015	0.1945
1965	4.60	1.018	0.3825	6.02	1.018	0.1922
1966	4.85	1.023	0.3796	6.33	1.021	0.1904
1967	4.96	1.028	0.3769	6.46	1.023	0.1886
1968	5.16	1.032	0.3741	6.71	1.025	0.1868
1969	5.32	1.036	0.3716	6.90	1.027	0.1852
1970	5.46	1.040	0.3691	7.06	1.029	0.1837
1971	5.56	1.046	0.3660	7.18	1.031	0.1817
1972	5.82	1.050	0.3635	7.50	1.034	0.1799
1973	6.08	1.071	0.3507	7.75	1.044	0.1719
1974	6.06	1.064	0.3547	7.76	1.041	0.1743
1975	6.13	1.060	0.3570	7.86	1.038	0.1761
1976	6.34	1.057	0.3588	8.14	1.037	0.1775
1977	6.49	1.053	0.3613	8.33	1.034	0.1795
1978	6.69	1.049	0.3640	8.60	1.031	0.1818
1979	6.72	1.044	0.3672	8.66	1.028	0.1843
1980	6.74	1.039	0.3701	8.70	1.025	0.1869

Table 6 (continued)**:** Standard of living, 1948-2010

	Egalitarian			Utilitarian		
	Standard of living (thousand of 2005 $)	Equity Index (2005 = 1.000)	Relative Inequality Index	Standard of living (thousand of 2005 $)	Equity Index (2005 = 1.000)	Relative Inequality Index
1981	6.99	1.051	0.3626	8.98	1.033	0.1807
1982	7.19	1.056	0.3596	9.23	1.035	0.1785
1983	7.42	1.040	0.3693	9.57	1.025	0.1869
1984	7.35	1.025	0.3783	9.53	1.016	0.1936
1985	7.55	1.020	0.3815	9.81	1.013	0.1961
1986	8.02	1.026	0.3778	10.40	1.017	0.1934
1987	8.09	1.030	0.3753	10.47	1.019	0.1914
1988	8.08	1.018	0.3825	10.49	1.010	0.1984
1989	8.48	1.037	0.3713	10.94	1.022	0.1893
1990	8.62	1.032	0.3744	11.12	1.018	0.1925
1991	8.51	1.039	0.3698	10.99	1.026	0.1862
1992	8.78	1.032	0.3741	11.34	1.019	0.1916
1993	9.03	1.040	0.3697	11.64	1.025	0.1872
1994	9.30	1.047	0.3654	11.94	1.028	0.1848
1995	9.16	1.046	0.3661	11.78	1.028	0.1848
1996	9.40	1.040	0.3693	12.11	1.024	0.1877
1997	9.36	1.025	0.3785	12.13	1.015	0.1946
1998	9.82	1.028	0.3767	12.70	1.017	0.1934
1999	9.86	1.010	0.3875	12.81	1.004	0.2039
2000	10.11	1.011	0.3871	13.16	1.005	0.2025
2001	10.28	1.007	0.3894	13.38	1.002	0.2053
2002	10.74	1.030	0.3752	13.86	1.016	0.1936
2003	10.70	1.012	0.3865	13.95	1.008	0.2000
2004	10.99	1.021	0.3811	14.25	1.011	0.1978
2005	11.07	1.000	0.3936	14.49	1.000	0.2067
2006	11.35	1.002	0.3923	14.82	1.001	0.2061
2007	11.52	1.002	0.3924	15.04	0.999	0.2072
2008	11.33	0.996	0.3963	14.84	0.996	0.2095
2009	11.10	1.003	0.3919	14.51	1.002	0.2053
2010	10.93	0.982	0.4049	14.40	0.988	0.2158

Table 7: Contributions to growth of the standard of living, 1948–2010

EGALITARIAN	1948-2010	1948-1973	1973-1995	1995-2000	2000-2005	2005-2010
Standard of Living	2.34	3.45	1.87	1.96	1.82	-0.27
Efficiency	2.16	2.67	1.97	2.65	2.03	0.11
Equity	0.17	0.78	-0.11	-0.68	-0.21	-0.37
UTILITARIAN	**1948-2010**	**1948-1973**	**1973-1995**	**1995-2000**	**2000-2005**	**2005-2010**
Standard of Living	2.24	3.09	1.90	2.20	1.93	-0.12
Efficiency	2.16	2.67	1.97	2.65	2.03	0.11
Equity	0.08	0.42	-0.07	-0.44	-0.10	-0.23