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Asset-based measurement of poverty

by Andrea Brandolini, Silvia Magri and Timothy M. Smeeding

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ASSET-BASED MEASUREMENT OF POVERTY

by A. Brandolini*, S. Magri* and T.M. Smeeding**

Abstract

Poverty is generally defined as income or expenditure insufficiency, but the economic condition of a household also depends on its real and financial asset holdings. This paper investigates measures of poverty that rely on indicators of household net worth. We review and assess two main approaches followed in the literature: income-net worth measures and asset-poverty. We provide fresh cross-national evidence based on data from the Luxembourg Wealth Study.

JEL Classification: D13, I32.
Keywords: poverty indicators, income, wealth.

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1. Introduction[1]

Income insufficiency, relative to some socially acceptable minimal level of income need, is still the most common criterion to define poverty in rich countries. In the United States (U.S.), a family and every individual in it are considered in poverty if the family's total money income before taxes is less than a threshold that varies by family size and composition and is updated annually for inflation (DeNavas-Walt, Proctor, & Smith, 2008). This threshold has fallen from almost 50 percent of the median income in the early 1960s to less than 30 percent in the early 2000s (Blank, 2008). In the European Union (EU), the population at risk of poverty comprises all persons with disposable income adjusted for family size (equivalized income) below 60 percent of the median national value in each year (European Commission, 2008).

In spite of different measurement choices on the adjustment for household size, the exact definition of income, and the absolute/relative characterization of the poverty line, a consumer unit is taken as poor in all of these calculations if its income falls below a predefined poverty threshold. The role of assets is absent, except as reflected in reported income Yet assets and lack thereof are important for measuring material well-being and social exclusion (Sullivan, Turner, & Danziger, 2008; Marlier & Atkinson, 2010; Nolan & Whelan, 2010) as well as for program eligibility and take up.[2]

Income is undoubtedly a good proxy of the living standard of an individual or a family, and the income insufficiency approach has been very effective in guiding policy action and raising public concern for poverty. Yet, it is not without shortcomings. First, income fails to represent the full amount of available resources, as individuals can also rely on real and financial assets to cope with the needs of everyday life and to face unexpected events.

[1] We thank Tony Atkinson, Kenneth Couch, Maureen Pirog, and three anonymous referees for very useful comments, and Deborah Johnson and Dawn Duren for manuscript preparation. We also thank participants in the joint OECD/University of Maryland conference "Measuring Poverty, Income Inequality, and Social Exclusion. Lessons from Europe" (Paris, March 16–17, 2009); the Third Meeting of the Society for the Study of Economic Inequality (Buenos Aires, July 21–23, 2009); the Third OECD World Forum on "Statistics, Knowledge and Policy" (Busan, October 27–30, 2009); the APPAM special pre-conference workshop "European measures of income, poverty, and social exclusion recent developments and lessons for U.S. poverty measurement" (Washington, D.C., November 4, 2009); and in seminars at the University of Rome Sapienza and University of Modena. The views expressed here are solely ours; in particular, they do not necessarily reflect those of the Bank of Italy or the Institute for Research on Poverty.

[2] See Fraker, Martini, Ohls, & Ponza (1995), Morgan (1993), and Smeeding (2002) on the role of assets in determining the eligibility for food stamps and other means-tested income transfer programs in the U.S., and Yates & Bradbury (2009) on asset-testing in the old age pension in Australia.

The omission of wealth may appear somewhat surprising in light of the standard economic theory of consumption behavior, where the budget constraint embodies current net worth together with the discounted value of current and future income streams. In empirical applications, the omission is often forced by the lack of a database with both income and wealth information, but it may also reflect the slow development of analytical tools accounting for the role of assets in the poverty definition. A second, more radical, critique of the income inadequacy approach is that income is only a means and not an end, and cannot account for the multiple dimensions of human well-being. Sen (1992, p. 109) wrote that poverty can be better seen as "the failure of basic capabilities to reach certain minimally acceptable levels" in dimensions such as being well-nourished, being adequately clothed and sheltered, avoiding preventable morbidity, or taking part in the life of the community. While in recent years a considerable body of research has investigated the implications for poverty analysis of adopting Sen's capability approach or, more generally, a multidimensional view of well-being (for example, Alkire, 2002; Nolan & Whelan, 2007, 2010; Brandolini, 2009), much less attention has been paid to embodying personal wealth into the analysis of poverty. In this paper we directly address this latter question.

We may see the role of wealth in the definition of poverty from two different perspectives. First, wealth affects current well-being. Consumer units with total earnings below the poverty threshold have different standards of living depending on the value of their net assets. A sudden income drop need not result in lower living conditions if the unit can decrease accumulated wealth, or if it can borrow. On the other hand, income can be above the poverty threshold, yet a family can feel vulnerable because it lacks the financial resources to face an adverse income shock. Assets and liabilities are fundamental to smoothing out consumption when income is volatile. Their insurance role is intertwined with the existence of and access to private or public insurance mechanisms. Indeed, wealth accumulation via "precautionary savings" is the primary means for household to self-insure against income decline.

Second, the possession of tangible and intangible assets is a major determinant of the longer-term prospects of households and individuals. A drop of current consumption below the poverty line is often seen to have a structural, and hence more worrying, nature when permanent income falls below the poverty line (Morduch, 1994) or asset holdings are below some critical threshold (Carter & Barrett, 2006). More generally, the chances in one's life depend on the set of opportunities open to an individual, which are, in turn, a function of her

or his intellectual and material endowments. In the presence of capital market imperfections, individuals with low endowments may be stuck in a poverty trap.[3] Whenever the policy objective is to level the playing field, wealth redistribution may be an effective alternative to income redistribution, particularly if a minimum endowment reinforces the sense of responsibility of individuals and their attitude to pursue more efficient behaviors (Bowles & Gintis, 1998).[4]

While the two perspectives clearly overlap, we consider here only the first one. We focus on how net worth affects households' current economic well-being, with the purpose of developing statistical measures to monitor the social situation of a community rather than to understand the causes, and remedies, of deep-seated economic inequalities. Accounting for the extent to which wealth contributes to living standards is also relevant for social policy, for instance, in the definition of eligibility for means-tested public benefits as mentioned earlier.

This article is organized as follows. In the next section, we outline a conceptual framework for including wealth into poverty analysis and review the income-net worth and asset-poverty measures. In the third section, we consider in greater detail the application of the income-net worth approach. We briefly describe the data at our disposal in the fourth section, and present comparative results from applying the two approaches in the fifth section. In the final section, we provide an assessment of these alternative approaches and draw some conclusions.

2. Defining asset-based measures of poverty

For purposes of poverty analysis, income is generally defined to include all labor incomes, private transfers, pensions, and other social insurance benefits, cash public social assistance, and cash rent, interests, dividends, and other returns on financial assets, possibly net of interest paid on mortgages and other household debts. Income can be taken before (like in the U.S.) or after (like in the EU) direct taxes and social security contributions. More

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[3] An extensive literature has underlined the negative consequences for aggregate economic growth of capital market imperfections and investment indivisibilities that prevent asset-poor individuals from accumulating human or physical capital (for example, Galor & Zeira, 1993).

[4] This concern motivates projects to establish a capital endowment for the young entering adulthood, as proposed by Ackerman and Alstott (1999) and implemented by the Child Trust Fund (2008) in the United Kingdom (UK).

comprehensive definitions might include non-cash imputed rent for owner-occupied dwellings, but they are uncommon.[5]

These definitions do account for (net) household wealth, but only through the (net) income flow it generates in the current year. They ignore the possibility that a consumer unit decreases accumulated savings to meet its current needs. This simple consideration suggests that the concept of available resources can be broadened by adding to current income from labor, pensions, and other transfers a function of wealth holdings more general than its annual return. On the other hand, we could refrain from integrating income and net worth into a single measure of economic resources and maintain the distinction between these two dimensions in poverty analysis, for instance by applying multidimensional indices such as those discussed by Bourguignon and Chakravarty (2003) and Atkinson (2003). A simple formalization may help us to distinguish these two alternatives.

Let us suppose that an individual receives income Y_t from labor, pensions, and other transfers (henceforth, labor income, for simplicity) in year t, and that at the beginning of the period he holds net worth NW_{t-1}. In the standard income insufficiency approach, total current income CY_t is defined as the sum of labor income Y_t and property income $r_t NW_{t-1}$, where r_t is the (weighted) average rate of return on assets:[6]

$$CY_t = Y_t + r_t NW_{t-1} \tag{1}$$

Poverty occurs whenever CY_t falls short of a pre-fix threshold Z_t, which represents the minimum acceptable level of command over resources.

As they share the same currency metrics, income and wealth are perfectly fungible and one unit of wealth can be straightforwardly substituted for one unit of income.[7] This implies that the total available financial resources FR_t are given by the sum of income and net worth:

$$FR_t = Y_t + (1 + r_t) NW_{t-1} \tag{2}$$

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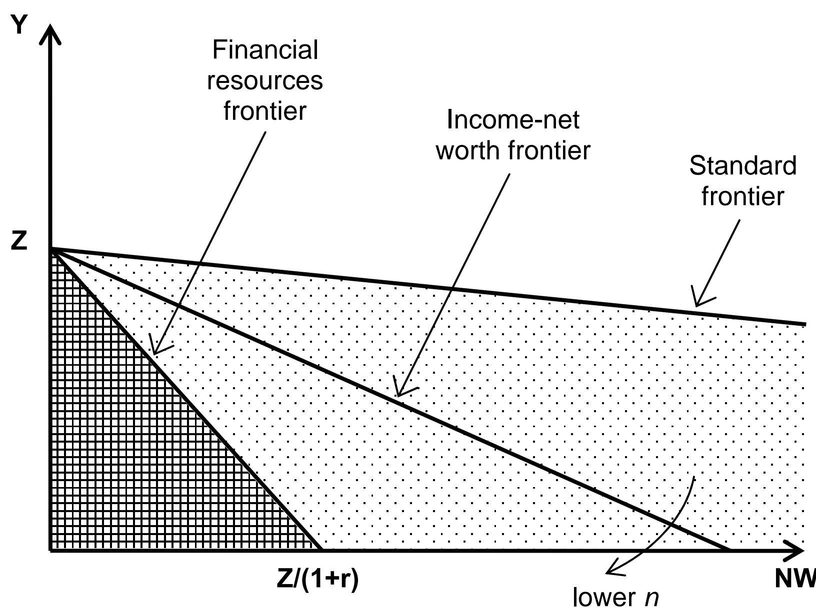
[5] Imputed rent tends to benefit a wide range of low to high income units, especially the elderly, but its overall effect may vary across countries, depending on the level of housing prices and the diffusion of home-ownership (Frick & Grabka, 2003). The inclusion of realized capital gains is also rare in the calculation of poverty statistics.

[6] Should we apply Hicks' well-known definition that "a person's income is what he can consume during the week and still expect to be as well off at the end of the week as he was at the beginning" (1946, p. 176), we should subtract from CY_t the loss in purchasing power caused by inflation on non-indexed nominal assets like bank deposits or Treasury bills; that is, we should replace the nominal rate of return r_t with the real rate of return (r_t–π), where π is the inflation rate. We ignore this correction, as it has never been applied in the literature.

[7] Not all assets can be sold immediately at their market value. For our purposes, an asset may be valued on a "realization" basis, net of the costs that have to be incurred in the case of immediate sale, or "the value obtained in a sale on the open market at the date in question" (Atkinson & Harrison, 1978, p. 5).

With definition (2), an individual would be classified as poor if total financial resources FR_t were less than Z_t.

This suggestion of taking into account all net worth to identify poverty status is extreme, but the comparison of (1) and (2) helps to define the boundaries of the financial poverty region in the labor income and net worth space. This is shown in Figure 1. According to the standard approach, individuals are poor if their current income CY_t is less than the poverty line Z_t, that is, if $Y_t < Z_t - r_t NW_{t-1}$. The poverty region is the union of the dotted and gridded areas below the "standard poverty frontier." When all net worth is used to identify the poor, the poverty region shrinks to the gridded area only, as an individual is now classified as poor if his financial resources FR_t are less than the poverty line Z_t, or $Y_t < Z_t - (1 + r_t)NW_{t-1}$.



Source: Authors' elaboration. See text for further explanation.

Figure 1. Poverty in the Labor Income and Net Worth Space: Income-Net Worth

It may be excessive to impose a condition that all wealth should be suddenly decreased to sustain current living standards. On the other hand, people save to transfer resources over all of their future life, and it is then sensible to suppose that part of the accumulated savings is used for current spending, especially when adverse circumstances make it necessary. This means identifying in Figure 1 a poverty frontier that lies between the standard frontier and the one assuming full use of all available financial resources. A possible solution is to utilize the "annuity value of net worth," as proposed by Weisbrod and Hansen (1968). Weisbrod and

Hansen's "income-net worth" concept is an augmented income definition where the yield on net worth in year t is replaced with the n-year annuity value of net worth:

$$AY_t = Y_t + \left[\frac{\rho}{1-(1+\rho)^{-n}} \right] NW_{t-1} \tag{3}$$

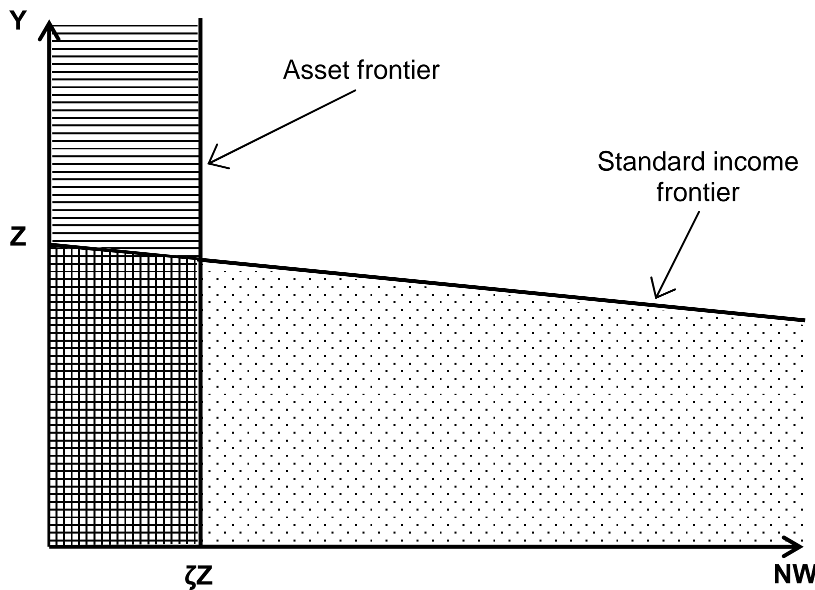
with n and ρ being the length and the interest rate of the annuity. In (3) net worth is converted into a constant flow of income, discounted at the rate ρ, over a period of n years. If n goes to infinity, the annuity consists entirely of interest, and (3) would coincide with (1) for ρ equal to r_t. At the other extreme, if the time horizon is one year, AY_t is simply the sum of current labor income and $(1+\rho)$ times net worth, which would coincide with (2) for ρ equal to r_t. Hence, as shown in Figure 1, the poverty frontier for the income-net worth concept lies between the frontiers for (1) and (2).

The critical parameter in (3) is the length of the annuity n. The lower n is, the steeper the income-net worth frontier and the smaller the poverty region. By shortening the period over which individuals are supposed to spread evenly their wealth, the fraction of personal wealth included into the assessment of the poverty status would be larger and the number of people classified as poor would be smaller. How can n be chosen? Weisbrod and Hansen (1968) proposed to equate it with the person's life expectancy, under the assumption that no wealth is left at death—even though the formula could easily allow for a bequest.

The income-net worth measure is an elegant way of combining income and net worth, but requires several assumptions, such as the choice of the values for ρ and n, which are discussed in greater detail in the next section. We might be reluctant to impose so much structure on the measurement, especially when we take into account the profound implications that such a measure has for the age structure of poverty. Accumulated assets at older ages with a shorter annuity horizon increase the income net worth of the elderly as compared to younger person with longer time horizons and fewer accumulated assets. An alternative approach is to maintain the analysis in the bi-dimensional space of income and net worth and to supplement the income-based notion of poverty with an asset-based measure.

In order to construct a separate measure of asset-poverty, we need to clarify its meaning and how its threshold can be set. Given our focus on statistical measures for monitoring current living conditions, we see asset-poverty as capturing the exposure to the risk that a minimally acceptable living standard cannot maintain should income suddenly fall; whereas, income-poverty refers to the static condition where income alone is insufficient to

maintain this standard. Following this distinction, an asset-based measure can be understood as referring to "vulnerability" more than "poverty" (World Bank, 2001, p. 139).



Source: Authors' elaboration. See text for further explanation.

Figure 2. Poverty in the Labor Income and Net Worth Space: Asset- and Income-Poverty Measures.

A simple way to translate these ideas into practice is to consider a consumer unit as asset-poor whenever its wealth holdings are not sufficient to secure the socially determined minimum standard of living for a given period of time. With this definition, we can straightforwardly identify the asset-poverty line with the income-poverty line multiplied by a factor related to the length of the reference period. Figure 2 shows the asset- and income-poverty regions in the labor income and net worth space. The asset-poverty line is set at a fraction ζ of the income-poverty line Z_t so that an individual is asset-poor if $NW_{t-1} < \zeta Z_t$; income-poverty occurs, as before, if $Y_t < Z_t - r_t NW_{t-1}$. Accounting for wealth allows us to separate the income-poor who would have sufficient wealth to keep them at the poverty line for a period of at least ζ×12 months (dotted area) from those who lack this buffer (gridded area). Both groups experience low incomes, but the latter is clearly worse off than the former. Moreover, a third group comprises individuals who currently have sufficient income to achieve the minimally acceptable standard of living but do not have enough assets to protect them from a sudden drop of their earnings (striped area). The concept of asset-poverty

enriches our analysis by identifying those income-poor who are in a particularly critical situation as well as those non-poor who are vulnerable to an adverse income shock.

In empirical estimates of the asset-poverty incidence, we need to choose the length of the reference period and the wealth aggregate. Haveman and Wolff (2004) take the period to be 3 months and consequently set the asset-poverty threshold at one-fourth of the expenditure-based absolute poverty line proposed by the U.S. National Academy of Science panel. They use two different wealth concepts: "net worth," which includes all marketable assets net of all debts and is seen as an indicator of "the long-run economic security of families"; and "liquid assets," which include only financial assets that can be easily monetized and are an indicator of "emergency fund availability" (Haveman & Wolff, p. 151). Short and Ruggles (2005) also use the 3-month reference period; whereas, Gornick, Sierminska, and Smeeding (2009) take a 6-month reference period in their cross-national examination of older women's poverty.[8]

The indicated values of ζ, ¼ and ½, look sensible, but are arbitrarily chosen. Given our interpretation of asset poverty, a promising way to pin down the value of ζ could be to rely on results of studies of precautionary savings. For instance, Carroll, Dynan, and Krane (2003) estimate on a sample of U.S. workers that an increase in the probability of suffering a job-loss by one percentage point leads to an increase in total wealth of about two months of annual income. Barceló and Villanueva (2009) calculate that Spanish temporary employees hold an average buffer of liquid wealth of 4 to 5 months' earnings. Using the 1995 and 1998 waves of the U.S. Survey of Consumer Finances (SCF), Kennickell and Lusardi (2005) find that the median value of the ratio of desired precautionary saving over permanent or normal income is around 10 percent. This ratio, however, rises for households more vulnerable to negative shocks, as the median goes up to 35 percent of normal income among the elderly households and to 16 percent among business households. These values can be read as suggesting an amount of precautionary savings ranging between 1 and 3 months of normal income. While these estimates provide no confirmation of the values used for ζ, it is interesting to note that their order of magnitude is similar across very dissimilar contexts and nations.

[8] In an investigation of the distribution of income and wealth among old Europeans based on data from the Survey of Health, Ageing and Retirement in Europe (SHARE), Christelis, Jappelli, Paccagnella, and Weber (2009) define "financial fragility" as a situation where a household's financial wealth does not exceed three months of the household gross income.

3. Applications of the income-net worth measure

Weisbrod and Hansen (1968) made clear that the income-net worth indicator must be seen as a conceptually consistent way of combining current income and net worth independently of its practical feasibility. In particular, it does not imply " . . . either that people generally do purchase annuities with any or all of their net worth, that they necessarily *should* do so, or that they *can* do so" (pp. 1316–1317). Yet, the assumption that a family seeks to spread evenly all its wealth over its lifetime is essentially arbitrary, as objected by Projector and Weiss (1969) and Atkinson (1975, p. 66). Moreover, expression (3) may ignore the life-cycle patterns of saving and fail to account for the higher saving potential of young units. More generally, the application of Weisbrod and Hansen's approach requires many measurement choices: the annuitization formula, the length of the annuity and its interest rate, the wealth aggregate that is annuitized, the treatment of couples, the population subgroups whose wealth is annuitized, the allowances for bequests and precautionary saving.

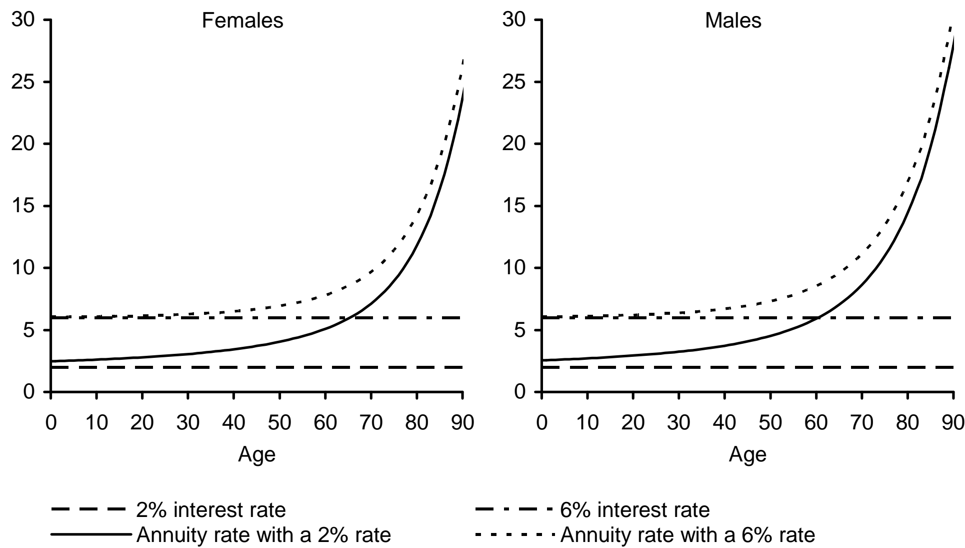
With regards to the annuitization formula, a more general formulation was proposed by Rendall and Speare Jr. (1993). After separating the component of Y_t that is not replaceable by pensions, X_t, and decomposing the life expectancy of a consumer unit into the remaining working time, T_W, time to the death of the member in the couple who dies first, T_1, and time to death of the survivor, T, the income-net worth indicator can be written as:

$$AY_t = Y_t - X_t + \left[\frac{\rho}{1-(1+\rho)^{-n}} \right] \left[NW_{t-1} + \sum_{\tau=0}^{T_W} \frac{X_t}{(1+r)^{-\tau}} \right] \quad (3a)$$

where r denotes the (average) real rate of return on net worth in future periods, and n is equal to T for an unmarried elderly person, and $T_1 + (T - T_1)b$ for a married elderly person—b being the reduction in the equivalence scale coefficient following the death of a member in the couple; for nonelderly members, resources are assumed to be allocated over an infinite horizon and n is taken to go to infinity.

Possibly because of the number of necessary measurement choices, possibly as a result of the lack of suitable databases, Weisbrod and Hansen's approach has not been extensively followed in the poverty literature. Almost all applications relate to the U.S. and often use as a measure of the length of the annuity the life expectancy of the family head or of the head and the spouse; more heterogeneity can be found in the choice of the annuity interest rate. Overall, the impact of including a measure of net worth in the calculation is not negligible as seen in Appendix Table A1. Whatever the precise formulation, the income-net worth approach results

in the elderly looking much better, on average, than they would be viewed using income alone. This is shown in Figure 3, which reports, separately for males and females, the annuity rate at different ages obtained by applying the expression in (3) to the life tables for Italy in 2002 for two values of the interest rate (2 percent and 6 percent). The annuity rate is always higher than the interest rate, as it implies that some fraction of wealth is run down even at young ages. The annuity rate rises rapidly with age: With a 2 percent interest rate, it goes from 4.5 percent for women and 5.1 percent for men at age 55 to 8.9 percent and 11.0 percent, respectively, at age 75. Thus, annuitization with zero bequests increases income-net worth as a person ages, almost in a monotonic fashion, and especially when net worth does not decline in old age.



Source: Authors' elaborations based on the life tables for Italy in 2002. See text for further explanation.

Figure 3. Percentage Annuity Rates by Age and Sex: An Illustration from Italy.

4. Data and measurement issues

In the next section we present cross-country comparative results on asset-based measures of poverty based on the Luxembourg Wealth Study (LWS) database. The LWS database provides micro-data on household income and wealth for 10 rich countries. Data were made comparable by a thorough process of ex post harmonization, but important differences in definitions, valuation criteria, and survey quality could not be adjusted for.

Moreover, the degree to which LWS-based estimates match aggregate figures varies across surveys. These caveats have to be borne in mind when reading the results discussed below.[9]

We use three wealth variables: total financial assets, total debt, and net worth. Net worth does not include business equity, as the information is only available in some countries; moreover, we do not consider this variable for Norway and Sweden, as the valuation of real property on a taxable basis make the results for these two countries less comparable to those of the others. Disposable income is the sum of wages and salaries, self-employment income, capital income (interest, rent, dividends, private pensions), and cash and near-cash public income transfers including social insurance benefits, net of direct taxes, and social security contributions; the imputed rent on owner-occupied houses is not included, nor are subtracted interest paid on mortgages or consumer loans.

We equivalize both income and wealth with the “square root equivalence scale,” whereby the number of equivalent adults is given by the square root of the household size. Whether wealth should be equivalized is still an unsettled issue, but it is a natural choice in our context, where we focus on the capacity of wealth to contribute to the achievement of a minimally acceptable standard of living. For each country, we define two types of income poverty thresholds: the first is a standard relative poverty line set at 50 percent of the national median of equivalized disposable income. These are called the “National Lines” in Tables 2 to 4. The second line is called the “US-PSID poverty line” and allows us to compare the situation across countries in absolute terms. It is constructed by taking the half-median income poverty line in the U.S. Panel Study of Income Dynamics (PSID) and converting this dollar amount to other currencies by using the Organisation for Economic Co-operation and Development (OECD) (2008) purchasing power parity (PPP) indices for GDP.[10] In our empirical application, we maintain these income-based poverty thresholds as reference points for the asset-based measures. This choice is natural for asset-poverty, where we set the threshold at one-fourth of the annual income-based poverty line, which suggests the notion that individuals have wealth sufficient to keep them at the poverty line for at least three months. However, this choice is more controversial for the income-net worth indicator. Here,

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[9] For a description and assessment of the LWS database see http://www.lisproject.org; Sierminska, Brandolini, and Smeeding (2008); and Jäntti, Sierminska, and Smeeding (2008). The list of the original surveys used in this paper, the agency producing them, and some summary characteristics are reported in Appendix Table A2**.**

[10] The half median poverty line in the PSID in Table 1 is much higher than the official U.S. absolute poverty line used annually by the Census Bureau to measure U.S. poverty. The U.S. poverty line is now 26 percent of CPS median income; whereas, our fixed poverty line is 50 percent of PSID median income (Smeeding, 2006).

we utilize the same poverty thresholds that we use for income. It may also be appropriate to set the thresholds at 50 percent of the national median of equivalized income-net worth. The latter solution is probably more consistent with a fully relative approach, but it implies that the change in poverty incidence would reflect both the use of the different indicator and the shift of the poverty line. In order to focus on the first effect, we have chosen not to recompute the poverty threshold as we change the indicator.

The importance of data collection methods shows up in the different median values found for the U.S. on the basis of the SCF and the PSID. The former is a wealth survey and the latter is an income survey, and each does a relatively better job at its focal issue. Still, the PSID is very close to the SCF in terms of assets below the 95th percentile of the asset distribution. The SCF incomes are comparable to the incomes in the Current Population Survey (CPS) by which income poverty is measured in the U.S. (Niskanen, 2007).

5. Integrating wealth into poverty analysis: comparative results from the LWS

The available information on the household balance sheets at the aggregate level shows that the ranking of countries by wealth level tends to be loosely related to that based on mean income. In 2005, before the collapse of financial markets and the global crisis, Italy exhibited the lowest per capita gross national income among G7 countries, 66 percent of the U.S. level. The corresponding ratio was comprised between 71 percent and 81 percent in the other five countries. But Italy fared much better in wealth terms, with a ratio of household net worth to disposable income equal to 8.3, against 8.2 in the UK, about 7.4 in France and Japan, 6.4 in the U.S., and below 6 in Canada and Germany.[11]

This difference is qualitatively confirmed by the LWS evidence. Table 1 reports the available per capita values of income, total financial assets, and net worth. The wealth-to-income ratios are much lower than those just mentioned, based on aggregate balance sheets. Definitions and differential macroeconomic coverage (for example, inclusion of nonprofit institutions and coverage of the institutionalized population) can explain some part of this difference. Yet another part is due to sampling errors and under-reporting in surveys, which are more serious for wealth than for income—hence the lower wealth-to-income ratios in

[11] The figures for per capita gross national income are from OECD (2009a); those for the ratio of net wealth to nominal disposable income of the household sector (including nonprofit institutions serving households, except for Italy) are from OECD (2009b, Annex Table 58).

surveys.[12] The impact of different survey characteristics is well-illustrated by the comparison between the two U.S. sources: Total financial assets are about 50 percent higher in the SCF than in the PSID, thanks to the specific focus on wealth and the over-sampling of the rich in the former. However, mean net worth, which includes the value of real estate and debt, is higher in the SCF, by 33 percent; whereas, the median is instead almost a tenth higher in the PSID, suggesting that the latter may perhaps better cover middle- and lower-class wealth holdings. These problems aside, Table 1 reveals how constructing a measure that combines income and wealth is likely to significantly affect country comparisons. The Finnish and Italian mean incomes are relatively close and are lower than the German one by 14 percent and 20 percent, respectively. But the evidence on mean net worth is strikingly different: The wealth of the Italians is twice as much as that of the Finns and almost 1.4 times that of the Germans. The mean Italian even looks wealthier than the mean U.S. person, on the basis of the PSID data. Differentials are further amplified by considering the medians.

For Finland, Germany, Italy, and the U.S., Table 2 shows how income-based poverty measures change as income is replaced by the income-net worth indicator. (All income and asset variables are equivalized.) With the relative income-based national poverty lines, the largest share of income-poor is found in the U.S., the more so if the SCF is used instead of the PSID. These results are consistent with the CPS based LIS results for the U.S.[13] Germany and Italy follow, preceding Finland. If we take the U.S. relative poverty line as in the PSID as the standard, the US-PSID poverty rates for income are identical by construction. But now the incidence of poverty looks considerably higher in all three European countries, which have much lower median real incomes than the U.S. Note that a perceptible increase in the headcount also occurs for the SCF, owing to its much lower median than the PSID median.[14]

[12] In the case of Germany, financial assets, durables and collectibles, and non-housing debt are only recorded when their respective values exceed 2,500 euros. Missing values are later imputed. This may help to explain the nil value of the median of total financial assets.

[13] Found at http://www.lisproject.org/key-figures/key-figures.htm.

[14] In 2000, the official U.S. poverty rate using the U.S. cash only before-tax income definition produced a poverty rate of 11.3 percent as compared to the 17.4 percent and 19.5 percent rates in Table 4 (DeNavas-Walt, Proctor, & Smith, 2008, Table B-1, p. 46). Apart from many differences in methods and definitions, it should be borne in mind that the former figure is based on an absolute poverty line; whereas, the latter two figures are based on relative poverty lines.

Table 1. Per Capita Disposable Income, Total Financial Assets, and Net Worth

	Disposable Income		Total Financial Assets		Net Worth		
Country	U.S. Dollars	Index: US-PSID=100	U.S. Dollars	Index: US-PSID=100	U.S. Dollars	Index: US-PSID=100	Net Worth to Disposable Income Ratio
				Mean			
Canada (1999)	14,215	68.9	10,962	39.1	36,475	55.3	2.6
Finland (1998)	11,277	54.7	6,547	23.3	33,968	51.5	3.0
Germany (2002)	13,146	63.7	8,448	30.1	51,492	78.1	3.9
Italy (2002)	10,546	51.1	10,800	38.5	70,342	106.6	6.7
Norway (2002)	17,168	83.2	17,819	63.5	—	—	–
Sweden (2002)	12,776	61.9	12,441	44.3	—	—	–
UK (2000)	12,892	62.5	12,011	42.8	57,051	86.5	4.4
US-PSID (2001)	20,629	100.0	28,061	100.0	65,957	100.0	3.2
US-SCF (2001)	18,325	88.8	42,155	150.2	87,437	132.6	4.8
				Median			
Canada (1999)	11,938	77.8	863	64.8	13,020	91.7	1.1
Finland (1998)	9,603	62.6	1,301	97.6	18,545	130.6	1.9
Germany (2002)	10,879	70.9	0	0.0	12,914	90.9	1.2
Italy (2002)	8,868	57.8	2,817	211.4	42,268	297.7	4.8
Norway (2002)	14,569	94.9	3,754	281.6	—	—	—
Sweden (2002)	11,256	73.3	2,461	184.6	—	—	—
UK (2000)	10,907	71.1	1,544	115.8	26,071	183.6	2.4
US-PSID (2001)	15,349	100.0	1,333	100.0	14,200	100.0	0.9
US-SCF (2001)	12,459	81.2	1,950	146.3	13,000	91.5	1.0

Source: Authors' elaborations on LWS data (as of 27 February 2009). All values are in U.S. dollars at purchasing power parities.

Table 2. Share of Income-Poor and Income-Net Worth-Poor Households, All Households

	National Lines			US-PSID Line		
Country	Income-Net Worth Poor	Income Poor	Difference	Income-Net Worth Poor	Income Poor	Difference
			Net Worth			
Annuity interest rate: 2%						
Finland (1998)	8.4	10.6	-2.2	30.8	39.8	-9.0
Germany (2002)	11.3	12.9	-1.6	25.8	30.6	-4.8
Italy (2002)	9.2	12.5	-3.3	29.8	42.3	-12.5
US-PSID (2001)	14.5	17.4	-2.9	14.5	17.4	-2.9
US-SCF (2001)	16.6	19.5	-2.9	23.7	27.5	-3.8
Annuity interest rate: 10%						
Finland (1998)	8.4	10.6	-2.2	28.5	39.8	-11.3
Germany (2002)	11.2	12.9	-1.7	24.9	30.6	-5.7
Italy (2002)	8.9	12.5	-3.6	27.8	42.3	-14.5
US-PSID (2001)	14.5	17.4	-2.9	14.5	17.4	-2.9
US-SCF (2001)	15.9	19.5	-3.6	22.9	27.5	-4.6
			Total Financial Assets			
Annuity interest rate: 2%						
Finland (1998)	10.2	10.6	-0.4	39.6	39.8	-0.2
Germany (2002)	13.4	12.9	0.5	30.5	30.6	-0.1
Italy (2002)	12.3	12.5	-0.2	40.5	42.3	-1.8
US-PSID (2001)	16.3	17.4	-1.1	16.3	17.4	-1.1
US-SCF (2001)	19.0	19.5	-0.5	26.6	27.5	-0.9
Annuity interest rate: 10%						
Finland (1998)	10.0	10.6	-0.6	38.6	39.8	-1.2
Germany (2002)	13.1	12.9	0.2	29.6	30.6	-1.0
Italy (2002)	12.1	12.5	-0.4	39.7	42.3	-2.6
US-PSID (2001)	16.3	17.4	-1.1	16.3	17.4	-1.1
US-SCF (2001)	18.5	19.5	-1.0	26.2	27.5	-1.3

Source: Authors' elaborations on LWS data (as of 27 February 2009). All values are in U.S. dollars at purchasing power parities and are equivalized by the square root equivalence scale.

In all countries, replacing the actual annual yield of net worth in the income definition with its annuity value brings about a sizeable reduction of poverty rates. We compute figures in Table 2 by applying definition (3) using either net worth or total financial assets (top and bottom panels, respectively) for two values of the annuity interest rate: 2 percent and 10 percent. Following other applications in the literature, we utilize the income-net worth concept only for older households. More precisely, when the household head is older than 54 years, we replace cash property income with a zero-bequest annuity whose length is given by the remaining years of life of the household head, as indicated in the country's life table by sex and age for the year of the survey; when the head is 54 or younger, we do not implement this replacement. By substituting for income alone with income-net worth, given the national

poverty lines, the portion who are poor fall by around 3 percentage points in the U.S. and Italy in the top left quarter of Table 2, and a little less in Finland and Germany. The impact is far larger with the common US-PSID threshold, especially for Italy. The change of the annuity interest rate from 2 percent to 10 percent makes some difference only when the common real US-PSID line is used. The country ranking does not vary, but the higher net worth holdings of Italian households produce the biggest reductions in measured poverty.

The comparison based on net worth is somewhat biased because net worth includes home equity, but income does not include the rental value of owner-occupied housing. On the other hand, home ownership provides not only a store of value but also a direct benefit by allowing people to satisfy the basic need of being sheltered (Fisher, Johnson, Marchand, Smeeding, & Boyle Torrey, 2007; 2009). This means that the house may not be a perfectly fungible asset, even if new financial instruments allow households to cash in part of housing equity by means of home equity loans. Another possibility is to narrow the wealth concept that is annuitized. By considering total financial assets, the reduction in measured poverty turns out to be fairly modest, at most 1 percentage point with the national lines, and less than 3 points using the fixed US-PSID line (bottom panel of Table 2).

In summary, poverty incidence varies according to both the poverty measure and the measure of income-net worth. The biggest differences across nations in income-net worth poverty are not due to the annuity rates assumed, but according to whether total net worth including housing is considered, or whether we restrict the analysis to financial assets alone.

The results just discussed refer to the whole population and consider jointly the unadjusted income of younger households with the income-net worth of older households. Table 3 presents the same statistics for the latter group, households whose head is aged 55 and over, alone. Income poverty is higher for this subgroup than for the whole population in Finland and the U.S.; whereas, it is lower in Italy and Germany (compare Tables 2 and 3). The adoption of the income-net worth indicator using net worth as a wealth index understandably has a much larger impact on this subgroup because owner-occupied housing with low or no mortgage is common for the age 55 and over population in these nations. Germany is a partial exception to this pattern, as shown by Chiuri and Jappelli (2010), and indeed it exhibits the lowest poverty reduction in the top left quarter of Table 3.

More interestingly, there is a pronounced narrowing of the relative national line poverty differential between the U.S. and the European countries, indicating that the North American elderly are relatively richer once income-net worth is used as the measure of well-being (see top half of Table 3). Italy, on the other hand, exhibits the lowest incidence of

(relative) poverty among households whose head is age 55 or older. This result is driven by the fact that home ownership in Italy is very high and outstanding mortgage debt is very low. These factors together explain the large effects on poverty using income-net worth in the top half of Table 3 as compared to those for income-net worth using only financial assets in the bottom half of Table 3, which are under 4 percentage points regardless of country or annuity rate.[15]

Table 3. Share of Income-Poor and Income-Net Worth-Poor Households, Households with Head Aged 55 and Over

	National Lines			US-PSID Line		
Country	Income-Net Worth Poor	Income Poor	Difference	Income-Net Worth Poor	Income Poor	Difference
			Net Worth			
Annuity interest rate: 2%						
Finland (1998)	6.7	13.3	-6.6	26.9	52.8	-25.9
Germany (2002)	7.8	11.4	-3.6	22.5	33.3	-10.8
Italy (2002)	5.2	11.9	-6.7	22.1	47.2	-25.1
US-PSID (2001)	8.9	18.0	-9.1	8.9	18.0	-9.1
US-SCF (2001)	13.5	21.9	-8.4	18.3	29.5	-11.2
Annuity interest rate: 10%						
Finland (1998)	6.5	13.3	-6.8	20.6	52.8	-32.2
Germany (2002)	7.4	11.4	-4.0	20.2	33.3	-13.1
Italy (2002)	4.5	11.9	-7.4	18.0	47.2	-29.2
US-PSID (2001)	8.9	18.0	-9.1	8.9	18.0	-9.1
US-SCF (2001)	11.6	21.9	-10.3	15.9	29.5	-13.6
			Total Financial Assets			
Annuity interest rate: 2%						
Finland (1998)	12.2	13.3	-1.1	52.3	52.8	-0.5
Germany (2002)	12.6	11.4	1.2	33.0	33.3	-0.3
Italy (2002)	11.4	11.9	-0.5	43.7	47.2	-3.5
US-PSID (2001)	14.6	18.0	-3.4	14.6	18.0	-3.4
US-SCF (2001)	20.5	21.9	-1.4	26.8	29.5	-2.7
Annuity interest rate: 10%						
Finland (1998)	11.6	13.3	-1.7	49.5	52.8	-3.3
Germany (2002)	11.8	11.4	0.4	31.1	33.3	-2.2
Italy (2002)	10.9	11.9	-1.0	41.9	47.2	-5.3
US-PSID (2001)	14.6	18.0	-3.4	14.6	18.0	-3.4
US-SCF (2001)	19.1	21.9	-2.8	25.6	29.5	-3.9

Source: Authors' elaborations on LWS data (as of 27 February 2009). All values are in U.S. dollars at purchasing power parities and are equivalized by the square root equivalence scale.

[15] These differences do not reflect demographic factors across these nations, especially at older ages. Instead the differences are due to types of wealth holding and the relative values of each type of wealth, for instance housing wealth in Italy (see Table 1).

In Table 4 we report the evidence for the asset-poverty incidence in eight LWS countries, the four already considered plus Canada, Norway, Sweden, and the UK. As discussed, this concept of asset-poverty tries to capture whether a consumer unit could maintain a standard of living above the poverty line for a certain period had it no income, nor any financial resources and borrowing ability other than accumulated wealth. The figures in Table 4 take this period to be 3 months; that is the asset-poverty line is set at one-fourth of the annual income-based poverty line. As before, we utilize two wealth aggregates: financial assets and net worth.

Table 4. Share of Income-Poor and Asset-Poor Households, Selected Countries

Country	Income Poverty Line	Income Poor	Net Worth Poor	Income And Net Worth Poor	Financial Asset Poor	Income And Financial Asset Poor
			National Lines			
Canada (1999)	10,327	16.5	33.8	11.3	56.5	13.4
Finland (1998)	7,956	10.6	28.3	5.7	49.0	7.7
Germany (2002)	8,736	12.9	38.0	8.4	52.3	10.4
Italy (2002)	7,591	12.5	14.3	4.4	31.7	9.2
Norway (2002)	12,123	12.0	–	–	36.1	6.8
Sweden (2002)	8,934	10.2	–	–	42.8	6.0
UK (2000)	8,979	14.6	24.7	5.4	46.0	9.7
US-PSID (2001)	12,989	17.4	33.2	11.0	52.6	14.7
US-SCF (2001)	10,562	19.5	31.7	11.2	44.6	15.1
			US-PSID Line			
Canada (1999)	12,989	26.8	18.4	16.5	60.1	21.0
Finland (1998)	12,989	39.8	11.3	19.1	57.9	29.0
Germany (2002)	12,989	30.6	20.9	18.8	55.8	23.6
Italy (2002)	12,989	42.3	5.2	11.1	40.3	26.8
Norway (2002)	12,989	14.8	–	–	37.5	8.2
Sweden (2002)	12,989	32.3	–	–	47.4	19.6
UK (2000)	12,989	31.8	13.2	12.6	50.4	21.3
US-PSID (2001)	12,989	17.4	22.2	11.0	52.6	14.7
US-SCF (2001)	12,989	27.5	17.0	15.4	47.2	21.1

Source: Authors' elaborations on LWS data (as of 27 February 2009). All values are in U.S. dollars at purchasing power parities and are equivalized by the square root equivalence scale. The asset poverty line is set at one-fourth of the income poverty line.

The figures for income-poverty, using national or US-PSID lines, are the same as in Table 2. But with larger number of nations, we now find Sweden at the bottom of the poverty ranking together with Finland, Norway in the middle with Italy and Germany, and the UK and Canada close to the top. Using the national lines, the U.S. still has the highest income poverty

rates. Changing to the “real” US-PSID poverty line at the bottom, Norway is least poor based on income alone, followed by the U.S.[16]

Net worth poverty is two to three times income poverty in most nations, owing to those who have very low or no assets, both in terms of overall net worth and liquid assets. Of course, it would be difficult to liquidate housing wealth if income flows were zero, but the availability of home equity loans and second mortgages makes this possible in most nations (see Fisher, Johnson, Marchand, Smeeding, & Boyle Torrey, 2007, for U.S. estimates).

Most interestingly, the fraction of units that are both income- *and* financial-asset-poor are only a few points less than those who are income-poor (second vs. last column in Table 4). When we take the asset non-poor from the income-poor, poverty falls by about 2 to 3 percentage points in all countries using the national lines, except in Norway, the UK, and Sweden, where the drops are larger, in the 4 to 5 points range. Using the US-PSID poverty line and the extant PPP indices we find that poverty drops are even larger, with Norway again being the least poor country. In most nations, 20 to 30 percent of their population is both income- and asset-poor.

Regardless of whether the poverty threshold is set nationally or at the U.S. level, the application of our asset-poverty measures highlights the fact that a large proportion of non-poor households in all countries are “vulnerable” in the sense that they do not have enough financial assets to maintain them at the poverty line for at least three months (compare the last two columns of Table 4). This proportion is probably not independent of the development of the welfare state, and indeed the lowest proportion is found for Italy, where social assistance measures are relatively less generous than in other European countries. The link between asset-poverty (or non-poverty) and the development of the welfare state is an interesting subject for future research.

6. Conclusions

As recently observed by Bourguignon (2006, p. 101), “there is now little doubt that defining poverty and inequality in terms of a multidimensional set of endowments and access to markets or goods is in many instances essential”: The challenge is to make “alternative

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[16] Using SCF data, Haveman and Wolff (2004) find a lower incidence than we do of income, net worth, and liquid asset poverty in the U.S. in 2001 (13.2 percent, 24.5 percent, and 37.5 percent, respectively). These different results reflect differences in definitions as well as the use of the absolute poverty line proposed by the U.S. National Academy of Science panel.

concepts to the income poverty paradigm truly operational." In this article we have taken on this challenge by investigating how wealth can be integrated into the analysis of poverty.

This integration poses both empirical and conceptual problems. On the empirical side, in many countries there are household-level data that can help us to shed light on cross-national differences in household finances. Thanks to the meticulous work made to construct and document the LWS database, we now have some broadly comparable national wealth datasets, but we are also aware that many problems remain. Comparative results must be taken with caution. The challenge is to begin a much needed process of ex ante standardization of methods and definitions, which involves wealth data producers. The LWS database provides a starting point, and the launch of the new Eurosystem Household Finance and Consumption Survey will give further impetus to this process (Eurosystem Household Finance and Consumption Network, 2009).

The availability of good data, however, does not suffice. The development of analytical tools for the integration of wealth into the measurement of poverty has lagged behind in the poverty research agenda. There are notable exceptions as our concise review has shown. In this article we have sketched a conceptual framework for asset-based measures of poverty. It is a first attempt to systematize the field, providing a unified way to look at existing research. Our empirical comparative results, however tentative because of the data problems, suggest that asset-related measures of poverty have a distinctive informative value with respect to income-based statistics and other statistics such as material hardship. The pools of asset-poor and income-poor and the way in which they overlap differ across countries. The concept of asset poverty has wide policy interest, as many countries, including the U.S., are emphasizing the accumulation of financial assets by lower income families as an antipoverty strategy (see Blank & Barr, 2008), even while the asset tests in many income transfer programs reduce access and eligibility (Fraker, Martini, Ohls, & Ponza, 1995; Morgan, 1993; Bansak & Raphael, 2007; Smeeding, 2002).

We need to better understand the properties of these alternative indicators and assess their sensitivity to different assumptions, especially in the case of the income-net worth measure. This research agenda is of increasing importance in the current economic crisis, which has dramatically exposed the close interlink among income, wealth, and household well-being.

Appendix Table A1. Some Applications of the Income-Net Worth Measure to Micro-Data

Authors	Country	Year	Source	Reference Population	Length of Annuity (n)	Annuity Interest Rate (ρ)	Wealth Concept	Impact on Mean: Income (1)	Impact on Mean: Income-Net Worth	Poverty Line	Headcount Ratio (%): Income (1)	Headcount Ratio (%): Income-Net Worth	Other Adjustments
Carlin and Reinsel 1973	U.S.	1966	Pesticide and General Farm Survey	All farm families	Life expectancy of wife assumed 2 years younger than spouse	6%	Net worth	$5,300 $4,200 (2)	$7,600 $6,100 (2)	$2,500	32	15	–
Taussig 1973	U.S.	1967	Survey of Economic Opportunity			6%		–	–	–	–	–	–
Moon 1976	U.S.	1967	Survey of Economic Opportunity	All families with a person aged 65 and over	Average life expectancy of aged family member and spouse	4%	Net worth	$2,427 (2)	$3,743 (2)	$2.000	40.4	25.2	Downward adjustment of home equity
Irvine 1980	Canada	1972	Statistics Canada and Survey of Consumer Finance	All households	Stochastic process to retrieve mortality rates	5.5%	Net worth	$8359	$12160.5	–	–	–	Also estimates of future earnings and discounted value of lifetime earnings
Burkhauser and Wilkinson 1982	U.S.	1969–1975	Retirement History Study	Subsample of married men aged 58 through 63 who worked in 1969 but had retired in 1975	Life expectancy at the average age of the sample in 1969 and 1975	5%	Net worth	–	–	Bureau census poverty line $3257 in 1975	–	–	–
Burkhauser, Butler and Wilkinson, 1985	U.S.	1969–1979	Retirement History Study	Household aged 55–64		5%	Net worth	1969: $20,179 1979: $11,207	1969: $35,076 1979: $19,875	–	–	–	–
Crystal and Shea 1990	U.S.	1983-84	Survey of Income and Program Participation	All persons	Individual life expectancy	2%	Total assets	0-64: $22,780 65+: $23,109	0-64: $23,410 65+: $28,637	–	–	–	70% of home equity as fungible; adjustment for underreporting.
Radner 1990	U.S.	1984	Survey of Income and Program Participation	All households	Expected remaining lifetime of the unit	2%	Financial assets (because of the higher liquidity)	$14,600 (2)	$14,600 (2) $16,600 (4)	–	–	–	–

Appendix Table A1, continued

Authors	Country	Year	Source	Reference Population	Length of Annuity (n)	Annuity Interest Rate (ρ)	Wealth Concept	Impact on Mean		Poverty Line	Headcount Ratio (%)		Other Adjustments
								Income (1)	Income-Net Worth	Income (1)	Income-Net Worth		
Rendall and Speare Jr 1993	U.S.	1984	Survey of Income and Program Participation	All households with a person aged 65 and over	Life expectancies of family head and spouse; infinite horizon for non-elderly.	-0.4% 1.6%	Total assets	1.77 (3) 1.97 (3)	2.42 (3) 2.57 (3)	1.25 × SSA line	15.1 12.0	8.9 8.2	Correction for: remaining years of work lifetime; death of partner
Rendall and Speare Jr 1995	U.S.	1984	Survey of Income and Program Participation	All households with a person aged 65 and over	Life expectancies of family head and spouse; infinite horizon for non-elderly.	-0.4% 2%	Total assets	–	–	1.25 × SSA line	–	–	Model including bequests
Short and Ruggles 2005	U.S.	1996	Survey of Income and Program Participation	All persons	Life expectancy of family head	2% 4% 2%/6%	Total assets Net worth Total assets/Debt	–	–	Official	13.3	11.3 11.0 12.6	–
El Osta, Mishra, Morehart 2007	U.S.	2001	Agricultural and Resource Management Survey	Farm households	Life expectancy of the unit	4%	Net worth	–	–	–	–	–	–
Wolff and Zacharias 2007	U.S.	1989 1995 2001	Survey of Consumer Finance	All persons	Maximum life expectancy be-tween head and spouse	Weighted average of historic real rates	Net worth less gross value of owner-occupied housing	$42,198 (2)	$45,392 (2)	–	–	–	Income adjusted by household production and public services

Source: Authors' elaboration. (1) The income concept varies across studies. (2) Median. (3) Ratio of the median to the poverty line. (4) Impact when one-third of financial assets are included.

Appendix Table A2. LWS Household Wealth Surveys

Country	Name	Agency	Wealth Year (1)	Income Year	Type of Source	Over-Sampling of the Wealthy	Sample Size	No. of Non-Missing Net Worth	No. of Wealth Items
Canada	Survey of Financial Security (SFS)	Statistics Canada	1999	1998	Sample survey	Yes	15,933	15,933	17
Finland	Household Wealth Survey (HWS)	Statistics Finland	End of 1998	1998	Sample survey	No	3,893	3,893	23
Germany	Socio-Economic Panel (SOEP)	Deutsches Institut Für Wirtschaftsforschung (DIW) Berlin	2002	2001	Sample panel survey	Yes	12,692	12,129	9
Italy	Survey of Household Income and Wealth (SHIW)	Bank of Italy	End of 2002	2002	Sample survey (panel section)	No	8,011	8,010	34
Norway	Income Distribution Survey (IDS)	Statistics Norway	End of 2002	2002	Sample survey plus administrative records	No	22,870	22,870	35
Sweden	Wealth Survey (HINK)	Statistics Sweden	End of 2002	2002	Sample survey plus administrative records	No	17,954	17,954	26
United Kingdom	British Household Panel Survey (BHPS)	ESRC	2000	2000	Sample panel survey	No	4,867 (2)	4,185	7
United States	Panel Study of Income Dynamics (PSID)	Survey Research Center of the University of Michigan	2001	2000	Sample panel survey	No	7,406	7,071	14
	Survey of Consumer Finances (SCF)	Federal Reserve Board and U.S. Department of Treasury	2001	2000	Sample survey	Yes	4,442 (3)	4,442 (3)	30

Source: Sierminska, Brandolini, and Smeeding (2008), Table 1. (1) Values refer to the time of the interview unless otherwise indicated. (2) Original survey sample. Sample size can rise to 8,761 when weights are not used. (3) Data are stored as five successive replicates of each record that should not be used separately; thus, actual sample size for users is 22,210. The special sample of the wealthy includes 1,532 households.

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