



## Ensuring Time-Series Consistency in Estimates of Income and Wealth

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IB 2002-030  
July 2002



### Introduction

In the past decade, researchers have made substantial improvements to survey questions that allow them to obtain more accurate information from survey respondents about income and wealth. However, changing survey questions--even for the better-- can create problems. For example, if we ask a respondent about his wealth holdings in 1992 and ask him again in 1994 but use a different and improved set of questions, we cannot be sure that changes in his wealth are real because part of the observed change can be due to the fact that we simply got better information the second time we asked. Thus, the cost of improved questions can be inconsistency in the data over time. We refer to this problem as "time-series inconsistency." In this *Issue in Brief*, we summarize work that addresses this problem in the Health and Retirement Study (HRS) using data on income from financial assets. We describe a method of computation that allows us to resolve times series inconsistencies.

### Survey Structure Induced Bias in the HRS Financial Asset Income

The Health and Retirement Study (HRS) is a nationally representative panel study that began in 1992. The initial sample included 12,652 people born in 1931-41 and their spouses. When possible, respondents were followed up and interviewed again in 1994, 1996, 1998, and 2000. HRS respondents are asked to report all sources of income and assets. In 1992 and 1994, questions about assets were asked in one section and questions about income were asked in another. While this conventional approach

is sensible, in many cases it makes more sense to ask about the asset and the income together. This improvement was implemented starting in 1996. We find a doubling of income from assets reported by HRS respondents between 1992-1994 and 1996-2000. Since a massive increase in actual household asset income over this period is not a credible change, these findings imply that there is a serious time-series inconsistency in the HRS measures of asset income between 1992-94 and 1996-2000.

In contrast, there seems to be no time-series inconsistency in the value of household financial asset holdings between 1992-1994 and 1996-2000. Assets climb steadily between 1992 and 2000, as one would expect in a period of strong capital gains. With measured asset income abnormally higher but measured financial asset holdings normally higher in 1996-2000, the measured rate of return on financial assets, which equals asset income divided by financial asset holdings, is much greater in 1996-2000 than in 1992-1994, and is thus time-series inconsistent.

### Computation Strategy

In this section, we outline a strategy to resolve this time-series inconsistency. Since we believe that the 1996-2000 asset income data are better because of a better questionnaire design, we want a way to create new time-series consistent values of asset income in the 1992 and 1994 HRS data to replace the old, time-series inconsistent data. Our strategy is to use the rates of return on financial assets computed for the 1996 HRS data to assign a new, time-series consistent rate of return to households in the 1992 and 1994 HRS data. Since the financial asset holdings data are

time-series consistent, as noted earlier, multiplying financial asset holdings in 1992 or 1994 by the assigned rate of return from the 1996 data should result in a new, time-series consistent estimate of income from assets 1992 or 1994.

We implement this strategy in three ways. In the first, strategy (A), we only calculate new estimates of asset income for households that report financial asset holdings but zero asset income in the 1992 and 1994 HRS interviews. In the second, strategy (B), we calculate new estimates of asset income for *all* households that report financial asset holdings in the 1992 and 1994 HRS interviews. The first strategy implies that the time-series inconsistency comes entirely from households that fail to report any asset income in 1992 or 1994; the second implies that it may also come from households that report positive but incomplete asset income in 1992 or 1994.

In both strategies, the calculation begins by splitting the 1992, 1994, and 1996 HRS into five groups: the first three quartiles of financial wealth along with the 75<sup>th</sup> to 90<sup>th</sup> and 90<sup>th</sup> and above percentile groups. Each household in 1992 and 1994 that is to be assigned a new estimate of asset income is assigned a new rate of return that is randomly chosen from the distribution of rates of return on financial assets of households in its asset group in the 1996 data. A new, time-series consistent estimate of asset income is then calculated from that assigned rate of return and the level of financial wealth as reported in the 1992 and 1994 interviews. A third strategy, strategy (C), is largely the same as strategy (B) except that whenever households are in the same asset category in 1992 or 1994 as they were in 1996, strategy (C) assigns the

1996 rate of return for that household to the 1992 and 1994 data instead of assigning the rate of return on financial assets of a randomly chosen household in the same asset category.

### Summary of Major Findings

The main results from this paper are presented in the Table 1.

Data Year	Computation Method	Financial Asset Percentile					All Households
		0-25%	25-50%	50-75%	75-90%	90-100%	
1992	None	25	360	1801	2882	8776	1876
	(A)	11	565	1446	4011	11675	2543
	(B)	2	272	734	3745	15306	2633
	(C)	19	202	958	4443	18901	2886
1994	None	16	311	706	1883	7683	1481
	(A)	11	524	1293	3622	12960	2600
	(B)	4	252	996	3976	17010	2984
	(C)	6	240	993	3693	17256	2961
1996	None	11	143	1070	4680	18451	3190
1998	None	6	163	1057	4643	22545	3740
2000	None	31	284	1015	4889	23307	4024

The mean values of income from financial assets as calculated from the original interviews are listed above for comparison. For these rows, the computation method is labeled as “None” and the rows are shaded gray. If we compare the change in the means of the original data overall (All Households), the percent change is a 21% decrease between 1992 and 1994, a 115% increase between 1994 and 1996, a 17% increase between 1996 and 1998, and a 7.6% increase between 1998 and 2000. The seam problem between 1994 and 1996 is glaring.

Focusing on strategy (C), which appears to be the most successful, the mean changes of the computed income from asset data between 1992-94, 1994-96, 1996-1998, and 1998-2000 are 2.6%, 7.7%, 17%, and 7.6%, respectively. This general upward trend is much more consistent with the upward trend in financial assets than is the original data. Using the 1998 or 2000 HRS data rather than the 1996 HRS data as the source of the rates of return used to compute asset incomes in 1992 and 1994 does not substantially change our results.

### Conclusion

In this Issue in Brief, we note the substantial improvements in measuring household income from assets that come from asking survey respondents about their financial asset holdings and asset income together rather than separately. In the HRS, the cost of changing questionnaires to make this improvement is a notable seam problem in values of household asset income between the years before and after the change. We propose several strategies that exploit the time-series consistency of financial asset holdings to make household asset income time-series consistent as well.

Future work will include correcting biases in income from privately owned business farms and real estate. Once these issues are adequately resolved, a superior measure of total household income will be made available. Until then, the results presented here should be a warning that survey respondents provide far more accurate measures of financial asset income when these questions are preceded by questions regarding the assets that gen-

erate that income. Those who utilize these data without a correction for time-series inconsistency will greatly overstate changes in asset income across the full survey period (1992-2000).

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This work was supported by a grant from the Social Security Administration through the Michigan Retirement Research Center (Grant # 10-P-98358-5). The opinions and conclusions are solely those of the authors and should not be considered as representing the opinions or policy of the Social Security Administration or any agency of the Federal Government.

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The Michigan Retirement Research Center is supported by a grant from the Social Security Administration (grant number 10-P-98358-5).