United States
Department of
Agriculture

USDA

Economic
Research
Service

Farm Household Well-Being

Comparing Consumption- and Income-Based Measures

Carol Adaire Jones
Daniel Milkove
Laura Paszkiewicz

Economic
Research
Report
Number 91

February 2010

www.ers.usda.gov

Visit Our Website To Learn More:

You can find additional information about farm household well-being at our website.

Farm Household Economics and Well-Being Briefing Room

http://www.ers.usda.gov/Briefing/WellBeing/

National Agricultural Library Cataloging Record:

Jones, Carol Adaire
Farm household well-being : comparing consumption- and income-based measures.
(Economic research report (United States. Dept. of Agriculture. Economic Research Service) ; no. 91)
1. Cost and standard of living—United States. 2. Rural families—United States. 3. Farm income—United States.
4. Consumption (Economics)—United States. I. Milkove, Daniel L. II. Paszkiewicz, Laura.
III. United States. Dept. of Agriculture. Economic Research Service. IV. Title.
HD6983

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and, where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

United States Department of Agriculture

Economic Research Report Number 91

February 2010

A Report from the Economic Research Service

www.ers.usda.gov

Farm Household Well-Being

Comparing Consumption- and Income-Based Measures

Carol Adaire Jones, cjones@ers.usda.gov
Daniel Milkove, dmilkove@ers.usda.gov
Laura Paszkiewicz, paszkiewicz.laura@bls.gov

Abstract

Household economic well-being can be gauged by the financial resources (income/wealth) available to the household or by the standard of living enjoyed by household members (consumption). Based on responses to USDA's annual Agricultural Resource Management Survey (ARMS), a joint effort by the Economic Research Service (ERS) and the USDA National Agricultural Statistics Service, ERS has long published estimates of farm household income and wealth. This report presents, for the first time, estimates of consumption-based measures of well-being for farm households based on new questions in ARMS. The consumption measure provides a different perspective from income or wealth on farm households' well-being relative to that of all U.S. households.

Keywords: household consumption, household income, household well-being measures, farm households, self-employed households, permanent income, permanent income hypothesis.

Acknowledgments

This report benefited substantially from the comments of five anonymous peer reviewers, as well as from Robert Gibbs, James MacDonald, Patrick Sullivan, and James Whittaker of the Economic Research Service, USDA. We also gratefully acknowledge Dale Simms for editorial assistance, Linda Beeler and Kathleen Kassel for support in creating the graphics, and Cynthia A. Ray for graphics, layout and cover design.

Contents

Summary iii

Introduction 1

Well-Being of Farm Operator Households Versus All U.S. Households: Income and Wealth Measures, 1996-2006 2

Definitions and Data Sources 2

Income, Wealth, and Joint Income-Wealth Measures 2

Creating Consumption Measures: Hypotheses, Definitions, and Data 7

Consumption Behavior of Farm Households Versus All U.S. Households 7

Creating Consistent Expenditure and Consumption Measures With ARMS and CE Data 8

Data Analysis Samples and Descriptive Statistics 10

Household Expenditure and Consumption Levels 14

Comparing Expenditure and Consumption Measures for Farm Households 14

Benchmarking Farm Household (ARMS) Estimates With All U.S. Household (CE) Estimates 16

The Relationship Between Household Consumption and Income . . . 17

Propensity to Consume From Current Income: Farm Versus All U.S. Household 17

Propensity To Consume From Current Income: Households of Farms With Sales of $100,000+ Versus Households of Very Small Rural-Residence Farms 21

Consistency in Household Ranks in Income and Consumption Distributions 21

Relative Well-Being of Farm and All U.S. Households, as Indicated by Income and Consumption 25

Conclusions 30

References 31

Appendix A: Data Sources and Analysis Samples 34

Appendix B: Constructing Consumption and Expenditure Measures in the Consumer Expenditure Survey (CE) and the Agricultural Resource Management Survey (ARMS) 40

Recommended citation format for this publication:

Jones, Carol Adaire, Daniel Milkove, and Laura Paszkiewicz. *Farm Household Well-Being:Comparing Consumption- and Income-Based Measures*. Economic Research Report No. 91, U.S. Dept. of Agriculture, Economic Research Service. Feb. 2010.

Summary

The traditional measures of a household's economic well-being are money income and wealth, both of which indicate the financial resources available to the household. An alternative measure, indicating the current standard of living enjoyed by a household, is the household's consumption of goods and services. USDA's Economic Research Service (ERS) has long published estimates of farm household income and wealth based on responses to USDA's annual survey of farms, the Agricultural Resource Management Survey (ARMS), a joint effort by ERS and the USDA National Agricultural Statistics Service. This report presents, for the first time, estimates of consumption for farm households, calculated using new survey questions in ARMS, and compares them to consumption estimates for all U.S. households, calculated from the Consumer Expenditure Survey collected by the Bureau of Labor Statistics.

What Is the Issue?

Since 1998, median income for farm operator households has exceeded that of all U.S. households by 3 to 21 percent, and median farm household wealth has been 4-5 times that of all U.S. households. Farm household income fluctuates from year to year more than the income of the typical U.S. household, due to variable farm yields and market prices. Because of their reliance on farm income, farm households tend to have lower income at the low end of the distribution and higher income at the high end of the distribution, compared with all U.S. households. Income measures suggest more farm households are disadvantaged: about 5-8 percent of farm households have negative household income each year, compared with around 0.1 percent of all U.S. households. And the official U.S. poverty rate, based on comparing household income to the census poverty threshold, is 14.4 percent for persons in farm households compared to 12.3 percent for persons in all U.S. households.

Because farm income is so variable, consumption is likely to be a more stable indicator of the household's long-term standard of living than is its current income level. Households dependent on variable income sources are less likely than others with more stable incomes to adjust household consumption—which depends on longer term income expectations—in response to annual variations in household income—which are more likely to be temporary. When income is temporarily low, households with substantial wealth can draw down or borrow against their savings to maintain their standard of living; when income is temporarily high, they will be less inclined to expand discretionary purchases than similar households with more stable sources of income.

What Did the Study Find?

We cannot track individual households over time to measure changes in consumption as income varies from year to year. Instead, we examined differences in spending behavior among all farm households during 2006. As expected, farm households consumed a larger share of current household income than all U.S. households when household income was low, but as household income increased, the increases in farm household consumption were smaller than for all U.S. households. To further test the role of variable household income on consumption, we compared two groups of farm households that vary in their

exposure to income variability from self-employment—those operating farms with annual sales of $100,000 or more (for whom, in the aggregate, farm income contributes more than half of household income) and those operating farms with annual sales of less than $10,000 and an operator with a primary occupation other than farming (for whom, in the aggregate, farm income contributes a small negative amount to household income). We found a similar pattern—on average, the $100,000+ farm households had higher consumption when incomes were low and lower consumption when incomes were high relative to households with similar levels of income operating very small rural-residence farms.

When households are ranked from lowest to highest based on current income levels, farm households have higher income per person than all U.S. households at all but the lowest level of household income. The net effect of predominantly higher income, but a lower tendency to increase consumption as income increases, is that the farm household distribution of consumption is very similar to that of all U.S. households. Farm households appear to have higher consumption at the low end of the distribution, and lower consumption at the upper end of the distribution, compared with all U.S. households. Analogously, the relative levels of disadvantage are reversed when we switch from an income-poverty rate to a consumption-poverty rate, calculated by comparing household consumption to the census poverty threshold. The consumption poverty rate is lower for persons in farm households than for persons in all U.S. households. The divergence in income and consumption measures between farm and all U.S. households is even greater when we focus on households that operate farms with sales of $100,000 or more, which are more exposed to the income risks of self-employment.

At the individual household level, there is not a close mapping between the income and consumption measures for farm households compared with U.S. households. Among households that rank in the bottom 20 percent for household income, farm households are far more likely to rank high in the consumption distribution than are all U.S. households, indicating farm households are more likely either to view their income as temporarily low, or to have sufficient wealth to spend more than they earn. Analogously, among households that rank in the top 20 percent of the income distribution, farm households are far more likely to rank low in the consumption distribution than are U.S. households, indicating they view their current income as temporarily high. The greater divergence implies that income is a less effective proxy for consumption—an indicator of long-term standard of living—for farm households than for most other U.S. households. Consequently, consumption indicators are an important complement to income indicators for understanding farm household well-being.

How Was the Study Conducted?

The principal source for farm household data is USDA's annual ARMS survey, which collects information on farm finances—including farm business income, household income, farm and nonfarm wealth, and living expenses—from a nationally representative sample of farm operator households. To explore farm household well-being in more detail, ERS in 2003 added to ARMS questions related to household consumption. The principal source for data on living expenses for all U.S. households is the Consumer Expenditure Survey collected by the Bureau of Labor Statistics. In addition, we use data from the Current Population Survey and Survey of Consumer Finances to provide income and wealth measures for all U.S. households over 1995-2006.

Introduction

How does farm household economic well-being compare to that of the typical U.S. household? The answer depends upon whether well-being is measured by available resources or by standard of living. Past research has relied primarily on measures of current-year money income and wealth—indicators of resources available to the household. Many analysts agree that capturing standard of living by measuring goods and services consumed in the current year is an alternative measure of well-being with a number of advantages (Cutler and Katz, 1991; Hurd and Rohwedder, 2006; Johnson et al., 2005; Jorgenson, 1998; Meyer and Sullivan, 2003; and Rogers and Gray, 1994). Households tend to smooth consumption over time, given temporary increases or decreases in income, in order to maintain their standard of living. Consequently, consumption better approximates lifetime well-being for a given household than current-year income.

Theory and empirical evidence imply a more pronounced difference between money income and consumption for households less reliant on money income and/or where income is highly variable across years. The literature has studied two populations where income is a poor proxy for a consumption measure of well-being: low-income populations, who receive private and public transfers from outside of the household and who may have higher underreporting of income (Jorgenson, 1998; Meyer and Sullivan, 2003; Slesnick, 2001); and the elderly, who have relatively high levels of wealth but low current income (Hurd and Rohwedder, 2006).

This report focuses on another population for which income may be a weak proxy for standard of living: farm households which, like other self-employed households, typically have more variable income and higher wealth than the average U.S. household.

Well-Being of Farm Operator Households Versus All U.S. Households: Income and Wealth Measures, 1996-2006

First, we define who is a farmer and identify the data sources for our reporting. We then report on patterns of well-being using traditional measures: income, wealth, and joint income-wealth.

Definitions and Data Sources

To identify our target population—households of principal operators of family farms—we start with USDA's definition of a farm ("any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year"). Because we are interested in the households of the principal farm operators, we restrict our analysis to "family farms," those in which majority ownership of the farm business is held by the operator and relatives of the operator. Most farms (96 percent in 2006) are family owned and operated. For family farms, we identify the principal operator of the operation, and collect information for that individual's household. About 10 percent of family farms have other operators who live in separate households; these households are not included in the population.[1]

In this section, we use the full family-farm sample from USDA's Agricultural Resource Management Survey (ARMS), a joint effort by ERS and the USDA National Agricultural Statistics Service, to describe the demographics and economics of farm households. (See Appendix A for more information about data sources.) ARMS is a major source of information for reporting official USDA statistics on farm income and farm household income and wealth.[2] The calculation of household income in ARMS includes: a detailed calculation of farm income, based on farm output, revenue, expenses, and depreciation; the allocation of farm income among stakeholders, including the principal operator, and the nonfarm income of the principal operator's household from earned and unearned sources.[3] ARMS also reports farm and nonfarm household wealth and household expenditure data. For all U.S. households, we rely on the Current Population Survey for income data and the triennial Survey of Consumer Finance for wealth data.

Tables 1 and 2 report income- and wealth-based measures of household well-being for principal farm operator and all U.S. households for 1996-2006.

Income, Wealth, and Joint Income-Wealth Measures

Following Slesnick (2001), we start with the three standard well-being measures, all based on household money income for a given year: the level of income at the midpoint of the population (median household income); the dispersion, or inequality, of income across households (the Gini coefficient[4]); and the share of households below a minimum threshold of income adequacy (the Census poverty rate).

In the 1930s, the per capita income for farm household members was about half that of nonfarm households (USDA, 1984).[5] In the 1970s, median farm household income approached that of all U.S. households—in some years,

[1]For multiple-operator farms, a principal operator is identified during the annual process of collecting economic information from farm businesses. About 40 percent of farms have more than one operator; however, for three-quarters of the farms with multiple operators, the farm is operated by a husband-wife team, so that both operators are part of the same "principal operator" household on which we focus.

[2]See ERS Briefing Rooms on Farm Income and Costs (http://www.ers.usda.gov/Briefing/FarmIncome/), Farm Household Economics and Well-Being (http://www.ers.usda.gov/Briefing/WellBeing/), and ARMS (http://www.ers.usda.gov/Briefing/ARMS/) for more information.

[3]Other net self-employment income is elicited directly from the respondent, as in the Current Population Survey. Though the CPS survey manual indicates that self-employment income is to be reported net of depreciation, this guidance does not appear on the survey form in CPS. Checks comparing farm self-employment income between CPS and ARMS suggest that the typical respondent does not deduct depreciation, resulting in lower estimates of farm self-employment income in ARMS than in CPS.

[4]The Gini coefficient is a ratio with values between 0 and 1: 0 corresponds to perfect equality (everyone having exactly the same income) and 1 corresponds to perfect inequality (where one person has all the income, while everyone else has zero income). Consequently, a low Gini coefficient indicates a more equal income or wealth distribution, while a high Gini coefficient indicates a more unequal distribution.

[5]Data for calculating farm household income are not available from ARMS or its precursor prior to 1986. In order to make historical comparisons between disposable personal incomes of farm and nonfarm residents, we use an alternate series for 1934-1983. For more information, see http://www.ers.usda.gov/Briefing/WellBeing/glossary.htm#disposable.

Table 1

Income measures of well-being for farm operator and all U.S. households, 1996-2006 (in 2006 dollars)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Farm primary operator households:											
Households (1,000)	1,717	2,012	1,872	2,148	2,121	2,094	2,115	2,085	2,061	2,034	2,022
Total household income ($)											
Median	35,149	42,588	49,635	52,983	50,954	51,026	52,105	52,283	57,268	55,822	56,022
Standard error	1,667	1,915	2,191	2,074	1,633	1,781	1,159	1,938	2,395	1,587	1,043
10th percentile	5,745	3,006	7,702	9,860	8,809	7,715	7,482	8,375	10,865	10,438	9,859
20th percentile	15,291	15,547	19,103	21,030	19,814	21,677	21,172	20,760	23,218	23,165	22,400
80th percentile	83,668	87,897	96,695	100,791	97,649	98,508	102,876	99,179	114,872	114,105	108,713
90th percentile	133,148	130,028	153,214	153,688	151,321	140,884	151,410	145,950	181,948	178,559	167,570
	Ratio										
80:20	5.5	5.7	5.1	4.8	4.9	4.5	4.9	4.8	4.9	4.9	4.8
90:10	23.2	43.3	19.9	15.6	17.2	18.3	20.2	17.4	16.7	17.1	16.0
	Index										
Gini	0.647	0.624	0.590	0.582	0.587	0.591	0.589	0.587	0.578	0.583	0.582
Standard error	0.0188	0.0136	0.0124	0.0130	0.0102	0.0134	0.0162	0.0093	0.0140	0.0052	0.0092
	Percent										
Poverty rate per person	20.4	na	na	14.3	na	na	16.0	15.1	13.3	na	14.4
Negative household income	6.0	7.5	5.8	5.2	6.0	6.5	6.4	5.8	5.0	5.4	5.9
Farm income share	13.3	11.8	10.2	9.6	4.6	8.3	5.3	11.5	17.5	18.1	11.4
Farm + other self-employment income share	26	24	22	27	na	na	18	23	30	na	25
All U.S. households:											
Households (1,000)	101,018	102,528	103,874	106,434	108,209	109,294	111,278	112,000	113,343	114,384	116,011
Total household income ($)											
Median	45,416	46,350	48,034	49,244	49,163	48,091	47,530	47,488	47,323	47,845	48,201
Standard error	229	214	284	230	155	147	156	206	209	160	207
10th percentile	11,401	11,542	11,982	12,519	12,390	12,170	11,902	11,550	11,641	11,658	12,000
20th percentile	18,897	19,289	19,908	20,735	20,981	20,465	20,079	19,715	19,732	19,807	20,035
80th percentile	87,032	89,556	92,647	95,875	95,733	95,094	94,160	95,229	93,934	94,712	97,032
90th percentile	117,787	122,325	125,135	130,417	131,132	129,405	127,890	129,578	129,014	130,224	133,000
	Ratio										
80:20	4.6	4.6	4.7	4.6	4.6	4.7	4.7	4.8	4.8	4.8	4.8
90:10	10.3	10.6	10.4	10.4	10.6	10.6	10.8	11.2	11.1	11.2	11.1
	Index										
Gini	0.455	0.459	0.456	0.458	0.462	0.466	0.462	0.464	0.466	0.469	0.470
Standard error	0.0043	0.0043	0.0042	0.0041	0.0030	0.0030	0.0029	0.0028	0.0029	0.0028	0.0028
	Percent										
Poverty rate per person	13.7	13.3	12.7	11.9	11.3	11.7	12.1	12.5	12.7	12.6	12.3
Negative household income	0.011	0.116	0.135	0.130	0.097	0.124	0.129	0.131	0.129	0.104	0.058
Self-employment income share	4.9	5.4	5.4	5.2	5.1	4.5	4.7	4.9	4.7	5.2	5.3

Income is in 2006 CPI-U-RS adjusted dollars, for households current as of March the following year. na = Estimate does not comply with ERS disclosure limitation practices, is not available, or is not applicable. Sources: USDA, Economic Research Service using Agricultural Resource Management Survey, 1996-2006 (all survey versions) for farm households, and using Current Population Survey Report P60-223, U.S. Census Bureau, 2007, for all U.S. households (median and mean income, Table A-1; Gini of income, Table A-3.)

Table 2

Wealth measures of well-being for farm operator and all U.S. households, 1995-2006 (in 2006 dollars)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Farm primary operator households:												
Median ($)		283,006	na	337,133	435,098	375,174	386,321	376,474	455,853	487,715	517,467	548,193
Standard error		25,215		11,449	7,971	15,383	12,400	13,077	17,072	20,348	13,122	11,159
10th percentile		74,092	na	88,940	129,346	102,187	92,951	97,571	118,008	148,731	142,269	167,549
20th percentile		149,326	na	174,956	237,968	193,724	191,933	198,548	241,037	266,800	264,448	307,932
80th percentile		590,570	na	647,789	799,004	712,052	730,290	716,503	868,634	907,271	971,913	1,020,621
90th percentile		1,116,774	na	1,277,634	1,471,502	1,254,751	1,303,669	1,303,156	1,576,273	1,616,857	1,732,255	1,775,872
		Ratio										
75:25		4.0		3.7	3.4	3.7	3.8	3.6	3.6	3.4	3.7	3.3
90:10		15.1		14.4	11.4	12.3	14.0	13.4	13.4	10.9	12.2	10.6
		Index										
Gini		0.549	na	0.559	0.505	0.521	0.565	0.528	0.532	0.517	0.538	0.529
Standard error		0.0097		0.0101	0.0070	0.0138	0.0339	0.0094	0.0133	0.0129	0.0089	0.0052
All U.S. households:												
Median ($)**	75,573	79,985		88,809			97,882			99,376		
Standard error	2,562			3,416			3,522			4,590		
10th percentile	107			53			107			213		
25th percentile	13,129			12,275			14,517			14,197		
75th percentile	211,348			258,527			322,038			350,645		
90th percentile	500,616			611,520			834,929			887,660		
		Ratio										
75:25	16.1			21.1			22.2			24.7		
90:10	4,690			11,458			7,822			4,158		
		Index										
Gini	0.784			0.794			0.803			0.805		
Standard error	0.0043			0.0051			0.0041			0.0049		

na = Estimate does not comply with ERS disclosure limitation practices, is not available, or is not applicable.
** 1996 all U.S. wealth median estimate is interpolated from 1995 and 1998 estimates.
Sources: USDA, Economic Research Service using Agricultural Resource Management Survey, 1996-2006 (all survey versions), for farm households, and Survey of Consumer Finances (Kennickell, Jan 2006), for all U.S. households.

it was above the median for all U.S. households, and in other years, it was below it. Since 1998, median income for farm operator households has exceeded median income of all U.S. households by 3 to 21 percent (table 1).

Income levels are more disparate among farm households, as reflected in consistently higher Gini coefficients, than among all U.S. households. However, the Gini coefficients are converging: the Gini for all U.S. households rose from 0.455 in 1996 to 0.470 in 2006, implying widening income inequality, whereas the Gini for farm households fell from 0.647 to 0.582. Two other measures of dispersion, the ratio of income at the 80th and 20th percentiles and at the 90th and 10th percentiles, focus specifically on the distance between the upper and lower tails of the distribution. For the 80:20 ratio, farm and all U.S. households do converge in 2006 to the same value; for the 90:10 ratio, the gap is shrinking (table 1). Further, farm households have consistently higher income-based poverty rates (14.4 percent for farm households versus 12.3 percent for U.S. households in 2006) and larger shares with negative household income each year (5-8 percent of farm house-

holds, compared with 0.1 percent for all U.S. households across the period) (table 1).

The greater income variability among farm households from one year to another can be attributed to the greater share of self-employment income among farm households. Self-employment income is more likely to be negative in a given year due to the variability of business results, as well as to variability in how much production is allocated to inventory rather than sales in a given year and in depreciation expenses from recent capital expenditures. For all U.S. households, the share of income from self-employment averages about 5 percent over 1996-2006 (table 1). For farm households, the share of income from self-employment ranges from 18 to 30 percent, with the farm income share ranging from 5 to 18 percent. (Many of the other self-employment activities of farm households are related to farming, though not part of the farm business.)

The economic strategies of farm households are diverse. The average shares of household income from farming increase with the farm's sales class. Many households in the upper and lower ends of the income distribution are from the small set of households operating farms with annual sales over $100,000. Though these farms accounted for 16 percent of all farms in 2006, they produced 89 percent of total farm sales.

Farm households clearly dominate all U.S. households in wealth-based measures of well-being. In 2004 (the most recent year for which wealth information is available for all U.S. households), median wealth of farm households was about five times the estimated median wealth of all U.S. households (table 2.) A large share of household wealth in the farm sector is in farmland, which increased substantially in value relative to other assets over 1995-2006.

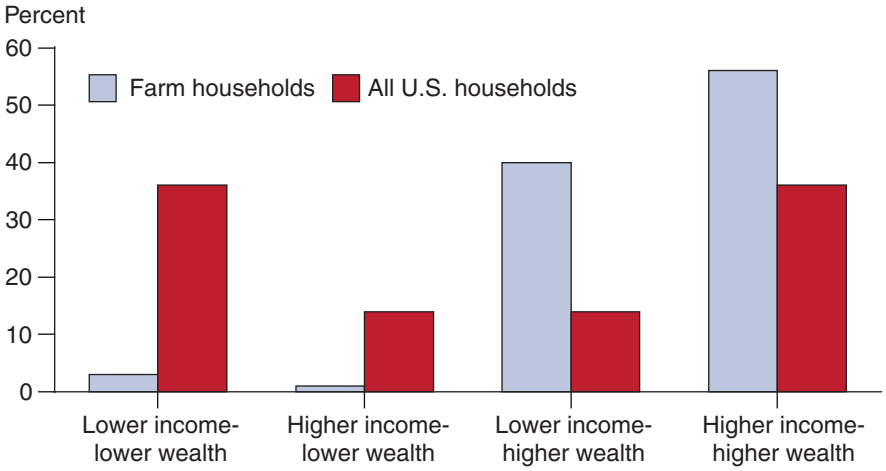
In contrast to all U.S. households, where wealth is very concentrated at the top end of the distribution, wealth is more evenly distributed among farm households: the Gini coefficients in 2004 were 0.517 for farm households and 0.805 for all U.S. households.

Recognizing the variability of income across years and the importance of wealth to sustain consumption amid temporary declines in income, Mishra et al. (2002) introduced a four-quadrant well-being indicator. It separates households into low- and high-income and low- and high-wealth, using the U.S. household medians for money income and wealth as the dividing lines. The combination of low income and low wealth is interpreted as an indication of "economic disadvantage." Using 2000 data, 6 percent of the U.S. farm population was in the low-income/low-wealth category. As the well-being of farm households (both income and wealth) improved over the next 6 years, the share of disadvantaged households fell to 3 percent in 2006.

Figure 1 compares the four-quadrant distributions of farm and all U.S. households for 2004, the last year for which household wealth data are available for all U.S. households. The shares with low income are similar (43 percent of farm households, 50 percent of all U.S. households). The striking difference is in wealth, where 96 percent of farm households had high wealth (compared to 50 percent of all U.S. households.)[6] For all U.S. households, income and wealth are positively correlated: more than two-thirds of the low-income group had low wealth and nearly two-thirds of the high-income group had high wealth. The pattern is significantly different for low-income farm households: virtually all of them had high wealth, suggesting that for many, their current-year income is temporarily low.

Figure 1

Joint household income and wealth distribution, for farm and all U.S. households, relative to U.S. household medians, 2004



"Lower" and "higher" income and wealth are defined relative to the U.S. household medians: in 2004 dollars, $45,817 for income and $91,700 for wealth.

Source: USDA, Economic Research Service using Agricultural Resource Management Survey, 2004; Current Population Survey, 2004, Bureau of Labor Statistics, U.S. Department of Labor; Survey of Consumer Finances, 2004, Federal Reserve Board.

[6]The 96 percent of farm households with high wealth are split into two groups, with 56 percent having income higher than the U.S. median and 40 percent having income lower than the U.S. median. On average, the low-income/high-wealth group tended to incur farm losses during the year, and some portion of their off-farm income served to offset these losses.

Creating Consumption Measures: Hypotheses, Definitions, and Data

In this chapter, we explore why patterns of consumption behavior may differ for farm households relative to all U.S. households. Then, we outline our approach for constructing consistent consumption measures in the Consumer Expenditure (CE) and ARMS survey data.

Consumption Behavior of Farm Households Versus All U.S. Households

In its simplest form, the permanent income hypothesis (PIH) of consumption and savings behavior posits that the choices made by consumers are determined not by current income but by longer term income expectations.[7] The concept of permanent income is based on the lifetime earning capacity of household real wealth, which includes both physical (real property and financial) and human (education and experience) assets. Measured current income typically contains a permanent component, which is anticipated and planned, and a transitory element, which may be unexpected. The concept of consumption differentiates outlays that result in current enjoyment of goods and services from those that reflect (at least in part) savings for future enjoyment, including the purchase of durable goods such as housing or vehicles, and financial assets such as retirement accounts and insurance.

[7]The permanent income hypothesis is a theory of consumption attributed to Milton Friedman (1957).

A major implication of the permanent income hypothesis is that—in the face of current income variability around permanent income—consumers will seek to allocate resources in order to smooth the marginal utility of consumption relative to current income. Household groups with higher shares of transitory income, such as the households of farm operators and other self-employed individuals, are predicted to have lower propensities to consume from current income. Indeed, Friedman (1957) cited this explanation for his finding that the elasticity of consumption with respect to current income was lower for farmers than for nonfarmers.

Whereas 15 years ago the literature interpreted the PIH theory as badly dated, more recent re-formulation of the theory, combined with improved data availability, has reinvigorated this line of research.[8] In recent years, a number of empirical studies have explored predictions from various versions of the permanent income hypothesis. DeJuan and Seater (2006), analyzing CE data, found that the income-elasticity of consumption is lower for households with greater transitory income. Whittaker and Effland (2009), using 2003-05 ARMS data, found that increases in relatively stable nonfarm income have a greater impact on farm household spending than do increases in farm production income, which can vary from year to year because of weather, crop failures, animal losses, and/or commodity price fluctuations.

[8]A prominent researcher suggested Friedman was more "prescient than primitive" in his 2001 review of the literature on theories of consumption (Carroll, 2001).

The theory predicts that the level of income variability is an important driver of the extent of consumption-smoothing behavior. Mishra and Sandretto (2002) document the substantial intertemporal variability of farm household income over the past seven decades, and suggest that variability has not declined during this period.

Ideally, we would conduct the test of income variability and consumption with panel data. However, lacking panel data capturing the same farm households across multiple years, we test for consumption smoothing across income levels in our cross-sectional data for 2006. The underlying assumption is that greater income dispersion at a point in time is associated with greater intertemporal variability as well, so that current incomes at the low and high ends of the distribution are less likely to be representative of long-term, or "permanent," income for farm households than for all U.S. households. For example, the operators of large farms, who have the highest average household income but whose farm income is most variable from year to year, are disproportionately represented at both the top and bottom of the income distribution.

We compare how patterns of consumption-smoothing relative to income levels differ between household groups with more and less income variability. We first compare farm households and all U.S. households. In addition, among farm households, we compare households operating farms with annual sales greater than $100,000 and households operating very small rural-residence farms (with sales less than $10,000 and a principal operator whose primary occupation is not farming).

Creating Consistent Expenditure and Consumption Measures With ARMS and CE Data

In our analysis, consumption refers to own-household consumption during the current year. The household consumption measure of standard of living—the value of service flows received by the household in the current period—is closely related to living expenses (current expenditures), but differs in key ways, requiring three (sometimes impractical) adjustments:

- The first adjustment is to separate the investment or savings component of expenditures from current consumption. For consumer durables such as housing and vehicles, this can be done by replacing current outlays with the estimated annual flow of consumer services. Also, expenditures that represent savings—such as on disability/life insurance and retirement plans—are excluded from the consumption measure. Some argue that education and health expenditures are more appropriately interpreted as investments and should be excluded, but we do not attempt to do so here.
- A second adjustment is to separate out net expenditures on other households, such as alimony and child support, gifts, and charitable contributions.
- A third adjustment is to capture goods and services consumed without private economic transactions (and therefore without household financial expenditures)—including leisure, public goods, and in-kind transfers (such as Medicare direct payments to health providers).

The categories in the current ARMS living expense (or household expenditure) questions were modeled after the major categories used in the Consumer Expenditure (CE) Survey, the most comprehensive source of expenditure data for U.S. households. Since the ARMS questions were not originally designed to calculate consumption, we adjusted the categories of expenditures in 2006 to isolate pure consumption items. (See Appendix B

for more details of the mapping between CE and ARMS categories and other aspects of the construction of the consumption measures in the two survey data sets.)

The CE survey collects data on over 200 expenditure items, whereas the ARMS survey now collects data on 10 items. Survey research indicates that the estimated value of an aggregate that depends on summing many components varies with the number of components that are measured. The reasoning is that each component is composed of subcomponents, and respondents will not remember all the subcomponents when reporting the value of the component (Weinberg et al., 1999). Thus, increasing the number of components that are queried will tend to increase the aggregate of the components.[9]

By this logic, the ARMS could have a tendency to understate total expenditures. Consequently, we recognize that the ARMS data may be subject to a downward bias, particularly for the aggregated category "all else." In its official reporting of CE data, BLS does not report a consumption measure. However, a number of researchers have calculated a consumption measure from CE data (Johnson et al., 2005; Meyer and Sullivan, 2003, 2009).

We make parallel adjustments to expenditure data in CE and ARMS in order to calculate consistent consumption measures from the two surveys. The first set of adjustments relates to separating out savings components of expenditures. For the two durable goods, housing and vehicles, we replace expenditures with the value of estimated service flows for shelter and vehicle services. We retain education expenditures (in "all else") and health expenditures (as a separate item), but drop expenditures on personal insurance and retirement plans in the analysis samples to calculate consumption for both survey samples.

Three categories are treated as disposable goods and services (i.e., their expenditures are included directly in the consumption measure)—food, health care, and all else. And in order to drop contributions to other households from our measure of consumption, we exclude the ARMS expenditure category "charitable contributions and contributions to other households" and the CE category "cash contributions."[10]

CE and ARMS provide limited opportunities to capture goods and services consumed without private economic transactions—our consumption measure does not include leisure, public goods, or barter. One in-kind transfer captured in the food category for both data sets—at least in concept—is food purchased with food stamps.[11] In addition, ARMS allows us to include for farm households "in-kind farm production for household consumption."

Calculating Per-Person Equivalence Measures

Household consumption is subject to economies of scale, where two (or more) people can attain a given standard of living more cheaply in one household than in separate households. To achieve comparability in the per-person standard of living across households of different sizes, we adjust the household income and consumption measures with an equivalence scale. Following Johnson et al. (2005), we use the single-parameter, constant-elasticity equivalence scale, an approach used more frequently in

[9]The ARMS question eliciting the "all else" measure specifically mentions all of the major categories of consumption in the CE survey included in the "all else" category, including entertainment, apparel, household furnishings and equipment, education, child (or adult) care, personal care and services; the only major categories not mentioned are alcohol, tobacco products, and reading, which represented 1.1 percent, 0.7 percent, and 0.3 percent of U.S. household consumption in 2006.

[10]However, we do not reflect in our measure the fact that some purchases may be given to other households as gifts, or that households may receive in-kind gifts.

[11]Meyer, Mok, and Sullivan (2009) document the under-reporting of transfers in the major U.S. economic data sets, including CE.

international comparisons of inequality (Johnson and Shipp, 1999). This particular scale is given by the square root of family size and indicates that the resources for a two-person household must be 41 percent (and not 100 percent) more than those of a single-person household for the two households to have an equivalent standard of living.

Data Analysis Samples and Descriptive Statistics

Table 3 reports descriptive statistics for the five data samples employed in our analysis. For the two main populations, principal farm operator households and all U.S. households, the primary samples are derived from the 2006 ARMS and CE, respectively. We create three additional sub-samples to support within-survey comparisons. Within CE, we pool observations over 3 years (2005-2007) to create a sample of households that report receiving farm income. Within ARMS, we create two farm household subsamples that vary greatly in their exposure to income variability from self-employment—households operating farms with $100,000 or more in sales and households operating farms with $10,000 or less in sales, in which the principal operator has a primary occupation other than farming (very small rural-residence farms).

Primary Analysis Samples: All Farm Households (ARMS) and All U.S. Households (CE)

Detailed expenditure data are only requested on one of the five ARMS questionnaires; consequently, the sample used to analyze consumption data is a subset (N = 4,683) of the full 5-questionnaire sample (N = 20,342) for 2006. For the consumption analysis, we use CE data (which are collected on a quarterly basis) from 2006. The distributions of demographic and economic variables in the analysis samples used in this section are very similar to those in the larger samples used in the income and wealth analysis (CPS for U.S. households, and the ARMS full sample for farm households), though we highlight below some differences in the income distributions. (See Appendix A for more details on the data sources and the benchmarking of the analysis samples.)

For the CE sample of all U.S. households and the ARMS sample of all farm households, mean values of various demographic and economic characteristics expected to affect the consumption measures are reported in columns 1 and 2 of table 3. Average household size is essentially the same for households of principal farm operators and all U.S. households (2.7 versus 2.5 persons). Not surprisingly, the average age of principal farm operators (57) is greater than for the reference person in CE households (49); however, the average number of farm household members over age 65 is only slightly greater (0.5 versus 0.3 person). Farm operators are much more likely to live in a nonmetro area than all U.S. households (60.6 percent versus 14.6 percent), but have comparable rates of college and post-college education.

Turning to income measures, we observe the familiar pattern of higher household income for farm operator households relative to all U.S. households. However, both analysis samples appear to understate income relative to the larger samples analyzed in table 1. The income distribution for U.S. households is lower in the CE data than the CPS, throughout the distribution

Table 3

Comparison of characteristics for CE and ARMS samples, 2006

Source	CE	ARMS	CE	ARMS	ARMS
Years	2006	2006	2005-2007	2006	2006
	All U.S. consumer units	All U.S. principal farm operator households	Farm consumer units	Households of farms with sales of $100,000 or more	Households of very small rural residence farms
Number of households or consumer units (1,000)	118,843	1,463	1,744	231	503
Sample size	35,832	4,683	1,235	2,538	574
Demographics					
Age of reference person	49	57	55	52	51
Average number of persons in consumer unit:					
Total	2.5	2.7	2.5	3.0	2.9
Children under 18	0.6	0.6	0.5	0.8	0.8
Persons 65 and over	0.3	0.5	0.5	0.2	0.1
Education of reference person:*					
Highest degree completed was:	*Percent*				
Less than high school	14.9	11.7	13.0	7.3	7.8
High school	26.2	39.2	21.2	39.2	34.6
Some college	21.1	23.1	20.8	27.0	24.4
Associates degree	9.7	na	9.8	na	na
College grad (bachelor's) and beyond	28.0	26.0	35.1	26.5	33.3
Nonmetro residence	14.6	60.6	51.9	69.0	54.8
Economics					
	Dollars				
Income before taxes - mean	60,533	75,080	82,879	108,610	81,930
- median	44,616	55,330	63,132	72,476	67,662
Wages & salaries - mean	48,119	40,222	51,367	23,816	67,179
Self-employment income - mean	3,607	17,024	15,879	72,682	6,502
Net nonfarm business income - mean	3,483	11,294	6,245	9,589	14,748
Net farm income - mean	124	5,730	9,634	63,093	-8,245
	Percent				
Wage income share	79.5	53.6	62.0	21.9	82.0
Self-employment income share	6.0	22.7	19.2	66.9	7.9
Negative household income	0.1	5.9	1.5	13.7	na
	Dollars				
Net worth - mean	na	955,708	na	1,636,325	659,501
- median	na	578,650	na	1,140,075	407,734
	Percent				
Household owns residence	67.0	20.4	92.3	22.6	20.6
Farm owns residence	na	77.1	na	73.8	77.0
	Dollars				
Value of residence - household owned	183,212	192,914	303,066	211,664	211,411
Value of residence - farm owned	na	138,089	na	145,342	140,550

Consumer units from the Consumer Expenditure survey are selected for the farm sample if they reported any farm income (positive or negative).
*Asked of reference person in the Consumer Expenditure survey, primary operator in Agricultural Resource Management Survey.
na = indicates data are not available or estimate does not comply with disclosure limitation practices.
Very small rural-residence farms: farms where the principal operator indicates his primary occupation is other than farming, and whose farm has sales of $10,000 or less this year.

Sources: USDA, Economic Research Service using Consumer Expenditure Survey and Agricultural Resource Management Survey, 2006 analysis sample.

(Appendix table A2). The share of total household income from (farm and nonfarm) self-employment received by all households is much higher for farm households (22.7 percent) than for all U.S. households (6.0 percent), as expected.

The CE collects limited information on wealth, but it does report whether the residence is rented or owned by the household and the market value of an owned home. The first critical difference regarding home ownership between the two populations is that three-quarters of farm operator households report they live in a residence owned by the farm. Virtually all of the rest (around 20 percent) report owning their own home, with only 2 percent reporting that they rent their dwelling. In contrast, among all U.S. households, two-thirds report owning their own home and one-third report renting. Market value of homes is comparable across the two groups for households that own their own home. But for those farm households whose home is owned by the farm, the market value of their residence averages 72 percent of homes owned by all U.S. households.

Farm Households (CE)

Within the CE sample of all U.S. households, we create a farm subsample by selecting any household that reported farm income. To get sufficient sample size, we pool CE observations from 2005 to 2007. The resulting sample size of 1,235 includes repeat observations of the same unit (up to four quarters in total). (In its statistical analysis, BLS treats each quarterly observation as independent.) The CE farm sample scales up to a U.S. population of around 1.7 million farm households, about 15 percent short of the USDA's count of 2.0 million principal farm operators. The deficit becomes 23 percent if one takes into account that the CE sample includes households of secondary operators as well.

Differences in demographic and economic characteristics suggest the CE sample is an imperfect proxy for the farm population, as defined by USDA. Household income averages about 10 percent higher in the CE farm sample than in ARMS. The wage/salary share is higher in the CE sample (62.0 percent versus 53.6 percent), while the self-employment share and share with negative household income are lower.

Diversity Within the Farm Sector: Farms with Sales of $100,000+ and Very Small Rural-Residence Lifestyle Farms (ARMS)

We exploit the diversity of the farm sector by comparing two farm household subgroups in ARMS—one that is not much exposed to the risks of self-employment income variability (households operating farms with annual sales of $10,000 or less, with an operator whose primary occupation is other than farming—very small rural-residence farms) and one that is exposed to such risks (households operating farms with annual sales of $100,000 or more).

Though very small rural-residence farms represent about 40 percent of U.S. farms, they produce a negligible portion of total sales. On average, farm income in this group is negative (-$8,245 in 2006). Total household income is a third higher than for all U.S. households, but the shares of income deriving from self-employment income (from farm and nonfarm sources) and from wages and salary are comparable to those of all U.S. households. The share with negative household income cannot be reported due to small sample size, but the estimate is substantially smaller than the overall farm household share (6.0 percent).

In contrast, farms with $100,000 or more in sales represented 16 percent of farms and produced 89 percent of total sales in 2006. On average, the self-employment share of household income (66.9 percent) is three times that of all farm households, and the share with negative household income (13.7 percent) is more than twice that of the average farm household.

Household Expenditure and Consumption Levels

We focus first on farm households, exploring which components contribute most to differences between farm household consumption and expenditures. We then turn to benchmarking the new ARMS measure against the CE measure.

Comparing Expenditure and Consumption Measures for Farm Households

Table 4 reports and figure 2 illustrates estimated means for components of expenditures and consumption for farm and all U.S. households. We consider first the farm household indicators. At the aggregate level, mean farm household consumption ($42,368) is 14 percent higher than mean farm household expenditures ($37,288). Similarly, on a per-person basis, mean equivalent-consumption ($27,141) is also 14 percent higher than mean equivalent-expenditures ($23,810).

The largest difference between farm expenditures and consumption is attributable to the housing component. The ARMS expenditure measure is substantially lower than consumption because three-quarters of farm households

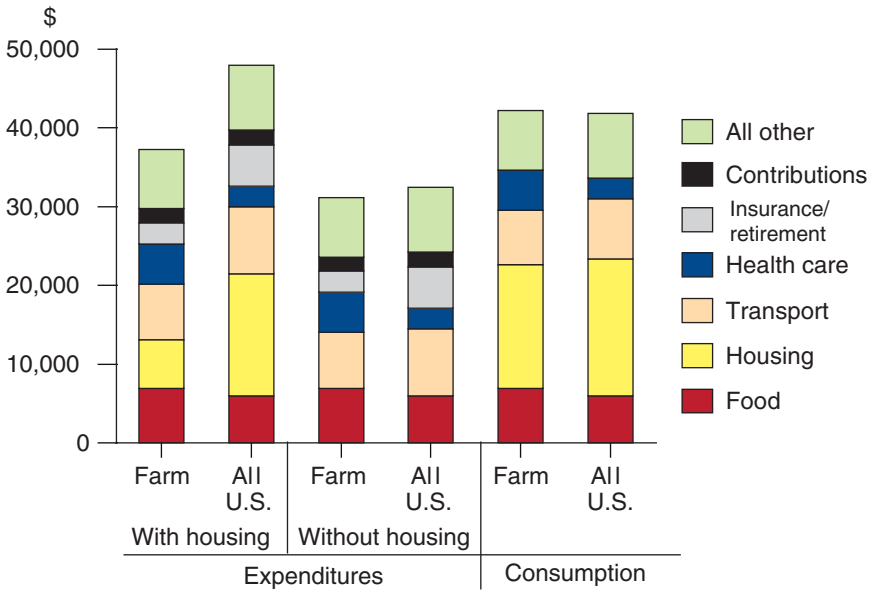
Table 4
Comparison of mean household expenditures and consumption by component, across farm operator and all U.S. households, 2006

	Farm households (ARMS)				All U.S. households (CE)			
	Expenditures		Consumption		Expenditures		Consumption	
Category	$	%	$	%	$	%	$	%
Food	6,968	18.7	6,968	16.4	6,003	12.5	6,003	14.3
Housing (total)	6,137	16.5	15,658	37.0	15,504	32.3	17,380	41.5
Shelter services	1,472	3.9	10,993	25.9	11,187	23.3	13,063	31.2
Operating expenses	4,665	12.5	4,665	11.0	4,317	9.0	4,317	10.3
Transport (total)	7,091	19.0	6,919	16.3	8,472	17.7	7,608	18.2
Vehicle services	3,414	9.2	3,242	7.7	4,411	9.2	3,547	8.5
Operating expenses	3,677	9.9	3,677	8.7	4,061	8.5	4,061	9.7
Health care (total)	5,097	13.7	5,097	12.0	2,609	5.4	2,609	6.2
Health/dental insurance (household share)	2,991	8.0	2,991	7.1	1,465	3.1	1,465	3.5
Out-of-pocket medical care expenditures	2,106	5.6	2,106	5.0	1,143	2.4	1,143	2.7
Personal insurance and retirement plans	2,690	7.2	--		5,270	11.0	--	
Contributions (outside of household)	1,756	4.7	--		1,869	3.9	--	
All other	7,549	20.2	7,549	17.8	8,252	17.2	8,252	19.7
Home consumption of farm produce	--		177	0.4	--		--	
TOTAL (mean)	37,288	100	42,368	100	47,979	100	41,852	100
TOTAL (median)	29,770		36,000		35,959		35,159	
TOTAL- per-person-equivalent (mean)	23,810		27,141		32,270		28,137	
TOTAL- per-person-equivalent (median)	19,320		23,092		24,409		24,001	

* Though the CE accounting does not count mortgage principal as an expenditure (but rather as a change in household assets), we do count it as an expenditure in our accounting here.
Sources: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006, and Consumer Expenditure Survey, 2006.

Figure 2

Average expenditures and consumption, by component, of farm operator and all U.S. households, 2006



Source: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006, and Consumer Expenditure Survey, 2006.

report they live in a residence owned by the farm, and so incur no outlays for shelter. Because the consumption measure includes a value for housing shelter services for that group, the average value of housing shelter services jumps to $10,993 from an average expenditure value of $1,472, and the value of total housing (which also includes operating costs) increases from $6,137 in mean expenditures to $15,658 in mean consumption. This adjustment raises total farm household expenditures by 26 percent.

Replacing current outlays for vehicle purchases with estimated vehicle services made little difference on the aggregate level, resulting in a reduction relative to total expenditures of less than 0.5 percent. On the individual level, however, consumption is lower than expenditures for those who purchased vehicles in 2006, and higher for those who did not.

Including the market value of farm production for household consumption adds less than 1 percent to the consumption estimate. (The value of food purchased with food stamps, another in-kind source, cannot be distinguished from other food expenditures.) The deductions of (1) retirement savings and life/disability insurance and (2) contributions to individuals outside the household represent 7.2 percent and 4.7 percent of total expenditures, respectively (table 4).

Benchmarking Farm Household (ARMS) Estimates With All U.S. Household (CE) Estimates

Figure 2 illustrates the expenditure and consumption measures, by component, for both farm and all U.S. households. The CE estimated mean household expenditures for all U.S. households are close to 30 percent higher than the ARMS estimated mean for farm households; however, if we exclude housing from the measure, U.S. household expenditures are essentially the same as farm household expenditures.

The estimates of mean household consumption are quite similar for the two populations ($42,368 for farm versus $41,852 for all U.S. households). The per-person equivalent-consumption estimates are $27,141 for farm versus $28,137 for all U.S. households.

The shares of consumption/expenditures accounted for by health care and food are higher for farm households than for all U.S. households; the shares spent on housing and "all else" are lower, with transport shares essentially the same. The absolute size of the differences in consumption levels between farm and all U.S. households is greatest for health care (+$2,488), followed closely by housing (-$1,744). The major difference in housing is in "shelter services," which reflects the lower housing values in nonmetro areas (Jolliffe, 2006), where farm households are much more prevalent. Higher health care expenditures among farm households are consistent with findings in other studies using alternative farm household data sets (Access Project, 2007).[12]

[12]A recent study compared health expenditure data from ARMS for farm households with data from the Medical Expenditure Panel Study for all U.S. households, which allows for more detailed decomposition of the differences (Jones et al., 2009). Health expenditures tend to be higher for all types of insurance coverage (including lack of insurance) among farm households compared to all U.S. households; however, the predominant source of the difference is the larger share of nonelderly farm households holding private direct-purchase insurance (17.9 percent for farm households versus 6.5 percent for all U.S. households), the type with the highest average household health expenditures ($7,389 for all U.S. households compared to $9,110 for farm households).

The Relationship Between Household Consumption and Income

In this section, we assess whether the relationships between income and consumption for farm and all U.S. households are consistent with the prediction that households exposed to greater income variability will smooth consumption from current income more than households with more stable income over time. The first test is to compare the patterns of average equivalent-consumption to average equivalent-income across equivalent-income categories. We first compare the patterns for all U.S. versus all farm households. To assess the reasonableness of the ARMS results, we compare the patterns in consumption shares (food, health, etc.) by type across the income categories. Subsequently, to avoid the noise introduced into the comparison as a result of using two different surveys with different elicitation approaches for expenditures, we conduct in-survey comparisons within CE and ARMS.

The second test will compare the consistency of individual household rankings (by quintile in the distributions) for consumption and for income, among farm households versus all U.S. households.

Propensity To Consume From Current Income: Farm Versus All U.S. Households

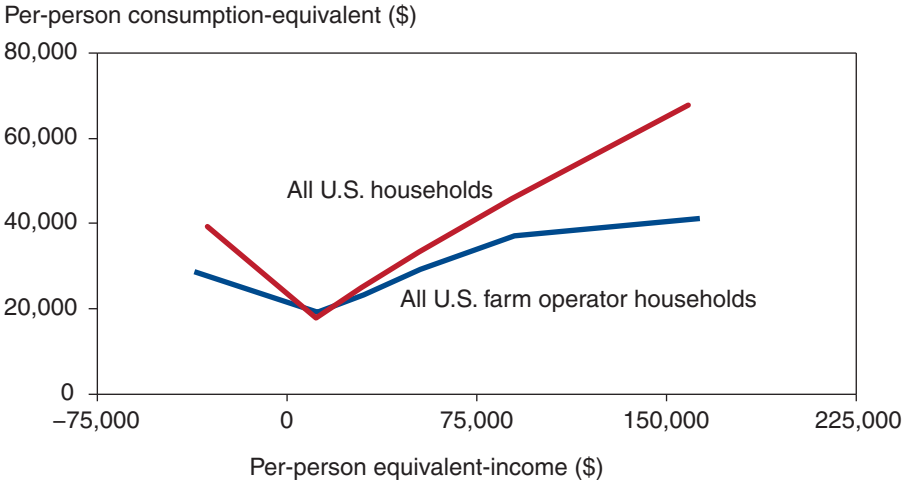
ARMS Farm Households and CE All U.S. Households

We first explore the hypothesis that farm households budget or moderate consumption to a greater extent than all U.S households, analyzing data from the best sources for each population—ARMS for farm households, and CE for all U.S. households. To do this, we split households in each population into six equivalent-income categories. Figure 3 illustrates the value of mean equivalent-consumption associated with mean equivalent-income for each population. Table 5 reports the values, along with additional economic data to provide insight into the extent of income risk-bearing and wealth (to support spending) within the category.

The lowest equivalent-income category is for households with negative household income—where self-employment losses exceed other sources of income. (By separating this group out, the interpretation of shares of income from wages or self-employment income is much cleaner.) The income shocks typically needed to generate negative household income are likely transitory, so we expect that permanent income may be substantially higher for households with negative current income. For example, nearly 6 percent of farm households had negative income in 2006 (compared to 0.2 percent for all U.S. households), but their average household net worth of $1.3 million is comparable to farm households with equivalent-income of $70,000-$124,999 (table 5). The average share that self-employment provides of total household income is negative in the second income category ($1-$19,999) for farm households, but increases to over 50 percent in the top two income groupings ($125,000-$224,999 and $225,000 and above).

Figure 3

Average propensity to consume, by equivalent-income class, of farm operator (ARMS) and all U.S. households (CE), 2006



Note: For the two population groups, each point represents the mean equivalent-income, equivalent-consumption pair for the following equivalent-income categories: (<$0, $1-19,999, $20,000-$39,999, $40,000-$69,999, $70,000-124,999, and $125,000-224,999). See table 5 for data.

Source: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006, for farm households and using Consumer Expenditure Survey, 2006, for all U.S. households.

As expected, the ratio of consumption to income decreases as income increases for both farm households and all U.S. households. Also as expected, the flatter consumption-income relationship for farm households illustrates their lower propensity to increase consumption with higher income in a given year, in order to accommodate greater income variability from year to year.

Our expectation is that, when income is unexpectedly low, farm households will be less inclined to cut back essentials such as food compared to similar households with more stable income, and when income is unexpectedly high, they will be less inclined to expand discretionary purchases. To assess whether we observe such behavior, we also report—for each equivalent-income category—the consumption shares for the five consumption components. We expect food shares will decline and "all else" shares will increase with income, except for the group with negative household income—we anticipate this group has positive and substantially higher permanent income, and so will display patterns comparable to a higher equivalent-income category.

The trends across income levels in consumption shares by type are comparable in the two populations: consumption shares for food, housing, health care—and for farm households, home consumption—basically decrease as income grows; shares for transportation increase until the upper tail of the distribution, where they decrease; and shares of "all else" increase across income levels. Households with negative household income are an exception to the pattern. For the most part, shares of "all else" consumption are lower for farm households; however, the rates of increase in the shares are the same for farm and all U.S. households. From the lowest (positive) to the highest income category,

Table 5

Average propensity to consume by income-equivalent categories, farm operator households and all U.S. households, 2006 (2005-2007)

Category	*<$0*	*$1-19,999*	*$20,000 - $39,999*	*$40,000 - $69,999*	*$70,000 - $124,999*	*$125,000 - $224,999*	*$225,000+*	*All*
Farm operator households, 2006 (ARMS)								
Percent of farm households	5.7	21.1	29.9	26.2	12.1	3.1	1.8	100.0
Cumulative percent of farm households	5.7	26.9	56.8	83.0	95.1	98.2	100.0	
Wage/salary income share	-18%	63%	66%	61%	53%	36%	17%	54%
Self-employment income share	127%	-17%	2%	15%	31%	49%	70%	23%
Household net worth—mean ($)	1,301,351	676,170	710,745	949,645	1,287,517	1,978,061	3,291,686	955,708
Est. market value of home (household or farm owned) ($)	151,561	109,859	126,395	155,384	184,343	232,155	325,531	145,697
Equivalent-income—mean ($)	-36,892	12,266	30,469	52,389	90,072	163,418	476,074	48,019
Equivalent-consumption—mean ($)	28,869	19,257	23,228	29,154	37,220	41,235	57,482	27,141
Equiv-C (mean)/Equiv-Y(mean)	-0.78	1.57	0.76	0.56	0.41	0.25	0.12	0.57
Equivalent-consumption shares:								
Food	17%	19%	17%	16%	15%	14%	11%	16%
Housing	38%	39%	37%	37%	36%	36%	33%	37%
Transport	12%	14%	16%	18%	19%	14%	17%	16%
Health care	15%	13%	13%	11%	10%	14%	11%	12%
All else	17%	14%	17%	18%	19%	22%	28%	18%
Home consumption of farm produce	0.8%	0.7%	0.5%	0.3%	0.2%	0.2%	0.2%	0.4%
All U.S. households, 2006 (CE)								
Percent of U.S. households	0.2	32.0	31.5	23.4	10.1	2.3	0.5	100.0
Cumulative percent of U.S. households	0.2	32.2	63.7	87.1	97.1	99.5	100.0	
Wage/salary income share	-56%	57%	78%	85%	85%	79%	66%	79%
Self-employment income share	152%	1%	3%	5%	7%	11%	23%	6%
Est. market value of owned home ($)	396,374	77,605	144,668	230,244	407,460	555,752	805,280	183,212
Equivalent-income—mean ($)	-31,548	11,458	29,336	51,981	88,888	158,556	352,918	39,558
Equivalent-consumption—mean ($)	39,254	17,815	24,981	33,297	45,909	67,759	95,292	28,137
Equiv-C (mean)/Equiv-Y(mean)	-1.24	1.55	0.85	0.64	0.52	0.43	0.27	0.71
Equivalent-consumption shares:								
Food	13%	16%	15%	14%	12%	11%	9%	14%
Housing	40%	46%	43%	41%	40%	37%	38%	42%
Transport	19%	15%	19%	20%	18%	16%	14%	18%
Health care	5%	7%	7%	6%	5%	5%	5%	6%
All else	24%	16%	17%	20%	24%	32%	33%	20%
Farm operator households, 2005-2007 (CE)								
Percent of farm households	na	10.6	29.7	36.1	16.1	4.2	na	100.0
Cumulative percent of farm households	na	12.1	41.9	78.0	94.1	98.4	na	
Wage/salary income share	na	71%	66%	62%	66%	49%	na	56%
Self-employment income share	na	7%	17%	23%	14%	29%	na	19%
Est. market value of owned home ($)	na	179,087	268,459	253,253	428,231	564,791	na	303,066
Equivalent-income—mean ($)	na	12,398	29,857	51,795	91,752	159,271	na	54,523
Equivalent-consumption—mean ($)	na	20,993	24,336	29,296	43,649	55,733	na	31,469
Equiv-C (mean)/Equiv-Y(mean)	na	1.69	0.82	0.57	0.48	0.35	na	0.58
Equivalent-consumption shares:								
Food	na	15%	14%	14%	14%	10%	na	15%
Housing	na	35%	35%	37%	33%	34%	na	42%
Transport	na	21%	20%	21%	19%	17%	na	18%
Health care	na	9%	11%	10%	9%	7%	na	6%
All else	na	19%	20%	19%	26%	32%	na	20%

Sources: USDA, Economic Research Service using Agricultural Resource Management Survey and Consumer Expenditure Survey.

"all else" shares double from 14 percent to 28 percent for farm households and from 16 percent to 33 percent for all U.S. households (table 5).

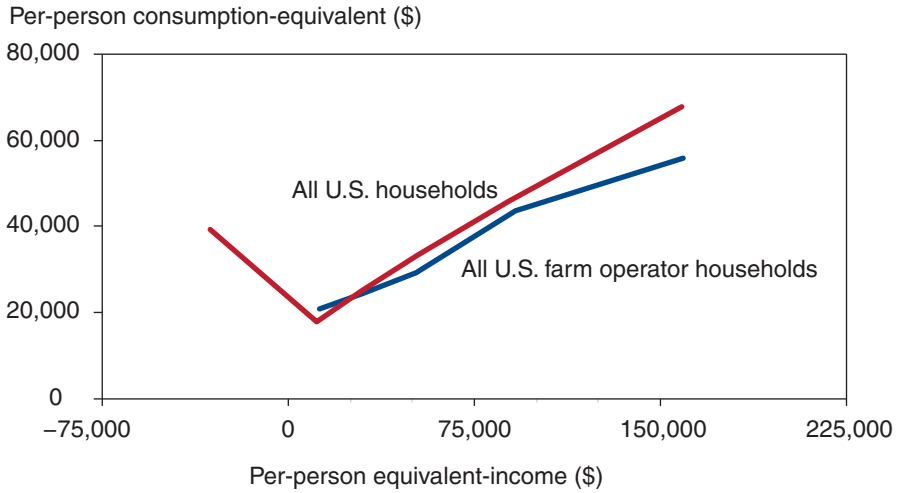
CE Farm Households and CE All U.S. Households

Farm households retain a flatter consumption-income relationship (than all U.S. households) when measured with CE data (fig. 4), though the line is not as flat as with ARMS data (fig. 3). This pattern is consistent with expectations, given that, in the two highest income categories, the self-employment income shares for CE farm households are about half that of ARMS farm households (14 and 29 percent for CE farm households versus 31 and 49 percent for ARMS farm households). Less dependent on self-employment income, CE farm households are more likely to have more stable income.

Consumption shares for farm households relative to all U.S. households in the CE data are consistent with ARMS for some commodities (housing is again lower and medical care higher for CE-farm households than for CE-all U.S. households), but diverge for others (the food share is lower and the "all else" share is higher for CE-farm households). Also, the patterns in CE farm consumption shares appear more random, attributable in part to the small sample sizes for individual income categories. Still, as elsewhere, food shares tend to decline with income and "all else" shares tend to increase.

Given the small sample sizes and presumed differences in risk exposure between cohorts, it seems unwarranted to interpret the differences between the CE and ARMS farm households as indicating understatement of con-

Figure 4
Average propensity to consume, by equivalent-income class, of farm operator households (CE) and all U.S. households (CE), 2005-2007



Note: For the two population groups, each point represents the mean equivalent-income, equivalent-consumption pair for the following equivalent-income categories:(<$0, $1-19,999, $20,000-$39,999, $40,000-69,999, $70,000-124,999, and $125,000-224,999). Sample size is insufficient to report the <$0 category for U.S. farm households. See table 5 for data.

Source: USDA, Economic Research Service using Consumer Expenditure Survey, 2006 for all U.S. households and 2005-2007 for all U.S. farm households.

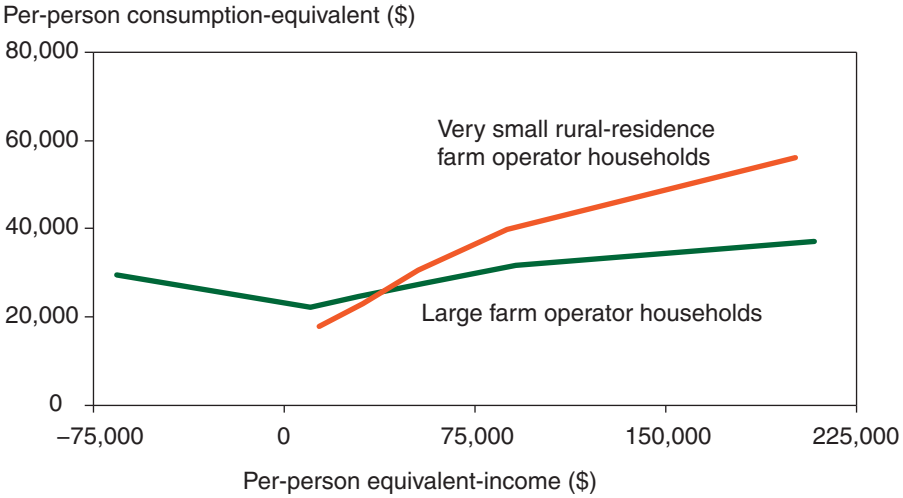
sumption levels at the upper end of the income distribution. At the same time, we are unable to rule out such measurement error.

Propensity To Consume From Current Income: Households of Farms with Sales of $100,000+ Versus Households of Very Small Rural-Residence Farms

We exploit the diversity of the farm sector by comparing two farm household subgroups in ARMS—one that is not much exposed to the risks of self-employment income variability (very small rural-residence farms) and one that is (farms with annual sales of $100,000 or more). For households of large farms, equivalent-income is higher on average, but is also more dispersed: it is more likely to be negative and is more likely to be above $225,000 (table 6). As expected, households operating these large farms have a lower propensity to consume from current income than households operating very small rural-residence farms (fig. 5).

We again report shares for the five components of consumption. Perhaps due to the smaller sample size, the patterns are less clear than with all farm households. The strongest trends are consistent with our predictions: the food share declines with income and the "all else" share increases with income (with one income category out of the pattern for each household type).

Figure 5
Average propensity to consume, by equivalent-income class, by households of large farm operators and of very small farm operators (ARMS), 2006



Note: For the two population groups, each point represents the mean equivalent-income, equivalent consumption pair for the following equivalent-income categories: (< $0, $1-$19,999, $20,000-$39,999, $40,000-$69,999, $70,000-$124,999, $125,000-$224,999). There is insufficient sample size to report the < $0 and $225,000 + categories for very small rural-residence farm households. See table 6 for data.

Definitions: **Large farms**: farms with sales of $100,000 or more. **Very small rural-residence farms:** farms where the principal operator indicates his primary occupation is other than farming, and whose farm has sales of $10,000 or less this year.

Source: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006.

Table 6

Average propensity to consume of households of farm operators of $100,000+ sales versus very small rural-residence farms, by equivalent-income groups, 2006

Both income and consumption measures are reported in equivalent form.

Income-equivalent classes:	*<$0*	*$1-19,999*	*$20,000 - $39,999*	*$40,000 - $69,999*	*$70,000 - $124,999*	*$125,000 - $224,999*	*$225,000+*	*All*
Farms with sales of $100,000 or more:								
Percent of households	13.7	14.0	21.1	21.5	16.7	9.8	3.3	100.0
Cumulative percent of households	13.7	27.7	48.8	70.3	87.0	96.7	100.0	
Wage/salary income share	-14%	76%	41%	32%	19%	11%	3%	22%
Self-employment income share	119%	-8%	44%	58%	70%	82%	91%	67%
Household net worth—mean ($)	1,648,679	1,352,141	1,116,385	1,370,141	1,868,172	2,709,479	3,528,134	1,636,325
Est. market value of home (household or farm owned ($)	152,443	132,302	130,615	146,003	164,529	227,143	235,344	155,155
Equivalent-income—mean ($)	-65,996	10,443	29,308	55,068	91,296	208,431	682,774	68,229
Equivalent-consumption—mean ($)	29,477	22,359	24,673	27,646	31,776	37,256	39,465	28,540
Equiv-C (mean)/Equiv-Y(mean)	-0.45	2.14	0.84	0.50	0.35	0.18	0.06	0.42
Equivalent-consumption shares:								
Food	17%	17%	16%	20%	16%	15%	13%	17%
Housing	34%	36%	35%	34%	35%	38%	37%	35%
Transport	14%	11%	15%	14%	15%	13%	14%	14%
Health care	14%	16%	14%	14%	11%	13%	10%	14%
All else	19%	18%	19%	17%	22%	20%	25%	20%
Home consumption of farm produce	1%	2%	1%	1%	1%	0%	0%	1%
Very small rural-residence farms:								
Percent of households	na	14.7	33.4	32.0	15.3	3.1	na	100.0
Cumulative percent of households	na	14.7	48.1	80.1	95.4	98.5	na	
Wage/salary income share	na	100%	99%	85%	76%	66%	na	82%
Self-employment income share	na	-8%	-9%	6%	16%	26%	na	8%
Household net worth--mean ($)	na	464,763	447,771	662,464	991,548	1,832,898	na	659,501
Est. market value of home (household or farm owned) ($)	na	111,941	123,505	148,897	201,209	267,634	na	151,791
Equivalent-income—mean ($)	na	13,950	30,751	52,683	87,515	200,748	na	51,331
Equivalent-consumption—mean ($)	na	17,860	23,165	30,624	39,860	56,129	na	28,763
Equiv-C (mean)/Equiv-Y(mean)	na	1.28	0.75	0.58	0.46	0.28	na	0.56
Equivalent-consumption shares:								
Food	na	22%	19%	16%	15%	15%	na	17%
Housing	na	39%	35%	36%	37%	28%	na	36%
Transport	na	14%	17%	19%	23%	20%	na	19%
Health care	na	9%	10%	10%	9%	7%	na	10%
All else	na	16%	18%	19%	16%	31%	na	18%
Home consumption of farm produce	na	0%	0%	0%	0%	0%	na	0%

Notes: To take account of differences in household size and economies of scale in standard of living, we adjust total household income and total household consumption by an equivalence scale (the square root of household size).
Definitions: **Large farms**: farms with sales of $100,000 or more. **Very small rural-residence farms**: farms where the principal operator indicates his primary occupation is other than farming, and whose farm has sales of $10,000 or less this year.
Median per-person equivalent-income is $40,493 for very small rural residence farms, and $42,103 for $100,000+ sales farms in this sample.
na = insufficient sample to report.

Source: USDA, Economic Research Service using ARMS analysis sample, 2006.

Consistency in Household Ranks in Income and Consumption Distributions

The lack of a close mapping between current income and consumption measures for farm households compared to all U.S. households can be attributed to the greater discrepancy they experience between permanent income and current income. As such, current income is a weaker proxy for current standard of living for farm (and other self-employed households) than for all U.S. households.

The two-way distributions in table 7 were inspired by the earlier work of Rogers and Gray (1994), who compared quintiles of income to quintiles of outlays for all U.S. households using 1992 CE data. If current income were a good predictor of consumption, we would expect households to be concentrated along the diagonals, where the household quintile ranking in the consumption distribution matches its ranking in the income distribution; alternatively, if the two were uncorrelated, a random distribution would suggest 20 percent in each cell in the income row.

Equivalent-income and equivalent-consumption quintiles: For U.S. households, the diagonal cells have the largest share of households along each row in the income-consumption table. The effect is strongest for the first and fifth quintiles: notably, 58 percent of households in the lowest income quintile are in the lowest consumption quintile, and 56 percent of households in the highest income quintile are in the highest consumption quintile. The other diagonal cells have about one-third of their row totals.

Table 7

Two-way distributions of household well-being measures by quintiles, 2006

Farm operator households					
Equivalent income quintiles	Equivalent-consumption quintiles				
	20	**40**	**60**	**80**	**100**
20	38	23	12	14	13
40	28	22	27	13	10
60	18	26	22	23	10
80	7	17	25	23	28
100	8	11	15	27	38

All U.S. households					
Equivalent income quintiles	Equivalent-consumption quintiles				
	20	**40**	**60**	**80**	**100**
20	58	21	10	7	5
40	27	32	22	12	7
60	11	29	29	20	11
80	3	15	28	33	21
100	1	3	11	28	56

Income quintiles	Household net worth quintiles				
	20	**40**	**60**	**80**	**100**
20	25	22	18	20	15
40	28	23	23	12	14
60	19	25	22	21	13
80	19	17	23	21	20
100	10	13	14	25	38

Notes: Each row and each column sums to 100 percent (except due to rounding error).

Sources: USDA, Economic Research Services using Consumer Expenditure Survey, 2006, and Agricultural Resource Management Survey, 2006 analysis sample.

Farm households are more likely to be off-diagonal. For example, among farm households, those in the lowest income quintile are much more likely to be in one of the three highest consumption quintiles than is evident for all U.S. households (39 percent of farm versus 22 percent of all U.S. households). Analogously, farm households in the highest income quintile are much more likely to be in the three lowest consumption quintiles (34 percent of farm versus 15 percent of all U.S. households).

Income-wealth quintiles: The final two-way comparison in table 7 is income versus net worth quintiles for farm households. The divergence in ranking between income and wealth is particularly strong for those in the first income-quintile (53 percent of which are in the top three wealth quintiles). This is consistent with households that operate commercial farms with an extensive asset base experiencing large income dips in a given year.

In sum, the extensive divergence in quintile ranking between income and consumption indicates that current farm household income is more variable than the long-term, or permanent, household income that drives consumption. Since wealth provides a source of assets to draw down or to borrow against during temporary income shortfalls, the even stronger pattern of divergence between income and wealth quintiles for farm households further supports this inference.

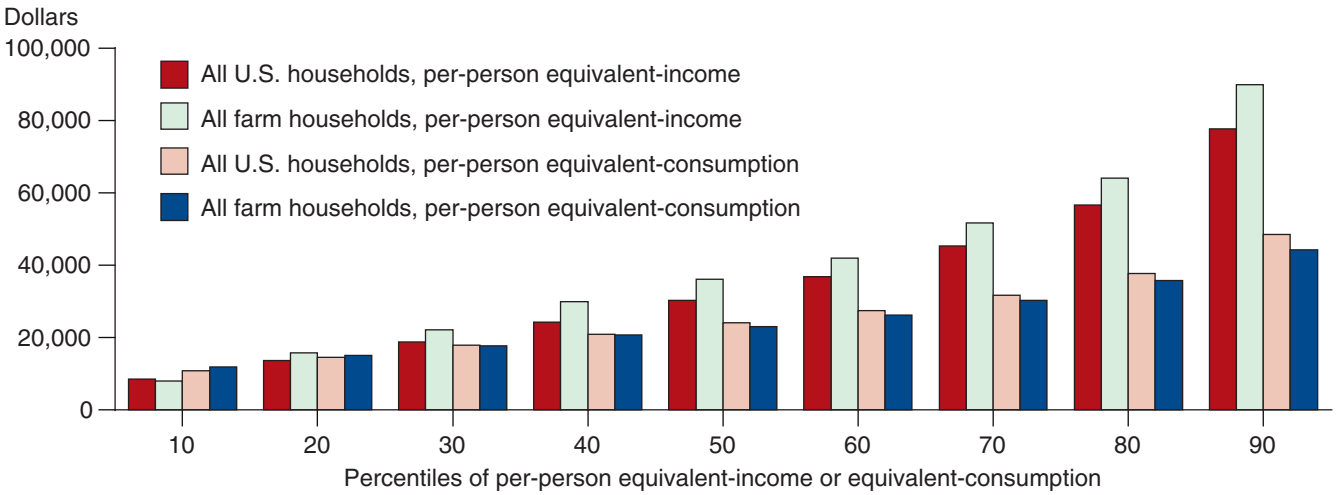
Relative Well-Being of Farm and All U.S. Households, as Indicated by Income and Consumption

Household income of farm households, compared to all U.S. households, is higher at the mid-point of the distribution, but also is more dispersed—lower at the low end of the distribution and higher at the high end; as a result, farm household income is higher at all deciles but the first, compared to all U.S. households (fig. 6). Farm households also have a lower tendency to increase consumption as income increases than do all U.S. households. What, then, is the net effect of these countervailing patterns on the distribution of consumption levels in the two populations?

To illustrate the different perspectives on relative well-being of farm and all U.S. households afforded by income and consumption measures, table 8 presents the values at each decile of the income and consumption distributions for the two populations. As a benchmark for the income data in the smaller consumption-analysis samples, column 1 of table 8 reports the value of equivalent-income at each decile, using CPS for all U.S. households and the full ARMS sample (with data from all five survey versions) for farm households. Columns 2 and 3 report the values at the deciles of equivalent-income and equivalent consumption, respectively, using the CE (for all U.S. households) and the ARMS (for all farm households) consumption-analysis samples.

Comparing the distribution of equivalent-income in columns 1 and 2 indicates that the ARMS consumption-analysis sample understates farm household income (relative to the full ARMS sample) at the 90th percentile and the CE income distribution understates all U.S. household income (relative to CPS) throughout the distribution. As a result, the farm household dominance in household income appears even greater in column 2 relative to column 1, except at the 80th and 90th percentiles.

Figure 6
Values of household equivalent-income and equivalent-consumption at decile cut-points, all farm and all U.S. households, 2006



Source: USDA, Economic Research Service using Agricultural Resource Management Survey 2006, and Consumer Expenditure Survey, 2006.

Table 8

Distributions of household equivalent-income and equivalent-consumption, 2006

Farm operator households	1	2	3
	ARMS full sample	ARMS analysis sample	
	Per-person equivalent-income		*Per-person equivalent consumption*
Mean	$51,878	$48,060	$27,141
Decile maximum			
10	$6,691	$8,060	$11,866
20	$15,405	$15,710	$15,037
30	$22,339	$22,098	$17,645
40	$29,397	$29,840	$20,720
Median 50	$35,560	$36,117	$23,092
60	$41,911	$41,936	$26,267
70	$53,007	$51,626	$30,214
80	$70,035	$64,114	$35,779
90	$107,390	$89,795	$44,250
	Ratio		
80:20	4.55	4.08	2.38
90:10	16.05	11.14	3.73
	Percent		
Poverty rate per person*	14.4	13.8	7.8
All U.S. households	1	2	3
	CPS	CE analysis sample	
	Per-person equivalent-income		*Per-person equivalent consumption*
Mean	$43,227	$39,558	$28,137
Decile maximum			
10	$9,384	$8,440	$10,886
20	$14,962	$13,729	$14,589
30	$20,162	$18,777	$17,868
40	$25,786	$24,288	$20,886
Median 50	$32,067	$30,281	$24,001
60	$39,659	$36,902	$27,420
70	$48,988	$45,334	$31,727
80	$61,327	$56,564	$37,626
90	$84,400	$77,610	$48,434
	Ratio		
80:20	4.10	4.12	2.58
90:10	8.99	9.20	4.45
	Percent		
Poverty rate per person*	12.3	11.8	9.2

Notes. For comparability across households of different sizes, we report per person equivalent-income and equivalent-consumption, where income and consumption have been adjusted for household size.

*Analogous to the procedure for individual income poverty, individuals are determined to be in consumption poverty by comparing their total household consumption against the official census poverty threshold used for income poverty. The census threshold incorporates an alternative equivalency adjustment for household size to the one employed in this study.

Sources: USDA, Economic Research Service using Consumer Expenditure Survey, 2006, and Agricultural Resource Management Survey, 2006 analysis sample.

In column 3, we see that the net effect of predominantly higher income, but a lower propensity to consume as income increases, is that the farm household distribution of consumption is very similar to that for all U.S. households. The similarities are strongest for the 30th, 40th, and 50th percentiles of the distribution. At the tails of the distributions, the pattern appears to be reversed from that of the income distribution: farm households appear better off at the low end of the distribution and worse off at the high end of the distribution, relative to all U.S. households.

We need to qualify the results at the upper end of the distribution because we are not able to rule out the possibility that measurement error could understate consumption levels at the upper end; in addition, there is attrition from the sample of the highest-income farm households, resulting in lower income at the 90th percentile.

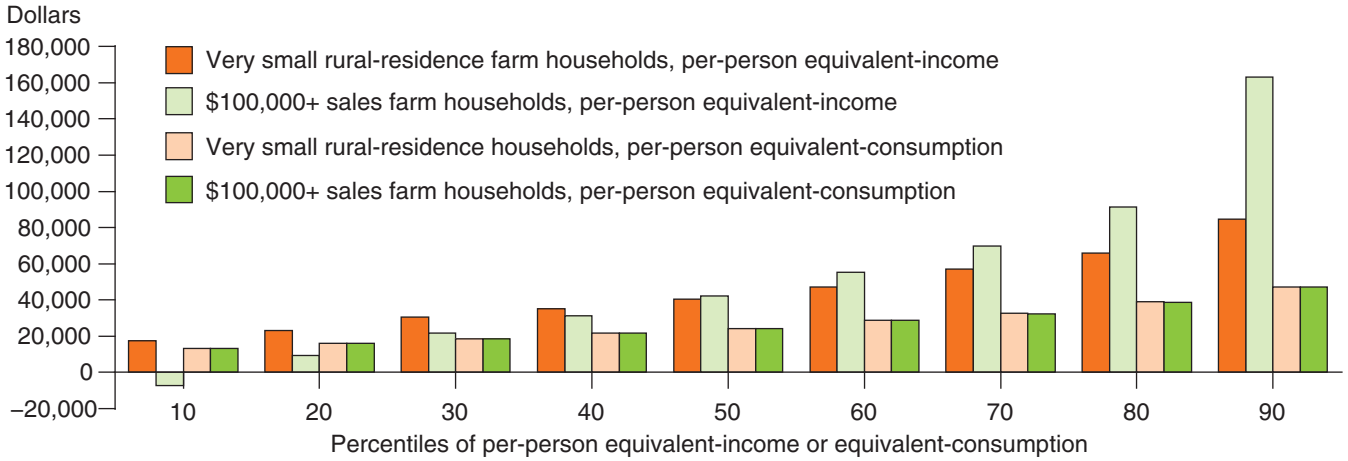
Our final indicator of well-being focuses on the low end of the distribution—income and consumption poverty rates. A convention in the literature is to calculate consumption poverty by comparing a household's consumption level to the census poverty threshold for the composition of that household, used to determine official income-based poverty rates. If consumption is a better indicator of standard of living for households where money income is less predominant as a resource and/or where income is highly variable across years, then consumption poverty may be a better measure of economic disadvantage than the official census income-based measure (Jorgenson, 1998; Meyers and Sullivan, 2003; Slesnick, 2001). The census poverty threshold incorporates an adjustment for household size (including age composition), one that is different from the equivalency measure employed in our data analysis. Consequently, poverty rates are calculated on total income and total consumption measures.

For the farm population (based on the ARMS analysis sample), poverty drops from 13.8 percent (14.4 percent in full ARMS sample) based on the official census income-poverty measure to 7.8 percent for the consumption-poverty measure. For all U.S. households (based on the CE analysis sample), poverty drops from 11.8 percent (12.3 percent in CPS) based on the official Census income-poverty measure to 9.2 percent for the consumption-poverty measure. Whereas farm households have a higher income-poverty rate, they have a lower consumption-poverty rate than all U.S. households.

In table 9 and figure 7, we report the per-person equivalent-income and equivalent-consumption distributions for households operating $100,000+ sales farms and very small rural-residence farms, two farm household subgroups that differ substantially in the extent of exposure to income variability from self-employment. Per-person equivalent-income is much more dispersed for households operating the larger farms than for households operating the very small farms, a pattern that affects both tails of the distribution: the larger-farm household income is lower at the low end of the distribution (indeed negative until the 14th percentile compared to below the 2nd percentile for the very small farms), and higher at the high end of the distribution. However, the propensity to consume is sufficiently lower among the larger-farm households that the consumption distributions are very similar. Analogously, the income-poverty rates are quite divergent (22 percent for $100,000+ sales farms versus 7 percent for very small rural-residence farms), but the consumption-poverty rates are roughly 6 percent for both groups.

Figure 7

Values of equivalent-income and equivalent-consumption at decile cut-points, households of very small rural-residence and $100,000+ sales farm operators, 2006



Source: USDA, Economic Research Service using Agricultural Resource Management Survey 2006, and Consumer Expenditure Survey, 2006.

To further understand the relative well-being of farm households, it is also instructive to compare all U.S. households (table 8, figure 6) with the subgroup of large-farm households (table 9, figure 7). Though large family farms (farms with sales of $100,000 or more) represent only 16 percent of farms, they produced 89 percent of total farm sales in 2006. At the low end of the income and consumption distributions, large-farm households have substantially lower equivalent-income, but higher equivalent-consumption, than the population of all family-farm households—which further increases the farm-all U.S divergence on the two measures. The differences at the low end are reflected in the poverty rates: income poverty is 22 percent among persons living in large-farm households, compared to 14 percent for persons in all farm households and 12 percent for all U.S. households; whereas consumption-poverty is 6 percent for persons living in large-farm households, compared to 8 percent in all farm households and 9 percent in all U.S. households.

At the high end of the income and consumption distributions, large-farm households have substantially higher equivalent-income, but—due to their higher exposure to income risk and their lower marginal propensity to consume—only slightly higher equivalent-consumption than all family-farm households. As a result, at the upper end of the consumption distribution, the consumption levels of large-farm households are very similar to those of all U.S. households.

Table 9

Distributions of household equivalent-income and equivalent-consumption, 2006

Farm operator households	1	2	3
Farms with sales of $100,000 or more	Full sample	Analysis sample	
	Per-person equivalent-income		*Per-person equivalent consumption*
Mean	$79,124	$68,229	$28,540
Decile maximum			
10	-$14,209	-$7,400	$13,526
20	$9,479	$9,486	$16,417
30	$22,981	$21,564	$19,528
40	$34,640	$31,204	$21,526
Median 50	$46,694	$42,103	$24,893
60	$60,670	$55,233	$28,023
70	$79,066	$69,910	$31,704
80	$111,591	$91,325	$37,346
90	$182,642	$163,136	$45,531
	Ratio		
80:20	11.77	9.63	2.27
90:10	-12.85	-22.05	3.37
	Percent		
Poverty rate per person*	22.1	21.7	5.8
Farm operator households	1	2	3
Very small rural-residence farms	Full sample	Analysis sample	
	Per-person equivalent-income		*Per-person equivalent consumption*
Mean	$51,530	$51,331	$28,763
Decile maximum			
10	$15,710	$17,440	$13,117
20	$22,066	$23,115	$16,127
30	$28,807	$30,572	$18,573
40	$33,404	$35,284	$21,873
Median 50	$37,528	$40,493	$24,275
60	$42,866	$47,178	$28,681
70	$51,970	$57,004	$32,497
80	$65,151	$66,052	$38,627
90	$90,478	$84,512	$47,274
	Ratio		
80:20	2.95	2.86	2.40
90:10	5.76	4.85	3.60
	Percent		
Poverty rate per person*	7.3	6.9	6.1

Notes. For comparability across households of different sizes, we report per-person equivalent-income and equivalent-consumption, where income and consumption have been adjusted for household size.

*Analogous to the procedure for individual income poverty, individuals are determined to be in consumption poverty by comparing their total household consumption against the official census poverty threshold used for income poverty. The census threshold incorporates an alternative equivalency adjustment for household size to the one employed in this study.

Sources: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006 analysis sample.

Conclusions

ERS publishes indicators of economic well-being for farm operator households. To date, the focus has been on income- and wealth-based measures calculated from the annual survey of farm households conducted by USDA (ARMS). In this report, we present estimates of a consumption measure for farm households calculated using revised ARMS expenditure questions, and benchmark the measure against the Bureau of Labor Statistics' Consumer Expenditure Survey (CE).

To assess the possibility of distortions introduced into the comparison from using surveys with different elicitation methods for expenditures, we conducted within-survey comparisons: within CE, we compared data for a sample of farm households created by pooling data for 2005-07 with data for all U.S. households; within ARMS, we compared data for two farm household subgroups that diverge substantially in their degree of reliance on farm income. The results support the reasonableness of the findings.

Citing extensive literature on household well-being, we argue on conceptual grounds that current consumption of goods and services provides an important complement to income and wealth in characterizing household economic well-being. Whereas income and wealth are important indicators of resources, current consumption is an indicator of current material standard of living. Further, consumption provides useful information about a household's lifetime standard of living because, when households face temporary increases or decreases in income relative to long-term income expectations, they tend to smooth consumption relative to variable income in order to maintain a standard of living linked to their long-term income expectations.

At an individual household level, there is not a close mapping between the income and consumption measures for farm households, compared with all U.S. households. Also, across the population, the consumption measure provides a different perspective than income and wealth on the distribution of well-being among farm households relative to all U.S. households. Farm households appear to have higher equivalent-income than all U.S. households at all income deciles but the lowest. But farm households, which are exposed to greater income volatility, have lower marginal propensities to consume from current income. The net effect is that the distribution of consumption appears to be similar for farm and all U.S. households. However, for farm households, the data suggest that consumption is higher at the low end of the distribution and lower at the high end of the distribution relative to all U.S. households.

Analogously, using poverty rates as an indicator of disadvantage within the populations, the relative levels of disadvantage are reversed when we switch from an income-poverty rate to a consumption-poverty rate, calculated by comparing household consumption to the census poverty threshold employed in official U.S. income poverty statistics. Whereas the income poverty rate is higher, the consumption poverty rate is lower for farm households relative to all U.S. households. The divergence in income- and consumption-poverty rates between farm and all U.S. households is even greater when we focus on households that operate farms with sales of $100,000 or more, which are more exposed to the income risks of self-employment.

References

Access Project (2007). *2007 Health Insurance Survey of Farm and Ranch Operators*, Issue Brief No. 1, Sept., www.accessproject.org

Buhmann, B., L. Rainwater, G. Schmauss, and T.M. Smeeding (1998). "Equivalence Scales, Well-Being, Inequality, and Poverty: Sensitivity Estimates Across Ten Countries Using the Luxembourg Income Study Database," *Review of Income and Wealth*, Vol. 34:115-142.

Burkhauser, R.V., S. Feng, S. Jenkins, and J. Larrimore (2008). "Estimating Trends in U.S. Income Inequality Using the Current Population Survey: The Importance of Controlling for Censoring." National Bureau of Economic Research Working Paper 14247.

Burkhauser, R.V., S. Feng, and S. Jenkins (2007). "Using the P90/10 Index to Measure U.S. Inequality Trends with Current Population Survey Data: A View from Inside the Census Bureau Vaults." Institute for Social & Economic Research Working Paper 2007-147. Colchester: University of Essex.

Carroll, Christopher D. (2001). "A Theory of the Consumption Function, With and Without Liquidity Constraints," *Journal of Economic Perspectives* 15(3): 23-46.

Carroll, Christopher D., and Miles S. Kimball (2007). "Precautionary Saving and Precautionary Wealth," *Palgrave Dictionary of Economics and Finance*, 2nd Ed.

Cutler, D., and L. Katz (1991). "Macroeconomic performance and the disadvantaged," *Brookings Papers on Economic Activity*, 2.

DeNavas-Walt, C., B.D. Proctor, and J. Smith (2007). *Income, Poverty and Health Insurance Coverage in the United States: 2006*, U.S. Census Bureau, Current Population Reports, P60-233.

DeJuan, Joseph, and J.J. Seater (2006). "A Simple Test of Friedman's Permanent Income Hypothesis," *Economica* 73:27-46.

Federman, M., T.I. Garner, K. Short, W.B. Cutter IV, J. Kiely, D. Levine, D. McDough, and M. McMillen (1996). "What Does It Mean to be Poor in America?" *Monthly Labor Review*, 119(5): 3-17.

Fernandez-Villaverde, J., and D. Krueger (2002). "Consumption Over the Life Cycle: Some Facts From the Consumer Expenditure Survey Data," National Bureau of Economic Research Working Paper 9382.

Fisher, Jonathan D., and David S. Johnson (2006). "Consumption Mobility in the U.S.: Evidence From Two Panel Data Sets," *Topics in Economic Analysis and Policy*, Brookings Economic Press, Vol. 16, issue 1.

Friedman, M. (1957). *A Theory of the Consumption Function*, Princeton University Press, Princeton, NJ.

Hoppe, Robert, and David Banker (2006). *Structure and Finance of U.S. Farms: 2005 Family Farm Report*, EIB-12, Economic Research Service, USDA, May.

Hurd, M.D., D. McFadden, H. Chand, L. Gan, A. Merrill, and M. Roberts (1998). "Consumption and Savings Balances of the Elderly: Experimental Evidence on Survey Response Bias," in D. Wise (ed.), *Frontiers in the Economics of Aging*, Chicago: University of Chicago Press.

Hurd, M.D., and S. Rohwedder (2006). "Economic Well-Being at Older Ages: Income and Consumption-Based Poverty Measures in the HRS," National Bureau of Economic Research Working Paper 12680.

Johnson, D. (2004). "Measuring Consumption and Consumption Poverty: Possibilities and Issues." Conference paper presented at "Reconsidering the Federal Poverty Measure, American Enterprise Institute, Washington, DC, Nov.

Johnson, D., and S. Shipp (1999). "Inequality and the Business Cycle: A Consumption Viewpoint," *Empirical Economics*, Vol. 24, issue 1.

Johnson, D., T. Smeeding, and B. Torrey (2005). "Economic Inequality through the Prisms of Income and Consumption," *Monthly Labor Review*, April.

Jolliffe, D. (2006). *The Cost of Living and the Geographic Distribution of Poverty*. ERR-26, Economic Research Service, USDA, Sept.

Jones, Carol A., Hisham El-Osta, and Robert Green (2006). *Economic Well-Being of Farm Households*, Economic Brief #7, Economic Research Service, USDA, March. http://www.ers.usda.gov/Publications/EB7/

Jones, Carol Adaire, Timothy S. Parker, Mary Ahearn, Ashok K. Mishra, and Jayachandran N. Variyam (2009). *Health Status and Health Care Access of Farm and Rural Populations*, EIB-57, Economic Research Service, USDA, Aug.

Jorgenson, D. (1998). "Did We Lose the War on Poverty?" *Journal of Economic Perspectives* 12:1.

Kennickell, Arthur B. (2006). "Current and Undercurrents: Changes in the Distribution of Wealth, 1989-2004." Federal Reserve Board. http://www.federalreserve.gov/pubs/oss/oss2/papers/concentration.2004.5.pdf

Meyer, B.D., W.K.C. Mok, and J.X. Sullivan (2009). "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences." National Bureau of Economic Research Working Paper 15181. http://www.nber.org/papers/w15181

Meyer, B.D., and J.X. Sullivan (2003). "Measuring the Well-Being of the Poor Using Income and Consumption," *Journal of Human Resources*, XXVIII Supplement.

Meyer, B.D., and J.X. Sullivan (2009). "Five Decades of Consumption and Income Poverty," National Bureau of Economic Research Working Paper 14827.

Mishra, Ashok, Hisham S. El-Osta, Mitchell J. Morehart, James D Johnson, and Jeffrey W. Hopkins (2002). *Income, Wealth and the Economic Well-Being of Farm Households*, AER-812, Economic Research Service, USDA, July.

Mishra, Ashok, and Carmen L. Sandretto (2002). "Stability of Farm Income and the Role of Nonfarm Income in U.S. Agriculture," *Review of Agricultural Economics*, Vol. 24, No. 1.

Rogers, J., and M. Gray (1994). "CE Data: Quintiles of Income Versus Quintiles of Outlays," *Monthly Labor Review* 118(8): 32-37.

Ruggles, P. (1990). *Drawing the Line*, Washington, DC: Urban Institute Press.

Sablehaus, J., and J. Groen (2000). "Can Permanent Income Theory Explain Cross-Section Consumption Patterns?" *Review of Economics and Statistics*, 82(3):431-438.

Short, K., M. Shea, D. Johnson, and T. Garner (1998). "Poverty-Measurement Research Using the Consumer Expenditure Survey and the Survey of Income and Program Participation," *American Economic Review*, 88(2), 352-356.

Slesnick, D. (2001). *Consumption and Social Welfare*, Cambridge: Cambridge University Press.

Slesnick, D. (1994). "Consumption, Needs, and Inequality," *International Economic Review*, vol. 35, no. 3.

USDA, Economic Research Service (1984). *Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics*. ECIFS3-3, Sept.

Weinberg, D., C. Nelson, M. I. Roemer, and E.J. Welniak, Jr. (1999). "Fifty Years of U.S. Income Data From the Current Population Survey: Alternatives, Trends and Quality," *American Economic Review*, vol. 89, no. 2.

Whittaker, J.B., and A. Effland (2009). "Income Stabilization Through Government Payments: How Is Farm Household Consumption Affected?" *Agricultural and Resource Economics Review* 38/1:1-10.

Appendix A: Data Sources and Analysis Samples

Agricultural Resource Management Survey (ARMS)

USDA's Agricultural Resource Management Survey (ARMS) provides annual observations of field-level farm practices, the economics of the farm business, and the characteristics of the farm household for a nationally representative sample of all U.S. farms in the 48 contiguous States. The official USDA definition of a "farm" is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year.

The survey data support estimation of farm business income and performance measures, farm sector income and value-added, production costs for crop and livestock enterprises, farm practices used in the production of crop and livestock commodities, and household characteristics of the principal farm operator, including demographic and financial well-being measures. Continuous data series for household income and wealth measures exist from 1996, when the current format for data collection was introduced.

ARMS is a large multi-phase and multi-version survey, employing stratified sampling procedures suited to collecting the different kinds of information.[1] This analysis uses data from Phase III surveys, which collect information on farm income and expenditures, farm financial transactions, and the farm operator household during the winter months immediately following the reference year. Several versions of the Phase III survey are distributed. One enumerated version (version 1), employing personal interviews with trained enumerators, covers farms of all types, and contains more in-depth questions than in other versions—including the household questions on living expenses needed for this analysis. Survey weights are developed to generate nationally representative estimates from version 1 data alone. In addition, typically two to three other personally enumerated versions are designed to capture detailed characteristics of specific commodity enterprise types; survey weights are developed to generate nationally representative estimates from these versions for the enterprise types surveyed. Finally, a short "core" version, which is distributed and returned by mail, supports State-level estimates for the 15 States with the highest values of farm production. Another set of weights provides nationally representative data from the pooled sample across all five versions of the survey (the "full sample"). The systems of weights address sampling, nonresponse, and undercoverage (calibrating to independent USDA estimates).[2]

[1] The sample is screened for continued operation and commodity coverage in Phase I, conducted in the summer of the reference year. In the fall, randomly selected Phase I farms are surveyed in Phase II concerning their crop production practices and chemical use at the field or production unit level. During the following winter, selected Phase I farms are surveyed in Phase III concerning business finances and operator characteristics.

[2] For more information about the ARMS, see http://www.ers.usda.gov/Data/ARMS/.

Analysis Samples

Full family farm sample: To report household income and wealth measures, we use data from a pooled sample of all five questionnaires. Because we are interested in farm households, we restrict our analysis to "family farms," those in which the majority ownership of the farm business is held by the operator and relatives of the operator. Most farms (96 percent in 2006) are family farms. Most farms have only one operator. For multiple-operator farms, a principal operator is identified during the annual process of

collecting economic information from farm businesses.[3] The unit of observation, then, is the household of the principal operator.

Expenditure/consumption analysis sample: To analyze consumption and expenditures, we use a sample constructed from questionnaire version 1, the only version in which detailed household expenditure data are elicited. Currently, USDA does not impute values of the living expense component variables. The set of variables is subject to substantial nonreporting, resulting in a net loss of 28 percent of the farm population. We also select for study two subgroups within the farm household population: farm operator households of farms with sales of $100,000 or more ("large") and farm operator households of very small rural-residence farms (those where the principal operator indicates an occupation other than farming as his primary occupation, and whose farm has annual sales of $10,000 or less).

To assess the implications of using the smaller version 1 sample with attrition due to missing data, we report in Appendix table A1 descriptive statistics for key demographic and economic variables for the expenditure/consumption analysis sample (N=4,683), the full version 1 sample (N=6,457), and the full sample across the five versions of the survey (N=20,342). We find that the values in the analysis sample generally were very similar to the larger samples. Among the demographic variables, the analysis-sample values of all variables—including operator age, household composition by age category, and education—were within +/- 5 percent of the full-sample values.

Among the variables characterizing the distributions of farm household income and wealth, the only variable that was substantially different was median debt level. Since, on average, debt is a small fraction of assets, the difference is not reflected in net wealth.

Current Population Survey, Annual Social and Economic Supplement

The Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS) is designed to provide timely and detailed estimates of income, poverty and health insurance coverage, and to measure change in those estimates at the national level. Conducted by the Bureau of the Census for the Bureau of Labor Statistics, the CPS ASEC is the official source of the national poverty estimates calculated in accordance with the Office of Management and Budget's Statistical Policy Directive 14. (Though the Census Bureau also reports income and poverty estimates based on the American Community Survey, part of the 2010 Decennial Census Program, it recommends people use ASEC/CPS for national estimates because it provides more complete and thorough estimates of income and poverty.)

The sample is scientifically selected to represent the civilian noninstitutional population living in the U.S. The unit of observation is the household. About 70,000 households are interviewed each year.

Analysis sample: Because CPS collects data for a larger sample relative to CE, we use CPS to calculate estimates of well-being measures based on household money income for all U.S. households (tables 1 and 2). We also use it to benchmark the CE data, including the estimates of household

[3] About 40 percent of farms have more than one operator; however, for three-quarters of the farms with multiple operators, the farm is operated by a husband-wife team, so that both operators are part of the principal operator household on which we focus. About 10 percent of family farms have other operator households associated with the farm, for which no data are collected.

Appendix table A1

Comparison of ARMS analysis sample to ARMS total version 1 and ARMS versions 1-5 samples, 2006

Farm operator households	1	2	3
	Analysis sample	Full sample (version 1)	Full sample (versions 1-5)
		Percent	
Number of farm households	1,463,313	2,022,535	2,022,501
Sample size	4,683	6,457	20,342
Demographics			
Age of operator	57	57	57
Average number in household - all ages	2.7	2.7	2.7
Children under 18	0.6	0.6	na
Persons 65 and over	0.5	0.5	na
Education - highest degree of operator		*Percent*	
High school	62.3%	66.6%	64.8%
College and beyond	26.0%	25.0%	25.0%
Economics			
Household income		*Dollars*	
Mean	$75,080	$76,224	$77,654
Median	$55,330	$55,696	$56,022
		Percent	
Wage/salary income share	53.6	50.5	49.8
Self-employment income share	22.5	24.8	25.4
		Dollars	
10th percentile	$10,735	$10,151	$9,859
20th percentile	$22,871	$23,310	$22,400
40th percentile	$45,064	$45,930	$45,064
60th percentile	$67,662	$67,370	$67,801
80th percentile	$102,710	$104,349	$108,713
90th percentile	$143,392	$144,565	$167,570
		Ratio	
80:20	4.5	4.5	4.9
90:10	13.4	14.2	17.0
		Index	
Gini coefficient	0.556	0.568	0.576
		Percent	
Negative household income	5.7	5.9	5.9
Poverty rate per person	13.8	13.5	14.4
Poverty rate per household	12.5	13.0	12.5
Household net worth			
		Dollars	
Net worth, median	$578,650	$587,111	$554,549
Assets, median	$629,900	$656,375	$602,750
Debt, median	$12,750	$23,400	$23,400
		Index	
Gini coefficient	0.511	0.515	0.529

Continued—

Appendix table A1
Comparison of ARMS analysis sample to ARMS total version 1 and ARMS versions 1-5 samples, 2006—continued

Farm operator households	1	2	3
	Analysis sample	Full sample (version 1)	Full sample (versions 1-5)
	Dollars		
Household-owned autos			
Mean value	$24,542	$25,455	na
Household dwelling			
Mean value, owned by farm	$138,089	$143,052	$142,951
Mean value, owned by household	$192,914	$192,539	na
	Percent		
Share owned by farm	77.1	80.1	73.2
Share owned by household	20.4	18.0	26.8*
Share rented	2.4	1.9	

Notes. 'na' means not available in survey versions other than version 1. * includes rental share as well.

Sources: USDA, Economic Research Service using Agricultural Resource Management Survey, 2006.

income. For a comparison of descriptive statistics for the two samples, refer to the section on CE below.

Survey of Consumer Finance (Federal Reserve Board)

The Survey of Consumer Finance (SCF), a triennial survey published since 1989, is the major source of wealth estimates for the U.S. population.

The SCF unit of analysis differs somewhat from that in ARMS, CPS, and CE. Most of the data in the survey are intended to represent the financial characteristics of a subset of the household unit referred to as the "primary economic unit" (PEU). In brief, the PEU consists of an economically dominant single individual or couple (married or living as partners) in a household and all other individuals in the household who are financially interdependent with that individual or couple. Typically, around 4,500 economic units are interviewed for the main portion of the survey.

Analysis sample: This survey is the source of data for household wealth distributions for all U.S. households in table 2.

Consumer Expenditure Survey

The Consumer Expenditure Survey (CE) is a nationally representative sample conducted by the Bureau of Labor Statistics, designed to provide a continuous summary of the spending habits of U.S. households. Expenditure data are reported at the level of the consumer unit, which is defined as either a group of individuals who are related by blood or marriage, a single or financially independent individual, or two or more persons who share resources. Interview data are collected from consumer units five times over a 13-month period, every 3 months over five calendar quarters. In the first interview, data on demographic characteristics for each member of the consumer unit age 14 and over and an inventory of major durable goods of the consumer unit are collected. In interviews 2-5, expenditure data for the consumer unit for the prior quarter are collected. Employment and income information are collected in interview 2

Appendix table A2

Comparison of characteristics for CE and CPS, 2006

	CE: all U.S. consumer units	CPS: all U.S. households
Number of households (1,000)	118,843	113,687
Sample size		73,629
Demographics		
Age of reference person	49	49
Average number of persons in consumer unit:		
Total	2.5	2.5
Children under 18	0.6	0.7
Persons 65 and over	0.3	0.3
	Percent	
Black: *	12	12
Hispanic or Latino origin: *	11	11
Education:*		
Highest level attained was:		
Less than high school degree	13.0	14.4
High school	21.2	30.2
HS degree and some college	30.6	27.4
College grad and beyond	35.1	28.0
Economics:		
Household income	*Dollars*	
Mean	$60,533	$66,575
Median	$44,616	$48,054
	Percent	
Self-employment income share	6.0	5.3
	Dollars	
10th percentile	$10,594	$12,000
20th percentile	$18,333	$20,037
40th percentile	$35,044	$37,888
60th percentile	$56,153	$60,022
80th percentile	$88,687	$97,462
90th percentile	$122,707	$133,799
	Ratio	
80:20	4.84	4.86
90:10	11.58	11.15

*Asked of reference person in CE, CPS.

Source: USDA, ERS using Current Expenditure Survey, 2006, and Current Population Survey ASEC, Feb.-April 2007 (for 2006 data).

(which is carried over to interviews 3 and 4) and interview 5. (CE also includes a separate diary survey providing more detailed information on smaller or more frequent expenditures that are more difficult to recall.) In total, around 7,100 households participated each quarter in 2006.

Expenditures consist of the transaction costs, including excise and sales taxes, of goods and services acquired during the interview or recordkeeping period. Expenditure estimates include expenditures for gifts, but exclude purchases or portions of purchases directly assignable to business purposes. Also excluded

are periodic credit or installment payments on goods or services already acquired; however, interest applied to these balances is included in expenditures. The full cost of each purchase is recorded, even though full payment may not have been made at the date of purchase. CE elicits consumer-unit totals for multiple categories of income, using an open-ended format. If respondents indicate they do not know the exact amount, they are asked a followup question by a value-code elicitation format (the top code is $50,000 and up).

Many articles have documented measurement error in the income measure reported in CE, which results in substantial underestimates of income, on average. More recently, the Consumer Expenditure Survey has implemented multiple imputation of income data, starting with the publication of the 2004 tables. In multiple imputation, several estimates are made for the same consumer unit, and the average of these estimates is published.

***All U.S. household analysis sample**:* We use the individual interview data from the CE survey to report household expenditures and consumption measures for all U.S. households, and for comparisons of consumption and income within individual households.

To benchmark the CE sample, we compare CE and CPS estimates of key variables in Appendix table A2. In particular, we are interested in the comparison of the income distribution. We observe in Appendix table A2 that the demographic and family composition characteristics have similar values in the CPS and CE samples. However, at each of the decile cutpoints, the values of income are underestimated between 6 and 12 percent, with the greatest underestimate occurring at the 10th percentile.

Appendix B: Constructing Consumption and Expenditure Measures in the Consumer Expenditure Survey (CE) and the Agricultural Resource Management Survey (ARMS)

Appendix table B-1 illustrates the mapping of the CE expenditure categories into the common major categories used in the parallel consumption measures we calculate for ARMS and CE data. Column 2 identifies the categories of ARMS variables. To make transparent the mapping between ARMS and CE categories, we identify in column 3 the subcategories of items in CE reflected in each ARMS variable (as well as in variables calculated for CE data designed to be comparable).

(A table with estimates of the detailed subcategories of the expenditure and consumption measures for the two populations is available from the authors.)

We make parallel adjustments to expenditure data in CE and ARMS in order to calculate consumption measures that are as consistent as possible using the two surveys. Three components merit particular attention. Here, we explain the procedures for calculating service flows for housing and vehicles, and the composition of the "all else" category in the CE and ARMS measures.

Expenditures on "All else"

ARMS: The survey question used to measure "all else" is at the end of the list and asks for "all other family living expenses, such as clothing, and personal care products and services; house furnishings and equipment, education and child (or adult) care, entertainment (hobbies, recreation, and vacations)."

CE: The CE categories that are combined into the "all else" category for the farm and all U.S. household consumption measures are shelter (other lodging); household furnishings and equipment; apparel; entertainment; personal care products and services; reading, education; tobacco products, smoking supplies; alcohol; and miscellaneous.

Housing ("shelter") service flows

ARMS: To calculate housing shelter services for farm households from ARMS data, we apply the BEA rent-to-value ratios used in the USDA Farm Income Sector Accounts to account for the asset value of the household residence. The BEA rent-to-value ratios are conditional on the value of residence and cover imputed rent only; no expenses are deducted or added, such as utilities.[4] We calculate values for households living in a residence owned by the farm as well as for households that own their residence.

For 2006, ARMS did not collect expenditure outlays for mortgages and related expenses for owned houses or for purchase of vehicles, so we imputed values based on 2005 data. For housing, the imputations for mortgage and related expenditures were needed for the 20 percent of the sample that reported

[4] Source: Denise McBride, BEA, personal communication, June 18, 2008.

Appendix table B1

Mapping of expenditure and consumption components between CE and ARMS, 2006

			ARMS	ARMS	CE	CE
Category	**ARMS variable subcategory**	**CE subcategory**	**Expenditures**	**Consumption**	**Expenditures**	**Consumption**
Food	Food	Food	yes	yes	yes	yes
Housing	Shelter	Shelter				
	- Owned dwellings:					
	-- Principal payments on mortgage	Principal payments on mortgage*	yes (imputed)	no	yes*	no
	-- Other mortgage-related expenses:		yes (imputed)	no	yes	no
		Mortgage interest and charges;				
		Property taxes;				
		Maintenance, repairs, insurance, other				
	--Shelter annual service flow	Rental value of owned home (Self-report)	no	yes (BEA rental factors)	no	yes (self-report of rental value)
	-Rented dwellings		yes	yes	yes	yes
	Operating expenses		yes	yes	yes	yes
		Utilities, fuels, and public services (electricity, gas, water, telephone, etc)				
		Household operations (personal services, other household expenses)				
		Housekeeping supplies				
Transport	Vehicle services					
	Owned vehicles					
	Net outlays	Vehicle purchases (net outlay)	yes (imputed)	no	yes	no
	Vehicle annual service flow	n/a	no	yes (imputed - user cost of capital)	no	yes (imputed - user cost of capital)
	Leased vehicles and public transportation		yes	yes	yes	yes
		Other vehicle expenses: vehicle rental, leasing, licensing, other				
		Public transportation				
	Operating expenses		yes	yes	yes	yes
		Gas and motor oil				
		Other vehicle expenses: finance charges, maintenance and repairs, vehicle insurance)				
Health care						
	Health and dental insurance (paid by household)	Health insurance (paid by hh)	yes	yes	yes	yes
	Out-of-pocket household medical expenditures		yes	yes	yes	yes
		Medical services				
		Drugs				
		Medical supplies				
All other			yes	yes	yes	yes
		Shelter: Other lodging				
		Housing: Furnishing/equipment(appliances, etc)				
		Apparel				
		Entertainment				
		Personal care products and services				
		Reading				
		Education				
		Tobacco products, smoking supplies				
		Miscellaneous				
		Alcohol				
Personal insurance and retirement plans			yes	no	yes	no
		Life and other personal insurance				
		Pensions and Social Security				
Contributions (outside of household)		Cash contributions	yes	no	yes	no
Home consumption		n/a	no	yes	no	na

*CE does not consider mortgage principal as an expenditure (but rather as a change in household assets).

owning their residence through the household rather than through the farm business.

CE: To calculate housing shelter services for all U.S. households from CE data, we follow standard practice and use the self-reported rental equivalence value obtained from the consumer unit. Consumer units who own their own home are asked, "If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?" For respondents who do not know the rental equivalence of their home, CE reported an imputed value.

Transportation service flows

CE: To calculate transportation services for all U.S. households, we calculate the user cost of capital based on Slesnick (1994, 2001) and others. In their formulation, the service flow in a given year from an asset = (r+d), where r = interest rate and d = depreciation rate. Starting with the original purchase price reported in CE, their formula is: St = (r+d)(1-d)s * P0, where P0 is the original purchase price and s = age of the vehicle. We assume, as Slesnick does, that r =.05 and d =.10.

ARMS: To calculate transportation services for farm households, we employ the same approach as with CE data. Since ARMS data include the current asset value, the calculation simplifies to *.15*household-owned current asset value*.