Income Stabilization Through Government Payments: How Is Farm Household Consumption Affected?

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We estimate the impacts of various types of government payments to U.S. agriculture on different components of farm household consumption. Using 2003 to 2005 data from the Agricultural Resource Management Survey (ARMS), we show that marginal rates of consumption differ by consumption category and income source, including different types of farm program payments. The results suggest that farm households treat income from different sources as imperfect substitutes and may reserve income from specific sources for specific types of consumption. Implications for the effects of different types of government payments on the farm household are considered.

Key Words: agricultural policy, consumption, farm households, government payments

Farm households receive income from a variety of sources, including farm policy payments. If farm households treat income from different sources as imperfect substitutes in the consumption of different goods, policy instruments may impact farm household spending in different ways, depending on their design. Understanding the basis on which farm households differentiate between income sources may have implications for effective policy design.

Our results indicate that incomes from different sources, including nonfarm income, market-based farm income, and different types of government payments, are imperfect substitutes in total consumption. In other words, disaggregated incomes are not fungible. While income volatility may play a role in driving these differences, we pre-sent evidence that suggests that more nuanced behavioral decision-making rules may be behind the results. Further, different consumption expenditure categories are affected in different ways by disaggregated sources of income. For example, all incomes are fungible for one expenditure category but not for others.

Similar to Carriker et al. (1993), we estimate a reduced-form equation where total income is regressed on farm, nonfarm, and government sources of income. We then follow Whitaker (2009) in disaggregating government income into the different program subsidies. We take Whitaker (2009) a step further by allowing a share of each income source to account for the consumption of a subgroup of consumer goods, rather than a portion of total household consumption. This allows us to investigate the impact of alternative government programs on the various components of household consumption. Unlike studies that focus on a specific program and total consumption (Chang, Lambert, and Mishra 2008), we are able to report how a specific commodity support program impacts specific subcategories of consumption.

Data for the years 2003 through 2005 are taken from the Agricultural Resource Management Survey (ARMS) conducted by the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS). Since 2003 the survey has gathered information on farm household expenditures

such as food, rent or mortgage and utilities, non-farm transportation, health and medical expenses, contributions to insurance or retirement plans, home improvement and furniture purchases, and other household living expenses. The survey also contains data on farm, nonfarm, and government sources of income, as well as some demographic information about the farm operator and household. These data are used to estimate separate marginal rates of consumption for different income sources and consumption categories.

Models of Consumption: Permanent Income or Mental Accounting?

Economic theory provides competing explanations of consumer behavior that might explain farm household consumption decisions. More traditional theories of consumption, such as the Permanent Income Hypothesis (PIH), explain consumer behavior over a lifetime in a framework of consumption smoothing (Friedman 1957, Ando and Modigliani 1963). A more behavioral approach posits that economic agents categorize income into separate "mental accounts" according to specific rules of thumb (Thaler 1985). Either theory may potentially explain the consumption behavior of farm households and may have implications for the effective design of policy instruments.

Friedman (1957) hypothesizes that marginal rates of consumption should be higher for households with more stable sources of income. With relatively volatile incomes, there is a greater need to smooth consumption by saving when incomes are high and spending from savings when incomes are low. But what if household income can be separated into a volatile source and a stable source, such as with relatively volatile farm income and relatively stable nonfarm earned income? The household may differentiate between these income sources or, alternatively, it may view the two sources of income as a single household income.

If incomes from different sources are fully fungible, or perfect substitutes, then the PIH predicts that the overall volatility of a single, combined household income will determine a marginal rate of consumption that should be equal for all of the separate income sources, regardless of their vola-

tility. If, however, incomes are not fungible, then households are differentiating between sources of income. The PIH suggests that this differentiation is based on the volatility of the income sources; volatile incomes are consumed at a lower marginal rate than more stable incomes.

An alternative theory of consumer behavior has developed in the literature that also allows for economic agents to differentiate between different sources of income. This theory does not rule out differentiation based on income volatility, but does offer additional, behaviorally motivated rules of income categorization. According to this theory, economic agents place incomes into different "mental accounts," where the marginal propensity to consume income from each account may differ given a specific basket of goods (Thaler 1985, Sheffrin and Thaler 1988, Thaler 1990, and Thaler 1999).

While income volatility may be driving the separation of incomes into different mental accounts, more behavioral factors, such as the size or source of the payment, may also affect how income is perceived and consumed. For example, Kooreman (2000) finds that labeling a government transfer payment as a "child support" payment leads to an increase in the consumption of children's clothing from that income source. This labeling effect is purely behavioral and may be a basis on which households differentiate between incomes. Farm households may differentiate between income sources based on "farm" and "nonfarm" labels, which could lead to different marginal rates of consumption independent of the respective income volatilities.

Regardless of the underlying theory of consumption, there is sufficient empirical evidence to conclude that incomes are not always fungible. Holbrook and Stafford (1971) find that the marginal propensity to consume income from transfer payments is a little over one-third of the marginal propensity to consume earned income. Carriker et al. (1993) find that farm households consume differently from farm production income than from nonfarm earned income or government transfer payments. Whitaker (2009) extends the Carriker et al. (1993) model to show that different government transfer payment programs are associated with different marginal rates of consumption. Del Boca and Flinn (1994) show that the marginal

propensity to consume children's goods is higher from child support payments, such as alimony, than from the income earned by the custodial parent. Hsieh (2003) finds that residents of Alaska do not alter their consumption when they receive their *expected* annual payment from the Alaskan Permanent Fund, but do alter their consumption with the receipt of tax returns, which are small relative to the Alaskan Permanent Fund payment, and the amounts of which may not be well known in advance.

While the literature shows that incomes may not be fungible, it struggles to adequately identify whether households differentiate between incomes based on characteristics such as income volatility, or based on more behavioral preferences such as income labeling. For example, Baker, Nagel, and Wurgler (2007) find that dividends are consumed at a higher rate than capital gains. They attribute this to a behavioral rule of "consume income, not principal," which labels the two income sources in a way that may affect how they are consumed. However, the difference in consumption rates for dividends and capital gains could be explained by differences in income volatility. Capital gains fluctuate dramatically and can be negative, compared to dividends, which have a lower limit of zero.

Farm household income often combines a range of stable and volatile income sources that may account for marginal differences in consumption patterns. Examining these household expenditure patterns may shed light on the basis by which farm households differentiate between sources of income. In addition to offering insights into the broader question of volatility vs. mental accounting explanations of expenditure behavior, farm household consumption patterns may also provide insights into the way in which policy design affects farm and farm household outcomes. If source and type of income matters to farm household consumption behavior, policymakers may want to consider the likely uses to which these types of income may be put in deciding which designs best meet policy objectives.

Farm income is generally volatile from year to year; it depends on exogenous factors such as weather and world market conditions. Some government payments are designed to compensate for this volatility by being paid only when market conditions are poor, making them volatile as well. If farm households differentiate between these income stabilization payments and farm production income, they may perceive two volatile incomes that lead to two low marginal rates of consumption rather than a single steady source of income that leads to a higher rate of marginal consumption. Other payments, however, establish a stable, predictable income stream that more closely mirrors nonfarm income and may have a similar effect on farm household consumption.

Whitaker (2009) concludes that more volatile sources of income are consumed from at lower marginal rates. However, he does not explicitly separate out countercyclical payments as a category of volatile payments. By explicitly disaggregating countercyclical payments, we show that a more nuanced behavioral decision-making process may better explain farm household consumption decisions.

Estimating Marginal Rates of Consumption from Multiple Income Sources

In the spirit of Carriker et al. (1993) and similar to Whitaker (2009), we further disaggregate government transfer payments into several categories based on their characteristics. Some payment programs are designed to supplement farm income in times of low commodity market prices, while others are designed to add to farm household incomes independent of agricultural market conditions. The former payments are relatively volatile, while the latter are relatively stable. Our analysis differs from Whitaker (2009) in that we include countercyclical payments as their own income category. Countercyclical payments are largely decoupled from individual production decisions, but are volatile from year to year because they depend on current market prices. We also utilize more recent data, from the years 2003 to 2005, which include information on lagged income and consumption for each observation, whereas Whitaker (2009) created a pseudo-panel of data from the set of repeated ARMS cross-sections. We then take Whitaker (2009) a step further by disaggregating farm household consumption into different expenditure categories to see if different income sources affect the consumption of different product groups in different ways

(Kooreman 2000, Del Boca and Flinn 1994, Edmonds 2002).

In this section we discuss the various sources of farm household income and the consumption categories that we investigate. We present our model as a reduced-form equation that allows us to perform statistical tests on the equality of estimated marginal rates of consumption for different income sources. We also discuss the data used and the unique characteristics of the ARMS data set.

Sources of Farm Household Income

Farm household income generally comes from three sources: (i) market income from farm production, (ii) nonfarm income, and (iii) U.S. government payments to agriculture. It is not uncommon for a single farm household to report income from all three sources.

Income from farm production can vary from year to year due to changing weather conditions, fluctuations in agricultural market prices, changes in the price of production inputs, or changes in farm size. Even though income from farm production is relatively less stable than income from other sources, farm household consumption remains relatively stable (Mishra et al. 2002). Farm households moderate fluctuations in farm income with other sources of income, mainly from nonfarm employment and government payments.

Nonfarm income can come from labor income earned off of the farm or from nonfarm business or investment income. Hoppe and Banker (2006) reported that 76.4 percent of all family farms have at least one person, either the principal operator, spouse, or both, employed off of the farm. Nonfarm employment creates a substantial source of income that is relatively stable compared to income from farm production.

Farm households may also use government payments as a stabilizing factor for consumption. There are many different types of subsidies paid to the agricultural sector, with many farm households receiving multiple types of support. We divide agricultural support into four main categories: direct payments, countercyclical payments, marketing loan benefits, and other government payments. Some of these payments are relatively stable, while others vary considerably from year

to year. How these various payments affect farm household consumption may depend on how farm households differentiate between payments.

Under the 2002 Farm Act, direct payments are independent of current production decisions.[1] They are tied to agricultural land, called "base" acres, that has a history of producing certain commodities. Direct payments are made to the operators of base acreage generally without regard to what crops they produce in the current period, or even whether they produce any crops at all.[2] They are fixed by law and are therefore relatively stable between periods of farm legislation, varying for individual farm households only when base acres are sold, rented, or taken out of agriculture, or under other special circumstances (Burfisher and Hopkins 2003, Westcott and Young 2004).

Countercyclical payments are also tied to base acres and are not affected by the commodity actually produced. Like direct payments, they are independent of individual farm operators' production decisions in the current period. However, countercyclical payments are made only when current market prices for the historically produced commodity fall below a specific level. For example, if a farm has 50 corn base acres, and the price of corn falls below the specific trigger level for corn, the operator will receive a countercyclical payment for corn, even if a commodity other than corn (or no commodity at all) is produced on the 50 corn base acres. This connection to market prices makes countercyclical payments relatively volatile from year to year. Unlike direct payments, they are as unpredictable as the commodity prices to which they are tied (Westcott, Young, and Price 2002, Westcott 2005).

Marketing loan benefits are directly tied to a farm's current commodity production and occur only when commodity prices are low. In this category we include Loan Deficiency Payments (LDP), Marketing Loan Gains (MLG), and Certificate Exchange Gains (CEG). These three components of the marketing loan program essentially provide a price floor by providing loans to pro-

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[1] While these payments are decoupled from current farm production, several ways in which they might indirectly affect production have been suggested (see Young and Westcott 2000).

[2] An exception to this rule in the 2002 Farm Act is restrictions on planting fruits and vegetables on base acres under certain circumstances.

ducers that may be repaid at a rate lower than the specified loan rate if the market price falls below that level, or by providing the equivalent gain. These payments vary from year to year with changes in market conditions.

We define other government payments as all other program payments, which include a variety of payments with characteristics different from those listed previously. Some payments are made for the conservation of environmentally sensitive lands, while others are made for relief from agricultural disasters. This category contains all government payments not included in previous categories.

Farm Household Consumption Categories

The ARMS data set reports expenditures on several different consumption categories. We investigate the impact that disaggregated farm household incomes has on four specific subcategories of consumption: food, home improvements, other living expenses, and retirement (or future consumption). Other consumption categories reported in the data set that are not included in the analysis are health and medical expenses, nonfarm transportation expenses, and housing expenses.

The "food consumption" sub-category consists of both food prepared at home and food consumed away from home. "Home improvements" includes more expensive and durable types of goods such as remodeling, major appliances, and household furnishings.[3] "Other living expenses" includes clothing, personal items, child care, hobbies, charitable contributions, vacations, and other such household consumption. "Retirement" includes contributions to personal insurance, retirement plans, pensions, and Social Security, but does not include other forms of saving or investment.[4]

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[3] On the 2005 ARMS survey, household furnishings were changed from the Home Improvements category to the Living Expenses category.

[4] While retirement contributions are technically a form of saving, we include them as a consumption category for several reasons. First, retirement contributions are listed on the ARMS questionnaire as an expenditure category. Second, they do represent future consumption. Third, it is possible (and perhaps likely) that farm households budget their Social Security and other retirement contributions as expenditures. This is especially true because retirement funds are difficult to access, unlike savings or other interest-bearing deposit accounts. We therefore treat Social Security and retirement contributions as expenditures that can vary with income source.

If farm households differentiate between income sources based on income volatility or "rule of thumb" behavior, they may also differentiate between consumption categories based on similar criteria. In other words, certain commodities consumed by farm households may have different marginal rates of consumption for different income sources. We want to know how disaggregated sources of income affect different categories of consumption expenditures.

Reduced-Form Equations

We use a time-series of independent cross-sections to estimate marginal rates of consumption from a reduced-form equation. If incomes are fungible, there is one marginal rate of total consumption for all income sources. This type of model is presented in equation (1), where total farm household consumption (C_i) is regressed on total income (or the sum of individual income sources y_{ji}) and other farm household characteristics (X_i).[5] The marginal rate of consumption for all k income sources is β:

$$(1) \qquad C_i = \alpha + \beta \sum_{j=1}^{k} y_{ji} + \gamma X_i + \varepsilon_i .$$

If incomes are not fungible, each source of income will have its own marginal rate of consumption. In equation (2), we disaggregate income into k sources, each with its own coefficient for marginal consumption. The β coefficients in equation (2) can be tested for statistical equality to determine if incomes are perfect substitutes in consumption:

$$(2) \qquad C_i = \alpha + \sum_{j=1}^{k} \beta_j y_{ji} + \gamma X_i + \varepsilon_i .$$

We next assume that each consumption category (c_r, where the sum of all consumption categories equals total consumption) is responsible for a fixed share of total consumption, or $c_{ri} = v_r C_i$ and

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[5] In the analysis, we include as independent variables the number of farm household family members, the age of the principal operator, and the square of the principal operator's age.

$$\sum_r \nu_r = 1.$$

Under this assumption, the impact of disaggregated incomes on a portion of total consumption becomes

$$(3) \qquad c_{ri} = \nu_r (\alpha + \sum_{j=1}^k \beta_j y_{ji} + \gamma X_i + \varepsilon_i).$$

The estimated coefficient is therefore interpreted as the marginal impact of income source *j* on total consumption times the consumption category's share of total consumption (i.e., the marginal impact of income on consumption of that category).

A Comprehensive Farm-Level Survey

Nationwide data on farm household income, expenditures, and characteristics can be found in the Agricultural Resource Management Survey (ARMS), conducted annually by the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS).[6] This annual survey of thousands of U.S. agricultural producers is intended to be representative of the entire U.S. agricultural population. It is conducted using stratified sampling techniques to ensure that all types of agricultural production are represented.[7]

The ARMS data set does not sample the same farms over time. Rather, it is a series of independent cross-sections. We pool the data over a three-year time period, 2003 through 2005, making necessary the assumption that marginal rates of consumption are constant over time as well as across individuals. We include year dummy variables in each regression. In the analysis, time has little effect on the estimated parameters and does not appear to affect consumption in any significant way. This is likely due to the short time period considered, during which little structural change, if any, took place.

We limit the data set to family farms of all production categories and sizes. The sample contains a little over 12,000 observations, an average of 4,200 for each year. Variable means and standard deviations are found in Table 1. Over the three-year period, total annual income averaged close to $78,100. Of the total annual income, an average of approximately $5,600 came from government payments, $61,000 from nonfarm income, and $11,400 from farm production income. Of the government payments, direct payments averaged $1,964, countercyclical payments $882, marketing loan benefits $1,177, and other government payments $1,616. Total annual household expenditures averaged approximately $38,200, with food expenditures totaling $7,203, home improvements $3,211, other living expenses $6,779, retirement contributions $4,662, and the remainder going to the consumption of other goods and services.

Can Farm Household Incomes Be Endogenous?

In an OLS regression, there is a required assumption that the independent variables are truly exogenous, or, in this analysis, that incomes are independent of consumption. This assumption may not always hold. It is possible that farm households seek to increase their income in order to increase their consumption. For example, the desire to purchase a new automobile may lead the farm operator or spouse to seek employment off of the farm or to increase farm production. This would cause incomes from those sources to be endogenous to the consumption decision. However, there are alternative motivations for seeking employment off of the farm or for increasing farm production that are exogenous to the consumption decision. For example, a farm operator or spouse may seek nonfarm employment for personal satisfaction or to achieve a career objective, independent of consumption desires. For many farmers, there is an element that keeps them farming independent of the income it generates; many residential/lifestyle farms actually lose money year after year.

To accurately control for the possible endogeneity of incomes, we use instrumental variables for farm and nonfarm sources of income in the analysis and compare the results with the non-instrumented variables. Although it is not a true panel of data, the ARMS data set does ask farm operators to indicate their previous year's level of nonfarm income and net farm-related income, including government payments, received by the farm. These two lagged values are used to instru-

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[6] See the ARMS Briefing Room at http://www.ers.usda.gov/Briefing/ARMS/.

[7] Because of the stratified nature of the sample, sample weights are used in the regression analysis. The weights are determined by NASS.

Table 1. Sample Statistics of Relevant Income and Consumption Variables (2003–2005)

Variable	Weighted Mean	Jackknife Std. Error
TOTAL INCOME	$78,109	$11,388
Nonfarm income	$61,047	$8,960
Farm production income	$11,424	$1,353
Direct payments	$1,964	$430
Countercyclical payments	$882	$168
Marketing loan benefits	$1,177	$192
Other government payments	$1,616	$620
TOTAL EXPENDITURES [a]	$38,181	$1,154
Food	$7,203	$733
Home improvements	$3,211	$556
Other living expenses	$6,779	$1,288
Retirement	$4,662	$630

[a] "Total expenditures" includes housing, health and medical, and nonfarm transportation expenditures in addition to the consumption categories listed in the table.

Note: There are 12,201 observations over the 3-year time period. Because ARMS uses stratified sampling procedures, means are weighted with sample weights developed by the U.S. Department of Agriculture's National Agricultural Statistics Service. Standard errors are therefore estimated using a jackknife procedure.

ment nonfarm income and farm production income in the analysis.[8]

Unfortunately, lagged levels of government payments are not reported separately. Thus, we do not instrument government payments in the analysis. Further, we argue that these payments are exogenous to the consumption decision because they require acts of legislation. While farmers may seek out more government payments through lobbying, and may do so for the specific purpose of increasing consumption (as opposed to for saving or for investment), the legislative process usually spans several years and is not relevant to our short 3-year analysis. One could argue that farmers seek out government payments by increasing farm production or acquiring base acres for the purpose of increasing consumption. However, the associated costs of acquiring these payments far outweigh the value of the payments

themselves. A farmer must pay the rent or purchase price of the associated additional land in order to increase government payments. Farm production must occur in order to make seeking out government payments worthwhile. It is therefore unlikely that our inability to instrument the government payments variable will significantly impact our findings.

Marginal Rates of Total Consumption Vary by Income Source

We begin by estimating the marginal rate of consumption for total income as set forth in equation (1) using OLS techniques. We include year dummy variables as well as variables for household size, farm operator age, and the square of the farm operator's age in all regressions. The estimated marginal rate of consumption, shown in Table 2, is about 5 percent. However, by instrumenting total income with lagged values for all farm-related and nonfarm income, the marginal rate of consumption is estimated to be about 18 percent, suggesting the possibility that total income is endogenous to the consumption decision.

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[8] We instrument current farm production income with a lagged value that includes both farm production income and all government payments. However, most of this lagged value likely comes from farm production income; on average, farm production income accounts for the bulk of all farm-related income for the data considered.

Table 2. Impacts of Income on Farm Household Expenditures (2003–2005)

	OLS	Instruments
AGGREGATED INCOME		
Total income [a,b]	0.048***	0.182***
	(0.008)	(0.020)
R-square	0.080	0.142
FARM VS. NONFARM INCOME		
Nonfarm income [a]	0.127***	0.181***
	(0.023)	(0.023)
All farm-related income [b]	0.012***	0.100***
	(0.003)	(0.014)
R-square	0.136	0.148
H$_o$: All incomes are fungible	Reject	Reject
PRODUCTION VS. SUBSIDY INCOME		
Nonfarm income [a]	0.128***	0.184***
	(0.023)	(0.023)
Farm production income [b]	0.007***	0.086***
	(0.002)	(0.015)
Government payments	0.117***	0.109***
	(0.016)	(0.016)
R-square	0.139	0.151
H$_o$: All incomes are fungible	Reject	Reject

[a] If instrumented, done so with lagged total nonfarm income.
[b] If instrumented, done so with lagged total farm income, including government payments.

Note: *, **, and *** represent significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are in parentheses. Data are taken from the Agricultural Resource Management Survey (ARMS) for the years 2003 to 2005. Independent variables not included are operator age, operator age squared, household size, and year dummy variables. The coefficients for year dummies are not significant at any reasonable level.

Note that marginal rate of consumption should not be interpreted as the percentage of income that is spent, but rather, given a farm household's current level of income, it is the estimated increase in expenditures that occurs with each additional dollar of income. It should also be noted that these estimates represent short-run marginal changes in consumption. In the short run, the remaining 82 percent of the marginal income might have been saved, used to pay off debt, or invested on the farm.

The remaining results reported in Table 2 represent marginal rates of total consumption for increasingly disaggregated incomes. Income is first separated into farm and nonfarm components. Farm income includes income from farm production plus all government payments. Nonfarm income includes both earned and unearned nonfarm income. The results without instruments in Table 2 show that a marginal increase in nonfarm income is consumed at a rate nearly 10 times that at which a marginal increase in farm-related income is consumed. This simple disaggregation also increases the explanatory power of the model, the R-square, by over 5 percentage points. However, by instrumenting nonfarm income with its own lagged value and all farm-related income with its own lagged value, we see that marginal rates of consumption are at 18 percent for nonfarm income and 10 percent for all farm-related income. In either case, an F-test reveals that nonfarm income is consumed by the farm household

at a statistically higher marginal rate than all farm-related income.

We next disaggregate all farm income into farm production income and government payments. The OLS results show that total government payments have a marginal rate of consumption that is similar to that of nonfarm income and much higher than that of farm production income. This suggests fungibility between nonfarm income and government payments in consumption. Farm production income, on the other hand, contributes to farm household consumption much less than the other two income sources. Our results when no instruments are used are similar to those of Carriker et al. (1993), who also do not control for the possible endogeneity of income. They report that government payments and nonfarm income have similar marginal rates of consumption, both differing from the marginal rate of consumption estimated for farm production income.[9] Whitaker (2009) also finds similar results when no instruments are used.[10]

When we instrument farm production income with lagged total farm-related income (including lagged government payments) and nonfarm income with lagged nonfarm income, we see that our conclusions are somewhat altered. Farm production income and government payments do not have statistically different marginal rates of consumption, while nonfarm income differs significantly from both. We still conclude that incomes are not fungible, but group government payments as fungible with farm income rather than with nonfarm income.[11]

Carriker et al. (1993) and Whitaker (2009) conclude from their results that more volatile farm production income has a lower associated marginal rate of consumption than more stable nonfarm sources of income. Both our OLS and instrumented results support this finding. However, because government payments consist of both stable and volatile types of income support, it is unclear whether they should, when combined, be classified as stable or volatile. Carriker et al. (1993) find government payments to be fungible with nonfarm income, but not farm production income. We find the opposite in one of our specifications. Therefore, we further disaggregate government payments into identifiable stable and volatile sources and look for additional evidence. If the variability of farm household incomes determines the marginal rates at which they are consumed, we would expect to see two volatile sources of government payments—countercyclical payments and marketing loan benefits—with similar (and smaller) marginal rates of consumption.

Results for both the OLS and instrumental variables approach are presented in Table 3. An F-test allows us to reject the hypothesis that marginal rates of consumption are equivalent for all income sources. Direct payments and countercyclical payments are similar in their estimated marginal rates of consumption. Marketing loan benefits, on the other hand, have a much smaller impact on consumption; the estimated marginal rate of consumption is not significantly different from zero.[12]

These results suggest that income volatility may not be the means by which farm households differentiate income. While both represent volatile incomes, countercyclical payments are not tied to current production, while marketing loan benefits are. It is possible that the farm household includes direct and countercyclical payments in the same "mental account" as nonfarm income due to their decoupled nature. Marketing loan benefits, on the other hand, could be perceived as more closely related to farm production income. Separating out countercyclical payments offers a

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[9] Carriker et al. (1993) show nonfarm income, government payments, and farm income with short-run marginal rates of consumption of 0.048, 0.052, and 0.026, respectively.

[10] Whitaker (2009) finds virtually no difference between his instrumented results and the regular OLS results. This is not surprising; Whitaker (2009) does not use lagged income as an instrument to address the possible endogeneity of income. Rather, he uses lagged consumption as an instrument in a pseudo-panel setting to control for endogeneity derived from differences between unknown actual lagged consumption and known lagged cohort consumption. See McKenzie (2004) for details.

[11] Note that this conclusion is the result of higher marginal rates of consumption for the instrumented farm production income and nonfarm income variables, not from any significant change in the coefficient for government payments. Nevertheless, this result may be driven by the fact that the lagged variable used to instrument farm production income includes lagged government payments. However, government payments represent only a small portion of the lagged value. Further, the result that farm production income has a lower marginal rate of consumption than nonfarm income holds with or without the inclusion of government payments as an independent variable. It also holds with or without the use of instrumented variables.

[12] While countercyclical payments have a high and statistically significant impact on consumption, and marketing loan benefits have no significant impact, the statistical possibility remains that marginal rates of consumption for the two government payments are not significantly different from one another.

Table 3. Impacts of Disaggregated Government Payments on Farm Household Expenditures (2003–2005)

	OLS	Instruments
Nonfarm income [a]	0.128***	0.184***
	(0.023)	(0.023)
Farm production income [b]	0.007***	0.085***
	(0.002)	(0.148)
Direct payments	0.156***	0.130***
	(0.033)	(0.034)
Countercyclical payments	0.149***	0.137***
	(0.056)	(0.049)
Marketing loan benefits	0.051	0.050
	(0.042)	(0.041)
Other government payments	0.110**	0.128**
	(0.055)	(0.052)
R-square	0.140	0.151
H$_o$: All incomes are fungible	Reject	Reject

[a] If instrumented, done so with lagged total nonfarm income.
[b] If instrumented, done so with lagged total farm income, including government payments.

Note: *, **, and *** represent significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are in parentheses. Data are taken from the Agricultural Resource Management Survey (ARMS) for the years 2003 to 2005. Independent variables not included are operator age, operator age squared, household size, and year dummy variables. The coefficients for year dummies are not significant at any reasonable level.

more nuanced interpretation of the Whitaker (2009) findings.

We also test to see whether farm households view the combination of farm production income and marketing loan benefits as a stable source of income. If they do, we would expect to see a higher rate of marginal consumption from the combination of farm income and marketing loan benefits into a single income source. We instrument this combined income variable using all lagged farm-related income. The result is a marginal rate of consumption of 0.083, a change of only -0.002 from the marginal rate estimated for farm production income alone reported in Table 2. Thus it appears that farm households may not view marketing loan benefits as a stabilizer of farm production income, but rather as a "parallel" volatile income source.

Different Marginal Rates of Consumption for Different Consumption Categories

The possibility that farm households differentiate between income sources based on more behavioral criteria raises the possibility that they cate-gorize their income for the purchase of specific consumer goods. We now look at the impact that disaggregated incomes have on different consumption shares as set forth in equation (3). Again, nonfarm income and farm production income are instrumented with their respective lagged values as previously described. Table 4 shows mixed results, suggesting that consumption varies not only by income source, but by consumption category.[13]

Food consumption is affected significantly by nonfarm income, farm production income, countercyclical payments, and other government payments. Marketing loan benefits appear to be negatively correlated with food consumption, but at a

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[13] Additional specifications of the model were considered. We included as independent variables farm type, farm size, three variables for the number of children in the household under 6, 13, and 18 years of age, and the education of the operator, in addition to state-level dummy variables and the other farm household characteristics. This augmented regression had mixed results over the different consumption categories. For example, there was virtually no difference in the results for food expenditures, but for home improvement expenditures, the impact of marketing loan benefits decreased by half, going from positive and significant to not significantly different from zero. Other estimates remained relatively unchanged.

Table 4. Impacts of Disaggregated Income on Disaggregated Household Expenditures (2003–2005)

Variable	Food	Home Improvements	Other Living Expenses	Retirement
Nonfarm income [a]	0.015***	0.018***	0.053***	0.034***
	(0.003)	(0.006)	(0.009)	(0.006)
Farm production income [b]	0.008***	0.002	0.033***	0.013***
	(0.002)	(0.003)	(0.006)	(0.005)
Direct payments	0.010	-0.011	0.032***	0.027***
	(0.007)	(0.008)	(0.010)	(0.010)
Countercyclical payments	0.029**	0.023**	0.053***	0.012
	(0.013)	(0.010)	(0.019)	(0.011)
Marketing loan benefits	-0.009	0.019*	0.044**	0.018*
	(0.007)	(0.010)	(0.021)	(0.010)
Other government payments	0.027**	0.001	0.043***	0.006
	(0.014)	(0.012)	(0.016)	(0.007)
H_o: All incomes are fungible	Reject	Reject	Fail to reject	Reject

[a] Instrumented with lagged total nonfarm income.

[b] Instrumented with lagged total farm income, including government payments.

Note: *, **, and *** represent significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are in parentheses. Data are taken from the Agricultural Resource Management Survey (ARMS) for the years 2003 to 2005. Independent variables not included are operator age, operator age squared, household size, and year dummy variables. The coefficients for year dummies are not significant at any reasonable level.

rate not significantly different from zero. Direct payments also appear to not significantly affect food consumption. We reject the hypothesis that all income sources are fungible in food consumption.

Home improvement expenditures are affected in a statistically significant way by nonfarm income, countercyclical payments, and marketing loan benefits. For this consumption category, it is direct payments that show a negative correlation, but the estimate is not significantly different from zero. It appears that nonfarm income, marketing loan benefits, and countercyclical payments are fungible in the consumption of more durable home improvement goods. Again, we reject the hypothesis that incomes from all sources are fungible in the consumption of home improvement goods. Further, we can also reject the hypothesis that farm production income and all sources of government-subsidized income are fungible.

The results are quite different for the consumption category "other living expenses." Incomes from all sources appear to be fungible. This implies a perfect substitutability of incomes in the consumption of everyday, relatively nondurable, nonfood goods. The consumption of other living expenses increases by the same amount when income from any source increases.

Expenditures on retirement products such as retirement accounts increase with marginal increases in nonfarm income, farm production income, direct payments, and marketing loan benefits. Again, while we reject the hypothesis that all income sources are fungible, we cannot conclude that farm production income and the separate government subsidy incomes are not fungible.

These results suggest that in some cases, farm households reserve income from certain sources for the consumption of specific goods. Knowledge about how and why farm households differ-

entiate between income sources could indicate ways in which particular types of policies are likely to impact farm households. The implications of this possibility go beyond the bounds of agricultural sector assistance programs and may have relevance for all government transfer payments.

Conclusions

We find evidence to support the hypothesis that farm households differentiate between sources of income with respect to consumption. This confirms results already found in the literature and implies that different federal support programs may have different impacts on consumption and, therefore, on farm household well-being. Farm households appear to differentiate between income sources based on income volatility as well as on more nuanced "rule of thumb" behaviors. Our results are most fully explained by the more behavioral response, but they also support the role of volatility in differing marginal rates of consumption.

Much additional work remains to be done in fully understanding the implications of these findings for policy design. If income volatility is not the primary determinant of farm household expenditure decisions, then policies attempting to reduce volatility may have little effect on improving or supporting farm household well-being. For example, the findings regarding marketing loan benefits suggest, in fact, that income stabilization policies may not create stable incomes from the point of view of the farm household, or at least as revealed in their associated consumption choices.

Similarly, although not directly tested by this research, mental accounting, or labeling, may be driving the low levels at which farm production income and marketing loan benefits impact household spending, as compared to direct and countercyclical payments. Income from production-related activities may be reinvested into production while income not tied to production, such as direct and countercyclical payments, may be seen as closer to nonfarm income due to its decoupled nature, and thus available for household uses.

Yet another field for further research is the difference in expenditure patterns for direct payments and countercyclical payments. Although countercyclical payments do not appear to be used in the same way as other volatile income sources, they also do not follow the same consumption pattern as nonfarm income or direct payments. Do farm households differentiate between direct and countercyclical payments based on labeling or other behavioral decision-making rules?

Our efforts have been to explore some aspects of how farm households use varied income sources in different ways. Our findings convince us that separate incomes are not necessarily fungible in the consumption of different farm household consumption goods. But at this point, we have probably succeeded more at raising intriguing new questions than at providing definitive answers. We therefore believe that future research should be approached by looking at more disaggregated data on income sources and consumption expenditures.

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