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Government subsidized farm savings accounts have gained attention as possible risk management tools. These accounts encourage farmers to set aside funds in high income years to be drawn upon in low income years. This study considers two potential savings programs, Farm and Ranch Risk Management (FARRM) accounts and Counter-Cyclical (CC) farm savings accounts. FARRM accounts use tax deferral as the primary incentive for participation and under CC accounts the government would match farmer deposits up to $5,000.

This report examines the potential benefits of these accounts for New York dairy farmers. The study illustrates how the selection of different income to define eligibility will impact the potential eligibility and benefits received by the accounts. In particular, if measures do not correct for changes in farm size, the value of the accounts to commercial farmers will be greatly reduced. Although participation and benefit estimates vary by the specific net and gross income measures used to define participation and allow withdrawals, the differences were relatively small. The analysis indicates that most commercial dairy farms would be eligible to build substantial balances in the accounts. The use of net income measures as opposed to gross income measures increases the likelihood that farmers will be able to access the funds deposited in the accounts.

The next sections of the study describe the construction of the farm data used to analyze the account programs. Then, the analysis of Farm and Ranch Risk Management (FARRM) and Counter-Cyclical (CC) farm savings accounts is presented. The analysis begins by describing the magnitude and degree of variability in measures of net income and gross farm income. Next, the analysis considers the ability of farmers to contribute to FARRM and CC accounts. Finally, the study considers the likelihood that farmers will be able to withdraw funds from the accounts and provides some very basic estimates of the potential benefits associated with FARRM and CC accounts.

Data Preparation and Analysis

Two data sets were developed to examine income variability for New York dairy farms. The farm level financial data comes from the Cornell Dairy Farm Business Summary program. Extension personnel working with farmers collect the data. All included records must meet cash and equity reconciliation standards. The first data set contains farms that had completed the financial summary program for each of the years 1997 to 2001. The second data set contains farms that completed the summary for each of the years 1993 to 2001. The five-year panel contains the financial records of 142 dairy farms and the 9-year panel contains the financial records of 89 dairy farms.

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Calculation of Farm Income Measures

Four measures of farm income were calculated to assess the viability of farm savings programs. The income measures were based upon income tax definitions. Two measures of gross income and two measures of net taxable income were calculated. The first two measures were based upon 1040 Schedule F. The procedure for calculating the Schedule F measures are shown in Table 1.

Table 1. Calculation of 1040 Schedule F Gross and 1040 Schedule F Net Farm Income from Dairy Farm Business Summary Records

Components	Description
Total cash receipts from farming	Cash receipts from the sale of farm products in a given calendar year. DFBS records include all revenue from farm operations.
- cattle sales	Sales of breeding livestock (both purchased and raised) are included in total receipts and must be subtracted to determine 1040 Schedule F gross income.
= Schedule F Gross Farm Income	Our estimate of the gross 1040 Schedule F income.
- total cash expenses	Any cash farm expenses in a given calendar year.
- real estate depreciation	Any depreciation taken on any real estate items in a given calendar year.
- machinery depreciation	Any depreciation taken on machinery in a given calendar year.
- livestock depreciation	Depreciation on purchased livestock. Estimated based upon culling rates and historical purchases.
= Schedule F Net Farm Income	Our estimate of net 1040 Schedule F income.

Several expense and revenue components do not appear on 1040 Schedule F. In order to examine the importance of total farm measures, two additional income measures of income were calculated. Again, one gross and one net measure were calculated. Total farm gross income was obtained by adding the gain or loss from the sale of livestock (purchased and raised) to Schedule F gross farm income. Total farm net income was calculated by subtracting the 1040 Schedule F expenses from total farm gross income. Table 2 describes these calculations and their components.

Table 2. Calculation of Gross and Net Taxable Farm Income from Dairy Farm Business Summary Records

Components	Description
1040 Schedule F Gross Farm Income	Our estimate of the gross 1040 Schedule F income.
+ sale of raised breeding livestock	Sale of raised breeding livestock held more than one year. Calculated subtracting sales of purchased livestock from total breeding livestock sales.
+ gain (loss) on the sale of purchased breeding livestock	Gain (loss) on the sale of culled, purchased livestock. Estimated based upon culling rates, historical purchases, purchase prices, and sales prices.
- loss on the death of purchased breeding livestock	Loss on the sale of purchased breeding livestock. Estimates based upon recorded death rates and historical purchase prices.
= Estimate of Total Farm Gross Income	Estimate of gross farm income.
- 1040 Schedule F expenses	Cash expenses plus real estate depreciation plus machinery depreciation plus livestock depreciation.
= Total Farm Net Income	Our estimate of net taxable total farm income.

Estimation of depreciation and gain or loss on livestock
It is important to note that, as the Dairy Farm Business Summary data are collected, the sale of breeding livestock is included in the total cash receipts for each farm and the expenses for raised livestock are included in the total cash expenses for each farm. In order to calculate Schedule F net income, it was necessary to exclude breeding livestock income and estimate depreciation on purchased livestock. Likewise, in order to calculate total farm net income it was necessary to estimate gain or loss on the sale of purchased breeding livestock, and loss from death of purchased livestock, as well as livestock depreciation. The estimation procedure was based upon actual farm livestock purchases and culling rates. The estimation was complicated because the farm business summary only collected information regarding culling rates beginning in 1999. The farm business summary recorded actual purchases of livestock for all years under consideration.

Because depreciation on purchased livestock in any given year is influenced by purchases in previous years, it is necessary to consider how purchases (and culling decisions) impact depreciation. A simple model was developed to estimate the amount of current year depreciation of purchased livestock. Livestock are considered 5-year property for depreciation purposes. The estimation process seeks to establish a percentage of purchases that are depreciated and a percentage that are counted as sold or died in each year.

Table 3 shows the calculation of these percentages under a 33% culling rate and a death loss of 3.7%. The average culling and death rates for each farm were estimated based upon the average culling and death rates employed/experienced by the farm over the years 1999 – 2001. Thus, it varies according to the actual culling practices employed on a particular farm. Similarly, the death loss was calculated according to the death losses experienced by the farm. Both values were necessary to determine the number of animals remaining in any given year.

Table 3. Calculation of Depreciation and Death Loss on Purchased Livestock[a]

Year	1	2	3	4	5	6
Culled (% of original purchase)	33.0%	20.9%	13.2%	8.4%	5.3%	3.4%
Percent of animals lost to death (% of original purchase)	3.7%	2.3%	1.5%	0.9%	0.6%	0.4%
Continued in herd (% of original purchase)	63.3%	40.1%	25.4%	16.1%	10.2%	6.4%
Depreciation expense (percent of original purchase)	6.3%	8.0%	5.1%	3.2%	2.0%	0.6%
Death loss (% of original purchase)	3.70%	2.11%	1.04%	0.47%	0.18%	0.04%
Tax basis	100%	90%	70%	50%	30%	10%

[a] Using average death and culling rates for all farms of 3.7 and 33 percent, respectively, and assuming straight line depreciation.

Depreciation

Depreciation as a percent of purchases in any given year is found in the 3rd row from the bottom of Table 3. For instance, in year one we would expect that a farm with a 33% culling rate and a 3.7% death loss would have depreciation equal to 6.3% of the purchases that they made in that year. This amount was determined by calculating the proportion of animals remaining in the herd after culling and death at the end of year one and applying the half-year convention. In this case, that would amount to 63.3% of the animals (100%*(1- (culling rate + death rate))) times 10%. The amount of animals remaining in the herd at the end of year two is 40.1% (100%*(1- (culling rate + death rate))^2) and these animals receive a full 20% depreciation in year two. Thus, 8% of the original (year one) purchase is depreciated in year two and so on. Therefore, in order to calculate the depreciation in any year it is necessary to multiply purchases in the previous 5 years by the appropriate percentage. The analysis assumes that the culling and death rates for newly purchased animals are the same as experienced for the rest of the herd.

Death loss

The loss on the death of purchased animals was calculated in a similar fashion. Table 3 shows the calculations for the case of an average death loss of 3.7%. The death losses for each farm were based upon the actual death losses experienced by a particular farm over the period 1999-2001. Again, the culling rates were based upon the 1999-2001 average of the farm. The culling rate is necessary to determine the amount of animals remaining in the herd. The proportion of animals lost to death is calculated by multiplying the proportion of animals remaining at the beginning of the year by the death rate. For example, 2.3% of the animals purchased in year one will die in year two. The loss on these animals is determined by multiplying the proportion of animals lost to death by their remaining tax basis at the time of death. In our example, the dollar loss due to death in year two would amount to 2.1% of the original purchase price (death loss*tax basis) or 2.3%*0.9. Thus, in order to calculate the dollar loss due to death for a given year, one would multiply the purchases in the current and previous five years by the proportions in the second to last row of Table 3.

Gain or Loss on Sale

In order to estimate the gain or loss on the sale of purchased breeding livestock it was necessary to determine sale price of the purchased livestock. Although DFBS records include data on the number and dollar amounts of livestock sales for 1999-2001, the number of animals sold prior to 1999 was not collected. This made it necessary to estimate the value of cull livestock sold prior to 1999. Historical data on the value of replacement livestock and value of cull dairy cows was used as the basis of this estimate (New York Agricultural Statistics). The historical reported cull price was multiplied by the average cull weight (1230 pounds) for all DFBS cull animals sold 1999-2001. The average receipts per animal were estimated by dividing cash cattle sales by the number of cull animals sold on each farm. Average receipts per animal were then divided by the average reported cull prices for the corresponding year to obtain the average weight per animal. This average was used for all years. Farms that sold replacement livestock were excluded from this analysis. Table 4 shows the replacement prices, cull prices, and cull values for New York dairy farms over the period 1987-2001. These results were then used to establish a relationship between the purchase price of the animals and their culling sale price.

Table 4. Value of Cull and Replacement Livestock, 1987 – 2001

	Replacement Value ($'s per head)	Cull Price ($/Cwt)	Cull Value ($'s per head)[a]
1987	840	40.7	500.61
1988	910	44.1	542.43
1989	960	45.7	562.11
1990	1100	48.7	599.01
1991	1030	47.0	578.10
1992	1070	44.6	548.58
1993	1100	45.0	553.50
1994	1090	41.3	507.99
1995	1090	35.3	434.19
1996	1010	29.8	366.54
1997	1000	32.8	403.44
1998	1010	32.3	397.29
1999	1190	32.8	403.44
2000	1230	36.2	445.26
2001	1410	38.4	472.32

[a] Cull price times 1230 pounds per animal.
Source: Agricultural Statistics, USDA

The gain or loss on the sale of purchased livestock was calculated by subtracting the sale price of the livestock from the estimated tax basis of the livestock. This calculation is relatively complex because in any given year animals of different ages are being sold. The tax basis was determined by multiplying previous purchases by the appropriate tax basis percentage. For instance, the 1998 tax basis of 1996 purchases would be 70% of 1996 purchases with straight line depreciation. In order to calculate the loss on these animals one must determine the proportion of animals sold in 1998. This was accomplished by multiplying the proportion of animals being culled by the original 1996 purchase value. If the culling rate was 33% and the death rate was 3.7%, approximately 13.2% of the 1996 purchases would be sold in 1998 (Table 3).

The selling price of these animals was determined by multiplying the 13.2% of the 1996 purchases by the relationship between 1998 value of culled livestock and the value of 1996 replacement livestock. In this case the cull value for 1998 was $397.29 per head and the replacement livestock purchased in 1996 were valued at $1,010 per head (Table 4). Thus, the purchases in 1996 were multiplied by 39.33% to determine the sales price. Because the tax basis is 70% of the purchase price (Table 3) and the selling price is 39.33% of the purchase price, the loss is estimated as 30.67% of the 1996 purchases that were culled in 1998. Because 13.2% of the 1996 purchases were culled in 1998 (Table 3), the loss is estimated as 30.67%*13.2% or 4.04% of 1996 purchases. If the sales price exceeds the tax basis, the loss will be negative, indicating a gain.

The relationship between the selling price and the purchase price of culled animals will depend on the years under consideration. The relationships between purchases and sales prices for each year from 1993 to 2001 are shown in Table 5. For instance, Table 5 shows that animals purchased in 1998 and sold in 2001were sold for 46.8% of their original purchase price. When information was not available on historical purchases, i.e., purchases prior to 1993, the average purchases, over the maximum number of years of data, were used

Table 5. Relationship Between Purchase Prices of Replacement Livestock and Sales Prices of Culled Livestock, 1993 – 2001

		Sales Price as a Percent of Original Purchase Price								
		Year Sold								
		1993	1994	1995	1996	1997	1998	1999	2000	2001
Year Purchased	1988	60.8								
	1989	57.7	52.9							
	1990	50.3	46.2	39.5						
	1991	53.7	49.3	42.2	35.6					
	1992	51.7	47.5	40.6	34.3	37.7				
	1993	50.3	46.2	39.5	33.3	36.7	36.1			
	1994		46.6	39.8	33.6	37.0	36.4	37.0		
	1995			39.8	33.6	37.0	36.4	37.0	40.8	
	1996				36.3	39.9	39.3	39.9	44.1	46.8
	1997					40.3	39.7	40.3	44.5	47.2
	1998						39.3	39.9	44.1	46.8
	1999							33.9	37.4	39.7
	2000								36.2	38.4
	2001									33.5

<u>Raised Livestock Sales</u>

The final step in the estimation of taxable income was to compute the raised livestock sales, because purchased livestock sales were included with sale of raised animals in cash breeding livestock sales in the original data set. This is accomplished by subtracting the estimated value of purchased livestock sold from total livestock sales. The estimate of purchased livestock sold was calculated by multiplying the value of purchased livestock times the proportion of livestock culled in any given year (Table 3) by the relationship between replacement purchase price and cull sales price (Table 5). For example, the amount of 1998 purchased livestock sold in 1998 was calculated by multiplying 1998 purchases by 33% (proportion culled) and 39.3% (relationship between replacement and cull price). In order to determine the total amount of purchased livestock sold in 1998 the same procedure was applied to purchases made from 1993 – 1997.

The 6.4 percent of purchased animals remaining in the herd after the sixth year would be sold in future years and would be 100 percent gain because the tax basis is zero. These are included with the raised livestock sales, because sale of purchased animals only counts sales during the first six years after purchase. This procedure correctly calculates gain, although a small part of the gain counted as the sale of raised animals, which would be capital gain, is really gain from the sale of purchased animals, which would be ordinary gain.

Summary data for estimated livestock sales and gain or loss for all farms in the sample for the most recent five years are shown in Table 5a. The estimated annual loss on the sale of purchased livestock is approximately equal to the estimated depreciation expense for purchased livestock.

Table 5a. Estimated Livestock Sales, Gains, and Losses, 142 New York Dairy Farms, 1997-2001

Year	Raised livestock sales	Purchased livestock sales	Depreciation on purchased livestock	Death loss	Loss on sale of purchased
1997	$20,735	$6,873	$6,584	$3,007	$7,079
1998	$21,680	$6,683	$6,623	$2,564	$6,921
1999	$24,491	$7,176	$7,195	$3,045	$8,757
2000	$29,612	$8,529	$8,098	$3,577	$9,647
2001	$30,552	$8,523	$8,644	$3,412	$9,588

Results

The data were analyzed to assess several aspects of the proposed farm savings account programs. These analyses focused on two specific savings account proposals. The proposals considered are often referred to as farm and ranch risk management accounts (FARRM) and farm counter-cyclical savings accounts (CC accounts). This section of the report presents the results of the analysis of each type of account. The analysis focuses on addressing three broad questions for each type of account. Specifically, we analyze:

1) the magnitude and degree of variability in measures of net income (FARRM) and the magnitude and the degree of variability in measures of gross farm income (CC accounts);
2) the ability of farmers to contribute to FARRM and CC accounts; and,
3) withdrawals from and benefits obtained by contributing to FARRM and CC accounts.

The analysis of income variability is relatively straightforward. An important difference between FARRM and CC accounts is that they are based on different measures of income. FARRM accounts are driven by a measure of net income, while CC accounts are driven by a measure of gross farm income. Similarly, the benefits for the programs differ. The main benefit from FARRM accounts is tax deferral and possible tax exemption, while CC accounts provide farmers a matching government deposit. Finally, the ability to withdraw funds is different for the accounts. Withdrawal from FARRM accounts is not restricted, while withdrawal from CC accounts is subject to shortfalls from a gross income target. Each of these issues is examined in the results section.

Analysis of FARRM Accounts

The FARRM account proposal uses tax deferral as an incentive for farmer saving. Although a variety of proposals have surfaced, the analyses in this report follow the basic idea that farmers would be allowed to take a tax deduction of up to 20 percent of eligible farm income for contributions made to a FARRM account. Although the program specifies that a measure of net income will be used to determine eligibility, the definition is somewhat ambiguous with respect to the components included in the measure. In addition, because many dairy farms have substantial income and expenses that are included on IRS form 4797, there is some interest in examining the importance of the net income measure selected to determine eligibility. For this reason, two alternative measures of net farm income were considered. The measures considered used to analyze FARRM accounts are Schedule F net farm income (Table 1) and total farm net income (Table 2).

FARRM Accounts: Analysis of Net Income Variability

In order to understand the potential benefit of FARRM accounts, it is important to examine the net income variability faced by farmers. Because the implementation of both FARRM and CC account proposals use would rely upon tax information the present study considers the variability in measures of taxable income. These measures do not necessarily reflect the actual or accrual profitability of the farms under consideration. The first set of analyses of FARRM Accounts considered the magnitude and extent of variability in two measures of taxable net farm income, Schedule F net farm income (hereafter referred to as NSF income) and total farm net income (hereafter referred to as NTF income). Table 6 presents the means and standard deviations of several summary measures of the variability of NSF and NTF income across the farms in our study.

Table 6. Average Income Variability per Farm, 142 New York Dairy Farms[a], 1997-2001

Measure	Mean	Standard Deviation	Minimum	Maximum
Total Farm Net Income				
Difference Between Highest and Lowest year's income ($'s)	$131,436	$195,048	$6,631	$1,778,229
Largest Negative Deviation from Mean ($'s)	$68,112	$120,410	$3,184	$1,251,549
Largest Negative Deviation from Mean (% of mean)	245%	506%	8%	3572%
Schedule F Net Farm Income				
Difference Between Highest and Lowest year's income ($'s)	$125,076	$190,511	$8,789	$1,778,293
Largest Negative Deviation from Mean ($'s)	$63,789	$117,089	$4,520	$1,242,416
Largest Negative Deviation from Mean (% of mean)	235%	518%	15%	5247%

[a]The statistics reported in the table are the average across farms n = 142. For instance, the difference between the highest and lowest net taxable income over the 5 year period was calculated for each farm and these values were averaged.

Several conclusions can be drawn from the analysis of the variability in the two measures of net income. First, one can see that both measures of net income produce similar estimates of the amount of variability experienced by the farms in the sample. Second, the average variability in net income is substantial. Over a five-year period the average difference between the highest and lowest NTF for the 142 farms was $131,436 and the standard deviation was $195,048. This would suggest that many farms experience dramatic changes in net income over a five-year period.

While the measures that utilize percentages are influenced by incomes that are close to zero, they present similar situations and the conclusions drawn from these measures are similar. Specifically, there is a substantial amount of income variability over a five-year period and that the specific measure NTF or NSF used as the basis for the analysis does not substantially influence this conclusion. We also compared the averages across farms to the averages across years. Table 7 reports the average NTF and NSF for all farms by year. The difference between the highest and lowest average NTF and NSF was $62,247 and $60,209, respectively. The analysis at the individual farm level indicates that the variability is much greater than the difference between the average incomes. As expected the total farm net income is greater than Schedule F income due to the inclusion of livestock sales that are only partially offset by losses on the sale of purchased livestock.

Table 7. Average Net Taxable Income Per Year, 142 New York Dairy Farms.

Year	NTF	NSF
1997	$24,039	$13,389
1998	$65,057	$53,115
1999	$86,286	$73,598
2000	$36,090	$19,702
2001	$64,353	$46,801

The average NSF and NTF income over the five year period was also calculated for each farm. The distribution of these averages shows that NSF and NTF are relatively similar for each farm (Figure 1). However, it is apparent that most farms are able to generate a greater NTF than NSF. The distribution also shows that the range in average income across farms is quite wide. Some farms generated negative NSF and NTF income while approximately 20 farms generated average incomes in excess of $100,000.

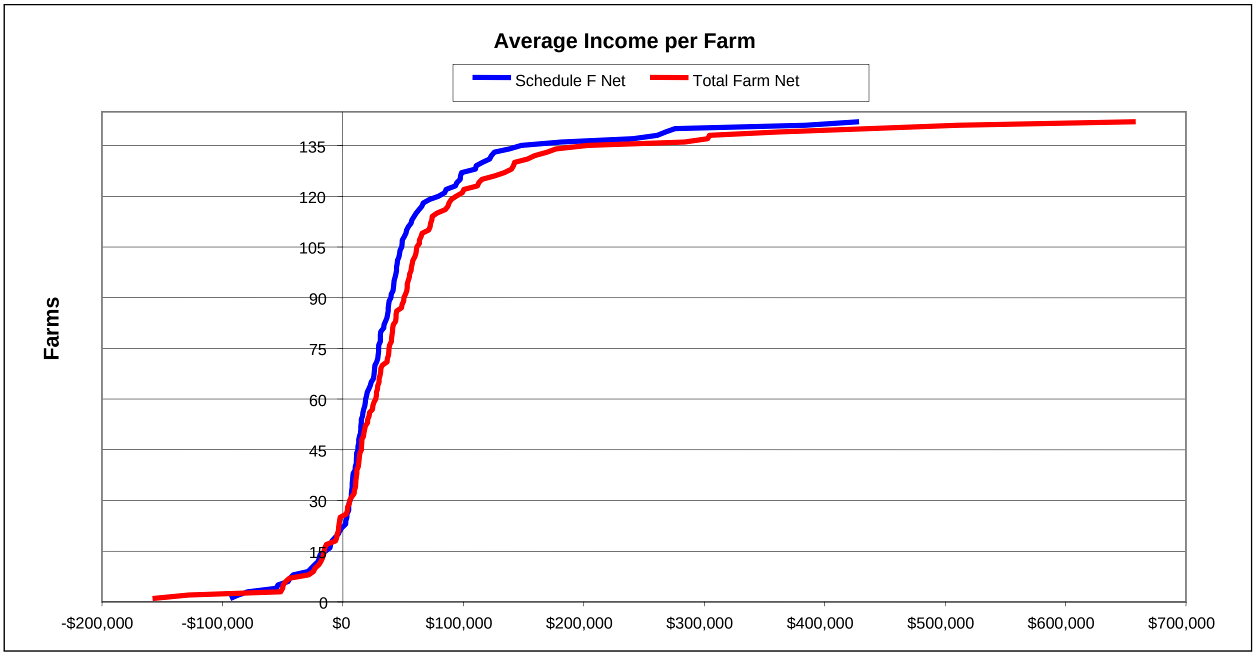

Figure 1. The Cumulative Distribution of Average NTF and NSF Income by Farm, 1997-2001, 142 New York Dairy Farms

To further investigate the range for NTF and NSF, the distribution of the range for each variable is plotted by farm in Figure 2. The figure indicates that the distributions of the differences in NTF and NSF are highly skewed. For 105 of the 142 farms, the difference between the greatest and lowest NTF is less than $162,000. The figure also illustrates the close correspondence between the two measures of net income. There are several factors that might cause variation in net income from year to year. These would include price changes (both input and output), variation in production levels and changes in farm size. Several of the farms in the sample have experienced growth over this time period. In fact the average percentage growth in herd size over the period 1997-2001 was 20%.

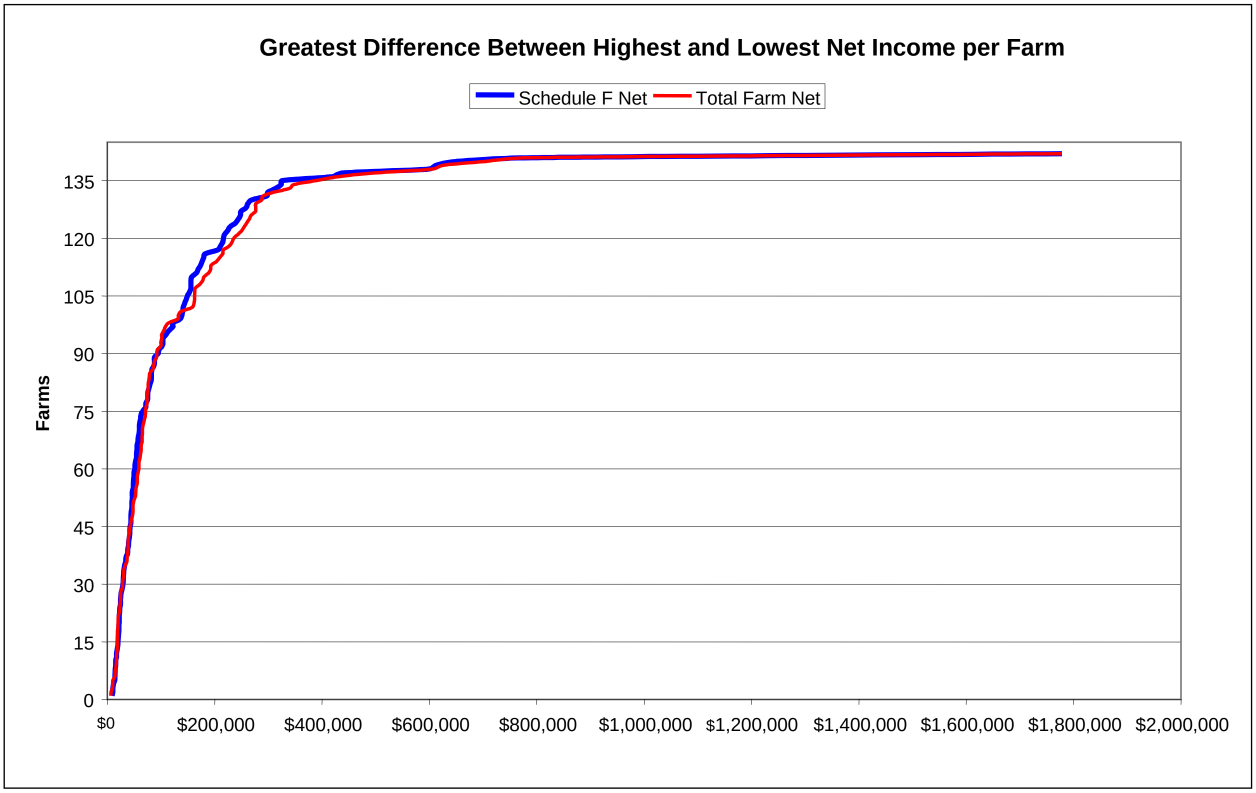

Figure 2. Differences Between the Highest and Lowest Net Farm Income per Farm, 1997-2001, 142 New York Dairy Farms

<u>FARRM Accounts: Analysis of Eligibility</u>

Eligibility to gain tax deferral benefits is dependent upon the farmer having positive taxable income. Funds invested in FARRM accounts are tax deductible, and thus, reduce taxes in the year of investment. The income is taxed in the year it is removed. Therefore, unless the tax rate on the funds in the year they are removed is less than in the year of the deposit, the advantage is the deferral of taxes. The deferral of taxes allows the farmer to invest the deferred taxes and earn interest income (which is taxable). The ability to defer taxes to a tax year in which the farm is in a lower tax bracket would result in lower taxes, creating an incentive for contribution to a FARRM account. For instance, a farmer could contribute to a FARRM account in a year in which the funds would be taxed at the 27% marginal tax bracket and then withdraw the income in a year where they find themselves in a lower tax bracket. For these reasons, the marginal tax bracket plays a critical role in determining the value of FARRM accounts.

The first step in the analysis was to determine how frequently farmers actually had taxable income. A farmer with a positive taxable income is eligible to contribute up to 20% of this income to a FARRM account. The proportion of farmers with a positive NSF or positive NTF varies by year (Table 8). In most years the proportion of eligible farmers is only slightly higher under the positive NTF rather than the positive NSF eligibility rules. The smallest proportion of farmers would qualify in 1997 when only 63 percent had a positive NSF and 70 percent of the farmers had a positive NTF. Although well over half of the farms would be eligible to contribute to a FARRM account, it is important to remember that many farms will show a positive NSF or NTF and still pay no taxes because of standard or itemized deductions and personal exemptions. Thus, those farms with low income levels would have little incentive to contribute to FARRM accounts. In the balance of the report, references to standard deductions refer to the sum of the standard or itemized deductions and personal exemptions of the taxpayer (standard deduction). This analysis simply considers whether the farmer would have a positive NTF and is equivalent to assuming that non-farm income would exactly offset the standard deductions available to the farm. It is also important to remember that the benefit of tax deferral and tax exemption is greater for those farms in higher tax brackets. Both of these issues will be revisited in detail in the section dealing with estimating the benefits of FARRM accounts.

Table 8. Percent of Farmers Eligible to Contribute to a FARRM Account Under Two Measures of Taxable Farm Income, 142 New York Dairy Farms, 1997-2001

Year	Schedule F Net Farm Income	Total Farm Net Income
Entire Period	78	80
1997	63	70
1998	85	85
1999	85	86
2000	77	77
2001	78	82

Analyses were also conducted to examine how frequently individual farms would be able to contribute over the five-year period. The results in Table 9 show the percent of farmers able to make up to 5 contributions to a FARRM account under the two measures of net income. Nearly all of the farms had a positive net income at some point in the five-year period. However, with an NSF trigger only 44 percent of the farms would have been eligible to contribute to a FARRM account all five years. In this case using an NTF trigger would enable 57 percent of the farms to contribute to the account each of the five years. These results indicate that many farmers would find years when they are unable to contribute to a FARRM account. This would suggest that they would want to withdraw income from the accounts in these years to offset the low net income.

Table 9. Percent of Farmers with Income Enabling them to Contribute to FARRM Accounts[a], 142 New York Dairy Farms, 1997-2001

Number of Years Qualified to Contribute	Schedule F Net Farm Income (% of Farmers)	Total Farm Net Income (% of Farmers)
0	1	1
1	6	8
2	10	8
3	13	11
4	26	15
5	44	57

[a] Entries in table identify the percent of 142 farms eligible to contribute to FARRM Accounts. For instance, 1 percent of the 142 farms never generated enough income to contribute to a FARRM account.

The results would suggest that in any given year we would expect nearly 80% of the farmers to be eligible to make a contribution using either an NTF or NSF trigger. However, it is important to remember that tax deferral and possible income tax reductions provide the primary incentive for participation. Although many of the farmers have a positive NTF, standard deduction will allow many of the farms to avoid tax liability. Producers whose NSF or NTF is close to zero are unlikely to pay income taxes, thereby reducing the incentive for participation. Table 10 shows the percent of farmers that would be eligible to contribute to the FARRM accounts if NTF is reduced by the amount of the standard deduction for a married couple filing jointly ($7,850) and two personal exemptions ($6,000) for a total deduction from net taxable farm income of $13,850 (year 2002). Our analyses do not consider any income other than farm income and make no allowances for deductions for state income tax or self-employment taxes or other credits. After applying these deductions, the number of farms that would have an incentive to contribute to the FARRM accounts falls ten percentage points. For instance, in 1997, 63% of the farms were eligible to contribute to the accounts (Table 8 and Table 10), but only 54% of the farms would have a positive NTF after standard deductions were applied.

Table 10. Percent of Farmers with Tax Liability After Standard Deductions and Exemptions, 142 New York Dairy Farms, 1997-2001

Year	Percent of Farms
Entire Period	68
1997	54
1998	72
1999	79
2000	66
2001	71

The next step in the analysis was to calculate the amount of funds eligible for deposit. Again, this was done for both NTF and NSF triggers. In both cases, it was assumed that eligible farmers would contribute 20 percent of either their NTF or NSF to the FARRM account. This is reasonable because the contribution can be withdrawn at any time and it allows the farmer to defer the tax for a minimum of one year. For example, a farmer could make a deposit in December of year one, or likely up to April 15 of year two, and then withdraw the funds early in year two, or a few days after deposit. Taxes are deferred for a year and only a few days of interest are incurred to obtain use of the funds. Deferral also opens the possibility that the farmer could reduce the tax rate (possibly to zero) on some of the deposited funds if their taxable income fell in the subsequent year(s). The actual benefit of the deferral amounts to the interest the farmer gains on the funds that would otherwise be paid to the government plus any tax exemption that the farmer is able to obtain due to falling income. These issues are covered in the section dealing with the benefits of the farm accounts.

Over the entire period, the average eligible deposit to FARRM accounts by farms was slightly greater under the NTF measure than under the NSF measure (Table 11). Under the 20% contribution rule farms would deposit on average $13,382 with a NTF trigger and $10,610 with a NSF trigger. Depending upon the tax bracket, this would result in a modest amount of tax deferral. The average deposits were also calculated for each year of the time period to assess how variable the deposits were from year to year. As expected the average deposits from year to year closely follow the average income of the farms for that year. It is clear that the NTF trigger allows the farms to defer a greater amount of their tax liability. In all years the amount of the contribution is greater than 20% of the average NTF or NSF. This is due to the negative incomes that count towards the average NTF or NSF but not toward the contributions.

Table 11. Average Maximum Contributions to FARRM Accounts per Farm by Year, 142 New York Dairy Farms, 1997-2001

Year	Schedule F Net Farm Income	Total Farm Net Income
Entire Period	$10,610	$13,382
1997	$5,975	$8,233
1998	$11,901	$14,359
1999	$15,710	$18,324
2000	$7,902	$10,870
2001	$11,560	$15,124

The final balances in the account will depend upon the amount of the deposits that are withdrawn in any given year. The amounts of withdrawals are dependent upon the tax benefits of the account. A later section of the report provides actual estimates of the withdrawals from FARRM accounts. The next section in the report examines the likelihood that a farmer will receive tax benefits from the accounts.

The marginal tax bracket is important in determining the benefits of FARRM accounts. The greatest benefit from FARRM accounts occurs when farmers can contribute in years with a high tax liability and withdraw in years with a reduced tax liability. In order to assess the tax situation, a series of analyses were conducted to determine the farmer's marginal tax bracket with and without FARRM account contributions and with and without standard deductions.

The first step in the analysis was to calculate the marginal tax bracket based only upon NTF. Next, the marginal tax bracket was calculated after subtracting a contribution to a FARRM account based upon either NSF or NTF income. The results of this analysis are reported in Table 12 for each year of the study period. In 1997, 30% of the farmers had no tax liability before standard deductions, 30% had no tax liability after a contribution based upon NSF income and 30% had no tax liability after a contribution based upon NTF income. This is surprising since one would expect the contributions to move some farms into the zero tax bracket. In later years the results indicate that additional farms enter the 0% tax bracket after contributing to FARRM accounts. The results allow one to begin to assess the movement in tax brackets caused by contributions to FARRM accounts. There are several important conclusions that flow from this analysis. First, the movements created by contributions based upon NSF and NTF income are similar. The only meaningful difference occurs in 1997, when an additional 8% of the farms enter the 10% tax bracket under an NTF contribution and an additional 3% shift to this bracket under a NSF contribution. This analysis was conducted with constant 2002 federal income tax rates acknowledging that the 10% bracket was not available in 1997. The second key result is that the contributions to FARRM accounts cause relatively small proportions of the farmers to switch income tax brackets. Further, most of this switching occurs in the middle (10% to 30%) income tax brackets, some occurs in the top tax brackets, and no switching occurs in the lowest income tax bracket.

Table 12. Percent of Farmers in Various Tax Brackets Ignoring Deductions and Exemptions and Maximum Contribution to FARRM Accounts Under Two Alternative Qualifying Income Measures, 142 New York Dairy Farms, 1997 – 2001

	Marginal Income Tax Bracket						
Basis for Deposits	0%	10%	15%	27%	30%	35%	38.6%
			Percent of Farms, 1997				
No Deposits	30	12	37	15	2	2	4
Deposits based on Schedule F Net Income	30	15	39	11	1	1	3
Deposits Based on Total Farm Net Income	30	20	35	11	1	2	1
			Percent of Farms, 1998				
No Deposits	15	7	37	25	7	6	4
Deposits Based on Schedule F Net income	15	13	36	23	6	6	1
Deposits Based on Total Farm Net Income	15	13	37	22	5	5	2
			Percent of Farms, 1999				
No Deposits	14	7	23	35	8	7	5
Schedule F Net income	14	8	29	32	6	6	5
Net Taxable Income	14	8	31	32	8	3	5
			Percent of Farms, 2000				
Original	23	11	30	25	6	4	2
Schedule F Net income	23	11	36	22	4	3	1
Net Taxable Income	23	13	37	21	3	3	1
			Percent of Farms, 2001				
Original	18	9	28	26	7	6	5
Schedule F Net income	18	10	34	23	7	4	4
Net Taxable Income	18	11	34	23	6	4	4

If one considers the impact of subtracting standard deductions from NTF, we would expect that the shifts in income tax brackets would also impact the lower income tax brackets. The analysis proceeded in the same fashion with the exception that the amount of the standard deduction ($13,850) was subtracted from each of the income levels (Table 13). As expected, incorporating exemptions and deductions coupled with the FARRM contribution results in fewer farms with a tax liability. The general conclusion regarding the shifts caused by NTF or NSF based contributions does not change. Namely, both measures result in similar changes in the proportion of farmers in each tax bracket. The greatest shift to lower tax brackets comes in the low income year, 1997. It is also useful to note that a much greater proportion of the farmers in the higher income tax brackets are impacted by contributions to the farm accounts. That is, there are fewer farms that are in the higher brackets to begin with and they are more likely to change brackets as a result of contributing to a FARRM account than are the farmers in lower tax brackets.

Table 13. Percent of Farmers in Various Tax Brackets Assuming Deductions and Maximum Contribution to FARRM Accounts [a], 142 New York Dairy Farms, 1997 – 2001

	Marginal Income Tax Bracket						
Basis for Deposits	0%	10%	15%	27%	30%	35%	38.6%
			Percent of Farms, 1997				
No Deposits	46	15	24	10	1	1	4
Schedule F Net income	50	15	22	8	1	2	1
Net Taxable Income	53	15	20	7	1	3	1
			Percent of Farms, 1998				
No Deposits	28	9	30	20	5	6	2
Schedule F Net income	30	11	30	17	4	6	1
Net Taxable Income	32	12	30	16	4	5	1
			Percent of Farms, 1999				
No Deposits	21	7	27	26	6	7	5
Schedule F Net income	25	8	32	21	6	4	4
Net Taxable Income	24	11	32	21	6	3	4
			Percent of Farms, 2000				
No Deposits	34	7	32	18	5	3	2
Schedule F Net income	37	8	32	16	3	3	1
Net Taxable Income	37	8	32	16	3	3	1
			Percent of Farms, 2001				
No Deposits	29	11	23	21	6	4	5
Schedule F Net income	30	12	28	16	6	4	4
Net Taxable Income	31	15	26	15	6	4	3

[a] The analysis assumes that net taxable farm income is reduced by the amount of the standard deduction for married filing jointly of $7,850 and two personal exemptions ($6,000 total). The NSF measure is only used to determine the amount of the FARRM Account contribution.

The final analysis of the marginal tax brackets summarizes the percent of farmers in each marginal tax bracket over the entire period, 1997-2001 (Table 14). These results further illustrate the findings previously presented. The ability to contribute to FARRM accounts tends to push farmers from the top tax brackets to lower tax brackets and the choice of NTF or NSF as the mechanism for determining the contribution does not result in a significant difference.

Table 14. Percent of Farm Incomes in Each Marginal Tax Bracket Over a Five-Year Period Assuming Different Deductions and Contributions, 1997-2001[a]

Highest Marginal Tax Bracket	0%	10%	15%	27%	30%	35%	38.6%
No standard deduction	20	9	31	25	6	5	4
No standard deduction, FARRM based on NTF	20	13	35	22	5	3	3
No standard deduction, FARRM based on NSF	20	11	35	22	5	4	3
With standard deduction	32	10	27	19	5	4	4
With standard deduction, FARRM based on NTF	35	13	28	15	4	4	2
With standard deduction, FARRM based on NSF	34	11	29	16	4	4	2

[a] The percentages are of 710 observations. The observations are for 142 farms over a five-year period.

FARRM Accounts: Analysis Withdrawals and Benefits

To this point the analyses have relied on very basic assumptions. In order to estimate the withdrawals from FARRM accounts and the benefits obtained by depositing funds in the accounts one must make additional assumptions. In doing so it is useful to examine the possible motivations and benefits that might accrue by contributing to FARRM accounts. The most basic benefit obtained by contributing to the account is the deferral of tax liability for one year or more. Because the farmer must eventually withdraw the funds, the contribution is a deferral unless the contribution is withdrawn when the farmer is in a lower tax bracket resulting in taxation at a lower, possibly zero, rate.

The ability to defer taxes allows the farmer to invest funds that would ordinarily be paid to the government. The benefit of investing these funds can be expressed as:

$$(1) \qquad benefit_i = (balance_i * t_i)(r)(1 - t_i)$$

where $benefit_i$ is the net benefit in year i of deferring taxes on the amount deposited in the account in year i, $balance_i$, t_i is the marginal tax rate in year i, and r is the rate of return earned on the deferred taxes. This equation was used to estimate the benefit of deferring taxes in any given year. The benefits received by investing deferred taxes overstate these benefits, because they do not consider any opportunity costs for the funds. For instance, if the farm could pay down debt with these funds, the benefits would likely be negative unless the rate of return in the account, r, is quite high. The cumulative balance in the account was estimated by adding the maximum contribution in any year i to previous year's balance and subtracting any withdrawals from the account.

$$(2) \qquad balance_i = balance_{i-1} + contribution_i - withdrawal_i$$

Therefore in order to estimate the benefit in any given year it was necessary to estimate the withdrawals from the accounts. The following general relationship was used to estimate withdrawals from the accounts under the assumption that the farmer wished to minimize taxes paid.

(3)

$$withdrawalT_i = \begin{cases} 0 \quad \text{if} \quad bkt_i \geq bkt_{i-i} \\ \min\left[\left(target_i - \left(income_i - contribution_i - adjustments_i\right)\right), balance_{i-1}\right] \quad \text{otherwise} \end{cases}$$

where $withdrawalT_i$ is the withdrawal from the account in year ***i*** under the tax minimization assumption, *min* returns the minimum of the arguments in brackets and *bkt* is the farmer's tax bracket in the current and previous period. In order to determine the withdrawal it is necessary to set a target income measure for each year *i*, $target_i$. In this case the target measure was set as the highest income level associated with the farmer's current tax bracket. For instance, if the farmer was in the 27% tax bracket the income target was $112,850 (Table 15). The current tax bracket was determined by subtracting the contribution to the account under either a total farm net income target or a schedule F net income rule from net taxable income. In other words, the tax bracket was always based on NTF, but the contribution to the account could be based upon 20% of either a NTF or NSF contribution rule. This makes it possible, although unlikely, that the tax brackets could differ depending upon the income measure used to define the maximum contribution to the account. Our analysis only allowed farmers to withdraw funds from the account if their tax bracket fell from the previous year. It would be possible to consider withdrawals designed to maximize the current tax bracket regardless of the previous tax bracket, but such analyses would not maximize the potential income tax exemption benefits associated with the FARRM accounts.

Table 15. The Marginal Tax Brackets (2002 year) Used as the Income Target in Tax Based Withdrawal Models

Marginal Tax Brackets	Income
0%	$0
10%	$12,000
15%	$46,700
27%	$112,850
30%	$171,950
35%	$307,050
38.6%	>$307,050

In each period, the current period NTF or NSF reduced by current period contributions and other adjustments are subtracted from the target income. If the value is positive the farm withdraws the smaller of the shortfall or the balance in the account as of the previous period. This formulation allows the farmer to reduce income by the amount of current period contributions, but current period withdrawals are limited to the amount that had been contributed in prior periods.

Two different scenarios were examined with respect to the size of the standard deduction allowed the farmer. These standard deductions are symbolized with the $adjustments_i$ variable. For instance, the base scenario assumes no standard deductions in which case $adjustments_i$ is equal to zero. In another case, the farmer is allowed the standard deduction for married filing jointly with two personal exemptions and $adjustments_i$ is equal to $13,850.

Three additional withdrawal rules were also examined. These rules were based upon income targets and can be summarized by (4).

(4)

$$withdrawal_i = \begin{cases} 0 \quad \text{if} \quad target_i - income_i < 0 \\ \min\left[\left(target_i - income_i\right), balance_{i-1}\right] \quad \text{otherwise} \end{cases}$$

In this formulation withdrawals were made when income fell below the target measures. The withdrawal was the lesser of the balance in the account in the previous period and the amount of the shortfall from the target income measure. This formulation does not reduce income by the amount of the contribution to the account. Under this mechanism the farmer would use the account to smooth their income. Targets were defined to represent a five-year rolling average of income, a one period rolling income target, and a short-term moving average income target. The targets were constructed for both NTF and NSF income. The descriptions of the targets are given for the case of total farm net income. The same targets were used for the case of Schedule F net income. The five-year rolling average income target for NTF is presented in (5).

$$(5) \qquad Roll5_{1997+j} = \frac{\sum_{i=j}^{3+j} NTI_{1992+i}}{4} \quad j = 1 \quad \text{and} \quad Roll5_{1997+j} = \frac{\sum_{i=j}^{4+j} NTI_{1992+i}}{5} \quad j = 2,3,4$$

The one period rolling income target for NTF is defined in (6).

$$(6) \qquad Roll1_{1997+j} = NTI_{1996+j} \forall j = 1,2..4$$

The short-term moving average income target for NTF is defined in (7)

$$(7) \qquad StAve_{1998+j} = \frac{\sum_{i=1}^{1+j} NTI_{1996+i}}{1+j} \forall j = 0,1,2,3$$

Benefits and Withdrawals: Tax Based Withdrawals

For NTF and NSF, two basic analyses were conducted and in both we assume that the tax brackets are those for a married couple filing jointly in 2002. The first analysis is based upon the assumption that the marginal tax bracket was determined based only upon the level of NTF and reduced by the amount of the contribution to the FARRM account (either NTF or NSF based). Thus, in both cases the level of NTF is used to determine the marginal tax bracket. The amount of the contribution will depend upon whether NTF or NSF is used as the contribution rule. This analysis is consistent with assuming that the farmer generated enough off-farm income to offset any potential standard deduction. The second analysis assumed that the farmer was able to reduce NTF by the amount of the contribution to the FARRM account (either NTF or NSF based) and by the standard deduction for a married couple filing jointly ($7,850) and two personal exemptions ($6,000) for a total deduction from net taxable farm income of $13,850.

In the previous section we estimated that the average annual contribution to FARRM accounts would range between $10,610 and $13,382 depending upon the net income measure used to define eligibility. Thus, a typical farm would contribute slightly over $50,000 to the account over a five-year period. One benefit of this contribution is that the farmer is able to invest the tax savings. The after-tax earnings on these funds are then a net benefit to the farm. In order to calculate the potential earnings on these funds it was necessary to estimate the balances in the accounts and the after-tax rate of return. This estimation requires that we also estimate the withdrawals from the accounts.

The average withdrawals from the accounts were first estimated assuming that farmers would only withdraw funds when they found themselves in a lower tax bracket (see equation (3)). The analysis proceeded by calculating the marginal tax bracket for each farm and each year. When the tax bracket fell the farmer was allowed to withdraw enough funds to exhaust the lower tax bracket or the balance in the account. The total withdrawals were then calculated for each farm and averaged. The estimated average annual withdrawals are reported in Table 16, which shows the average annual withdrawals per farm under various assumptions regarding the contribution rule and whether or not the standard deduction was allowed. It is also important to note that the withdrawals were only allowed in the 4 years after the establishment of the program (the farm could not contribute and withdraw the same funds in the same year). The results indicate that on average a farm would withdraw approximately $4,277 when the contribution was based upon NTF with no standard deduction applied. It is important to note the role the standard deduction plays is in determining the tax bracket.

Table 16. Average Annual Withdrawals from FARRM Accounts per Farm with a Tax Based Withdrawal Rule, 142 New York Dairy Farms, 1997-2001

Deposit Criterion	Standard Deduction	Average Withdrawal	Maximum Withdrawal
NTF	No	$4,277	$148,349
NSF	No	$3,622	$115,746
NTF	Yes	$4,531	$151,811
NSF	Yes	$3,858	$115,746

It is useful to note that it would appear that simply relying upon a tax based withdrawal rule would not let the farmers withdraw all of their funds from the accounts. Thus, it is likely that a 5-year maximum deposit limit would not allow farmers to wait for a drop in their tax bracket to withdraw all of their funds. This would limit the tax exemption benefit provided by the accounts, but would increase the tax deferral benefit of the accounts. The results indicate that by ignoring the standard deduction, one generally underestimates the amount that would be withdrawn from the account by $254 in the case of NTF and $236 in the case of NSF.

The distribution of average withdrawals under the four scenarios considered is shown in Figure 3. This figure truncates withdrawals at $30,000. At this point, the withdrawals from all but about 5 farms are captured. This figure illustrates several key points. First, a large proportion of the farms make no withdrawals from the accounts. The fewest farmers are able to withdraw under the NSF contribution and with the standard deduction (90). This occurs because fewer farms change tax brackets with this approach as the $13,850 reduction in taxable income places them at the top of a tax bracket and these farms are not offset by farms moved to the bottom of the tax brackets. Second, only about 10 of the farms make average withdrawals in excess of $10,000.

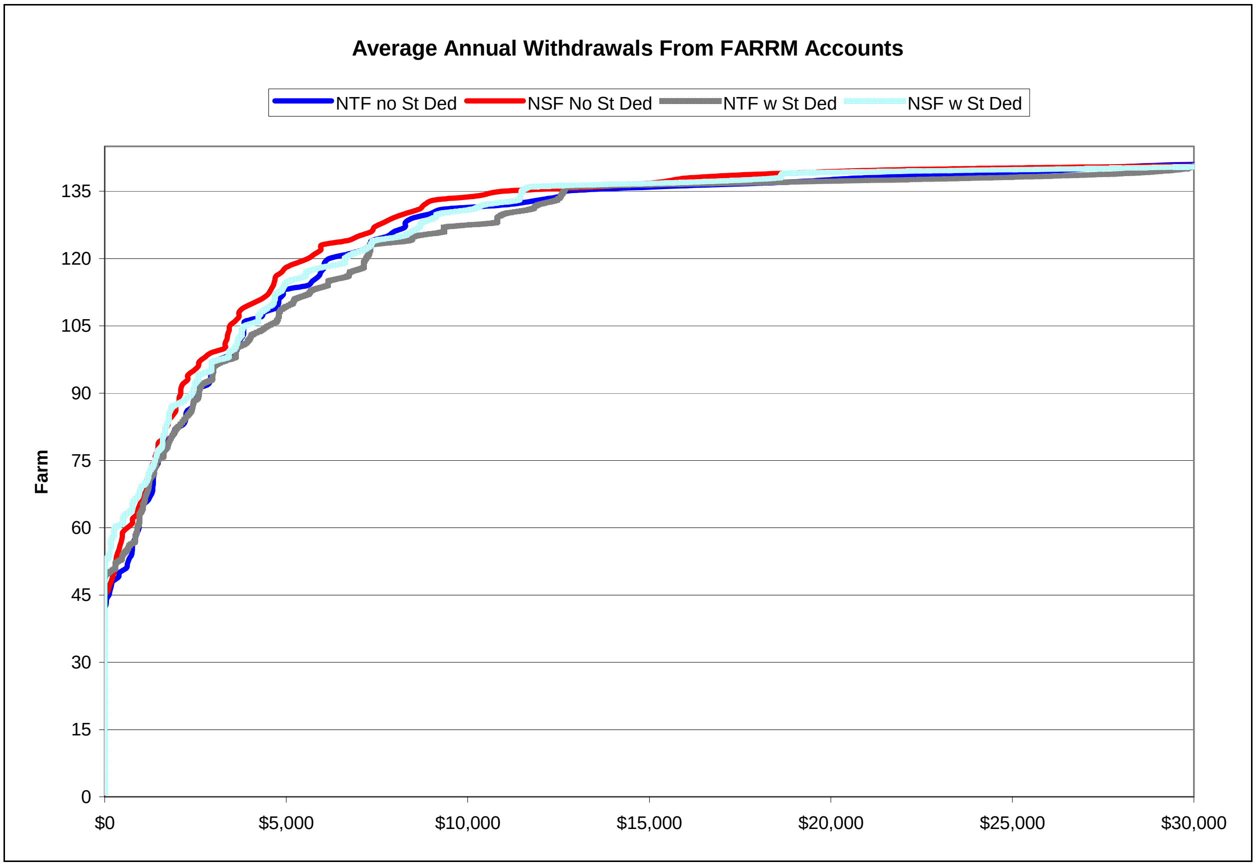

Figure 3. Average Annual Withdrawal From FARRM Accounts With and Without Deductions Under Two Net Farm Income Measures

The average annual balances and the average final balances in the FARRM accounts were also calculated for these scenarios (Table 17). The farms are able to build sizable account balances under all of the scenarios even when the withdrawals are taken into account. The average median balances also indicate that these balances are built rapidly and sustained throughout the time frame.

Table 17. Average Median Annual and Average Final Balances in FARRM Accounts per Farm with a Tax Based Withdrawal Rule, 142 New York Dairy Farms, 1997-2001

Deposit Criterion	Standard Deduction & Personal Exmp.	Average Median Annual Balance	Average Ending Balance
NTF	No	$30,963	$49,801
NSF	No	$24,453	$38,562
NTF	Yes	$30,065	$48,785
NSF	Yes	$23,923	$37,615

The tax deferral and tax exemption benefits of the accounts were calculated based upon the average balances in the accounts and the withdrawals from the accounts. Specifically, equation (1) was used to calculate the annual benefit of deferring taxes with FARRM account contributions. The tax brackets in any given year and a rate of return of 4% (pre-tax) were used to calculate the benefits. Table 18 shows the average annual benefit obtained by the farmers under these assumptions. The average annual benefits of the program are relatively small. One would expect that a farmer would earn about $239 after tax by investing the funds deposited under the NTF criterion and without the standard deduction. Because the earnings must be withdrawn each year the total benefit is simply the sum of the average annual benefits over the 5-year period. The NTF deposit criterion with no standard deduction yields the greatest annual benefit. This is a result of more funds being deposited under this program and fewer being withdrawn. Thus, the balances build and more interest is earned on the deposits.

Table 18. Average Annual and Cumulative Tax Deferral Benefits from FARRM Accounts, 142 New York Dairy Farms, 1997-2001

Deposit Criterion	Standard Deduction	Average Annual Benefit
NTF	No	$239
NSF	No	$180
NTF	Yes	$213
NSF	Yes	$164

While the average benefit obtained through tax deferral is relatively modest, an analysis of the distribution of benefits reveals that some farms receive very substantial benefits and others receive very modest benefits (Figure 4). Here the benefits are truncated at $500. All but 17 of the farms receive benefits less than $500 under any program. On the other hand, 45 of the farms receive an average annual benefit of less than $50 under even the most generous scenario (an NTF deposit and no standard deduction).

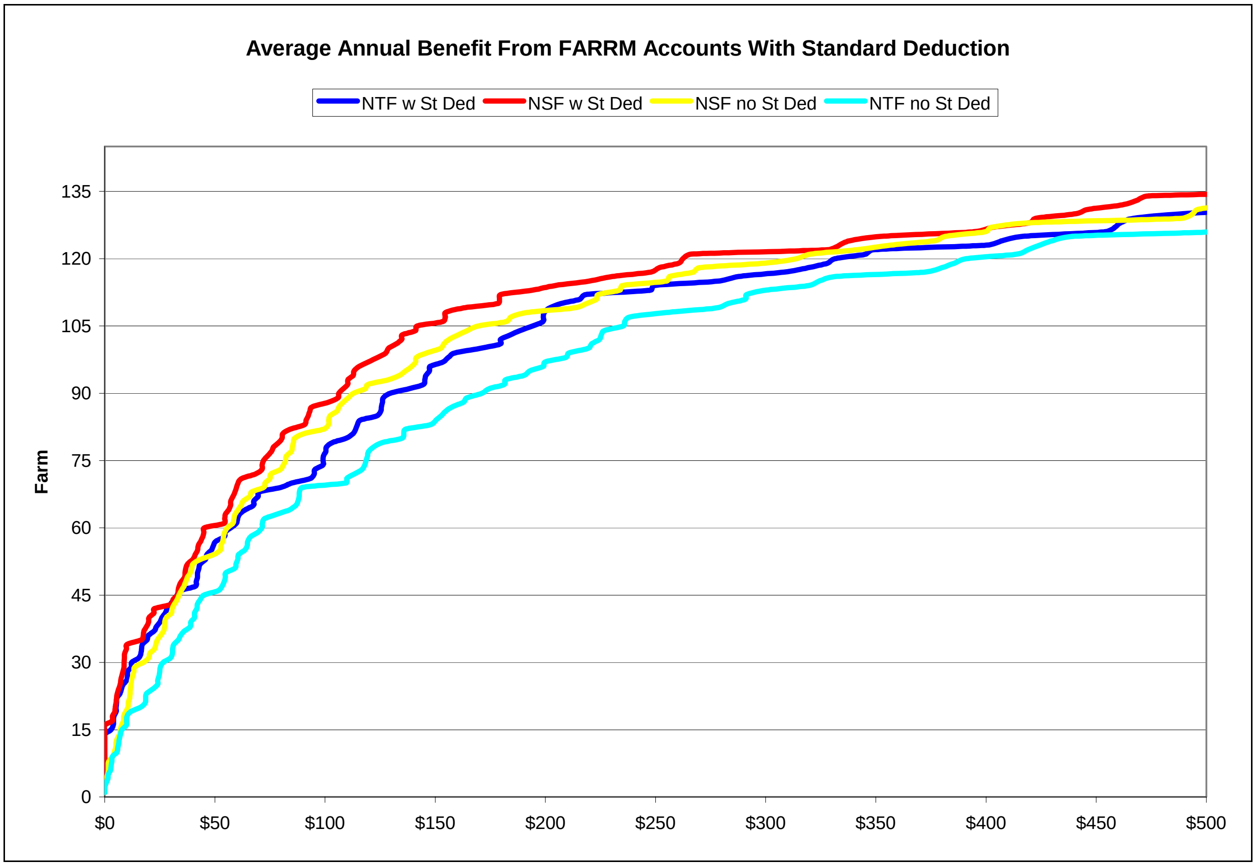

Figure 4. Average Annual Benefits from Tax Deferral, 142 New York Dairy Farms, 1997-2001

The study also examined the amount of taxes that were reduced under the tax based withdrawal system. Reductions occurred when FARRM account balances were withdrawn from the accounts at lower rates than that at which they were contributed. The amount of the reduction was calculated according to (8).

$$(8) \qquad Reduction_i = withdrawalT_i \left(bracket_{i-1} - bracket_i\right)$$

The reduction is the product of the current period withdrawal and the difference between the tax bracket in this period and the tax bracket in the previous period. Although the average annual benefits from deferring taxes are relatively small, the average annual benefits obtained through tax exemption are sizable (Table 19). The exemption benefits would appear to be about twice the benefits of tax deferral. In this case, the benefits with a standard deduction are greater than without the reduction because the withdrawals are greater under this assumption. It would appear that the additional benefit is close to $30. In the case of tax deferral, the assumption of a standard deduction reduced the benefit by about $20 to $30. Thus it would seem that the competing assumptions produce similar estimates of the total benefit of FARRM account contributions and withdrawals.

Table 19. Average Annual Tax Reduction from FARRM Accounts, 142 New York Dairy Farms, 1997-2001

Deposit Criterion	Standard Deduction	Average Annual Tax Reduction
NTF	No	$907
NSF	No	$753
NTF	Yes	$939
NSF	Yes	$787

Since there is a 10 percent penalty for funds left in the accounts more than five years, farmers would withdraw any funds that would be subject to such penalties. Although there could be cases where the tax bracket in some future year was more than 10 percent lower, this is quite unlikely. Thus, benefits accrue for only the five-year period.

<u>Benefits and Withdrawals: Income Based Withdrawals</u>

FARRM accounts utilize tax incentives to encourage farmers to save money for use in times of income shortfall. The three income based targets described above were applied to the data to estimate withdrawals from the FARRM accounts. The income targets were applied to both NTF and NSF income. Deposits to the accounts were determined according to the procedure previously applied.

The average withdrawals under the income targets are substantially greater than those under the tax based withdrawal rules (Table 20). As expected, the one period rolling income target provides the greatest average annual withdrawal under both measures of income. Although withdrawals are more frequent and greater in magnitude than under the tax-based withdrawals, the final balances in the accounts remain substantial.

Table 20. Average Annual Withdrawal and Average Final Balances in FARRM Accounts per Farm with an Income Based Withdrawal Rule, 142 New York Dairy Farms, 1997-2001

Withdrawal Rule	Average Annual Withdrawal	Frequency of Withdrawals[a]	Average Ending Account Balance
	Total Farm Net Income Deposits and Target		
One Period Rolling Income Target	$9,384	36%	$29,375
Short-term Moving Average	$6,843	29%	$39,537
5 Year Rolling Average[b]	$6,564	22%	$54,200
	Schedule F Net Income Deposits and Target		
One Period Rolling Income Target	$8,368	38%	$19,575
Short-term Moving Average	$6,519	30%	$26,974
5 Year Rolling Average[b]	$6,162	26%	$38,632

[a] The total number of withdrawals in the sample divided by the number of farm years in the sample (568 for one period and short-term average and 356 for 5-year rolling average).
[b]The results for the 5-year rolling average are for the 89 farms with data over the period 1993-2001

Analysis of Counter-Cyclical Savings Accounts

Several features of the counter-cyclical savings account proposal differ from the FARRM account proposal. First, gross income measures are used to determine eligibility for CC accounts. Second, deposits to the account are matched up to the lesser of 2% of a gross income target or $5,000. Third, the withdrawal of funds is limited to instances when gross income falls below a trigger point and can only be used to increase gross income to the 90% trigger level. Our analysis assumes that farmers will only contribute enough funds to maximize the potential government matching deposit. Although the proposal specifies that a measure of gross income will be used to determine eligibility, the definition is somewhat ambiguous with respect to the components included in the measure. Again, we have chosen to evaluate two measures of gross income. The measures considered are Schedule F gross farm income (Table 1) and Total Farm gross income (Table 2).

Counter-Cyclical Savings Accounts: Analysis of Gross Income Variability

Since this proposal would base contributions and withdrawals on gross income, the variability in gross income will determine participation. The calculations conducted to analyze this variability are similar to those conducted for the case of net farm income (above). Here we examine the distribution of Schedule F gross income (hereafter referred to as GSF) and total farm gross income (hereafter referred to as GTF). Table 21 presents the means and standard deviations of several summary measures of the variability of GSF and GTF income.

Table 21. Average Income Variability per Farm, 142 New York Dairy Farms[a], 1997-2001

Measure	Mean	Standard Deviation	Minimum	Maximum
Total Farm Gross Income				
Difference Between Highest and Lowest Year's Income ($'s)	$369,354	$508,604	$13,583	$3,232,922
Largest Negative Deviation from Mean ($'s)	$180,228	$237,639	$7,006	$1,132,324
Largest Negative Deviation from Mean (% of mean)	19.4%	10.7%	3.6%	63.8%
Schedule F Gross Income				
Difference Between Highest and Lowest Year's Income($'s)	$363,818	$498,442	$13,912	$3,150,071
Largest Negative Deviation from Mean ($'s)	$176,975	$231,647	$6,074	$1,073,573
Largest Negative Deviation from Mean (% of mean)	19.4%	10.5%	4.5%	57.3%

[a] The statistics reported in the table are the average across farms n = 142. For instance, the difference between the highest and lowest net taxable income over the 5-year period was calculated for each farm and these values were averaged.

The level of variability is similar for both of the gross income measures. In general, the level of variability is slightly greater for GTF. The measures also provide information with respect to the wide range of income and variability obtained by these farms. In the cases of the dollar estimates, the standard deviations are greater than the means, indicating a wide dispersion in the amount of variability experienced by these farms. There also appears to be an even greater relative correspondence between the two measures of gross income than existed for the two measures of net income.

The average GTF and GSF per farm were calculated by year (Table 22). The results show tremendous increases in gross income over the time period. In each year average GTF is roughly $20,000 greater than average GSF. The relationship between the measures of gross income and the measures of net income (Table 7) reveals little correspondence. For instance, net income fell substantially from 1999 to 2000 (58%), while gross income endured only a modest decline (5% on a GTF basis).

Table 22. Average Gross Taxable Income per Year, 142 New York Dairy Farms

Year	GTF	GSF
1997	$701,717	$691,067
1998	$846,111	$834,168
1999	$920,984	$908,296
2000	$872,493	$856,105
2001	$1,059,495	$1,041,943

The cumulative distribution of average GSF and GTF per farm are shown in Figure 5. The figure demonstrates the close correspondence between the two measures of gross farm income. In addition, it sheds further light on the tremendous disparity in the level of gross farm income achieved by these farms. Nearly half of the farms had a gross income less than $500,000. The income of the other half of the farms was spread over a much wider range than $500,000.

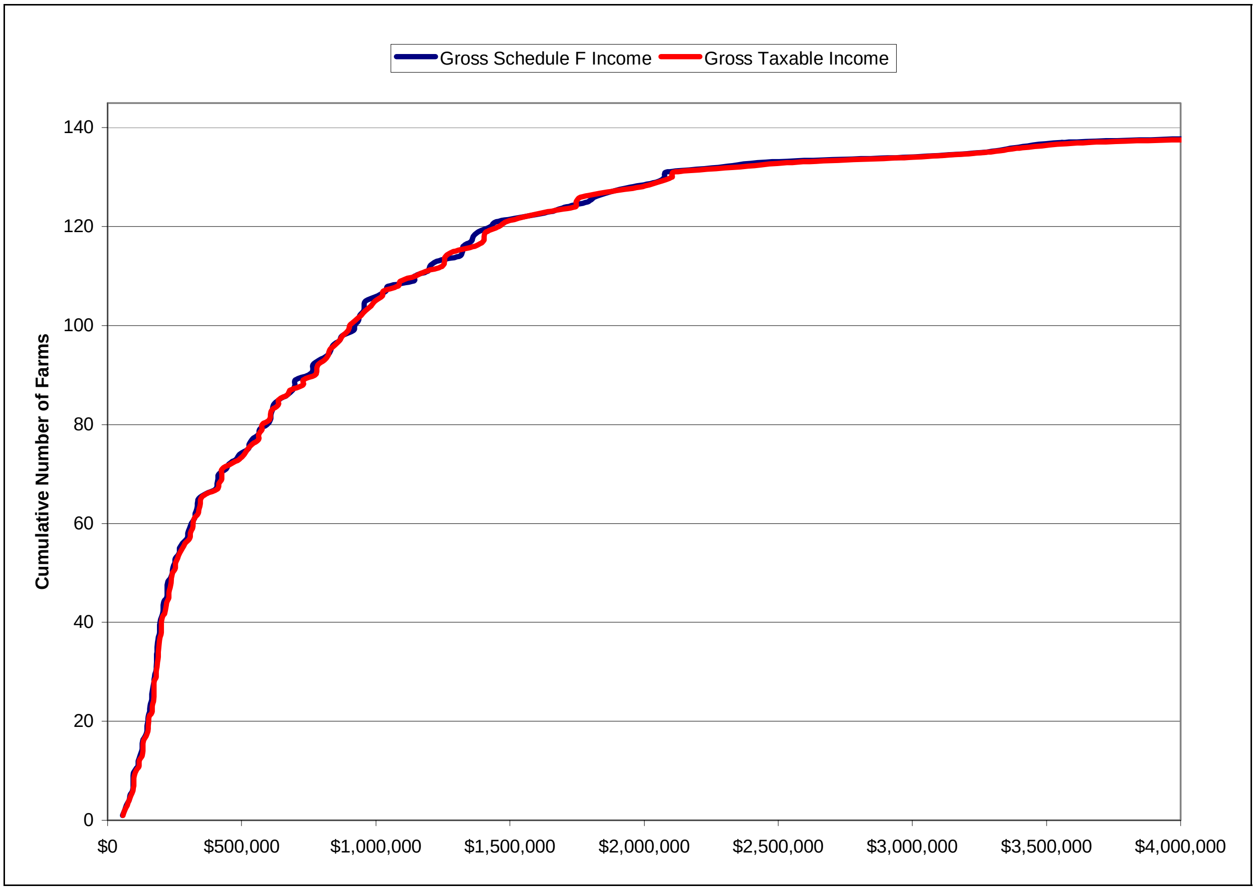

Figure 5. The Distribution of Average GTF and GSF Income by Farm, 1997-2001, 142 New York Dairy Farms

<u>Counter-Cyclical Accounts: Analysis of Eligibility</u>

The eligibility question is slightly different for the case of Counter-Cyclical accounts as opposed to FARRM accounts. Farmers can contribute to CC accounts any amount they desire as long as average gross income exceeds $50,000 over the last five years. However, the government matching contribution is limited to 2 percent of gross income up to $5,000. Since earnings on these accounts are distributed and taxed annually, farmers have little incentive to put unmatched money in CC accounts. The funds could be invested in other accounts with fewer restrictions on withdrawal. In the analysis that follows, it is assumed that farmers would contribute only amounts that would be matched by the federal government.

For CC accounts, all farmers in the sample were eligible to make a contribution to the account. Average contribution refers to the extent to which the farmer was able to take full advantage of the maximum government matching deposit of $5,000. As analyzed, farmers with the financial means or cash flow who wished to contribute the full $5,000 were only allowed to do so if the applicable average gross income measure was at least $250,000. Farmers with less average gross income were only allowed to contribute 2% of their average gross income. Specifically, the contribution rule was defined according to (9).

(9) $$contribution_i = \min[0.02(Gross),5000]$$

Several scenarios were considered for the method of determining eligible gross income, *gross*. Because there were a limited number of years of data available, some of the measures use data for the entire sample period rather than just historical data. The most logical method uses the historical average prior to the year being analyzed. Thus, the analysis uses the rolling average of the prior five years (four years for the first year) to assess eligibility (10).

(10) $$Roll5_{1996+j} = \frac{\sum_{i=j}^{3+j} Gross_{1992+i}}{4} \quad j=1 \quad \text{and} \quad Roll5_{1996+j} = \frac{\sum_{i=j}^{4+j} Gross_{1991+i}}{5} \quad j=2,3,4$$

The rolling average gross income measure is consistent with the language of the proposed measure. However, using this approach reduces the number of observations from 142 to 89. When historical data are not available, or it is desired to use the total sample period data for analysis, the average over the entire sample period could be used. In this average, gross income (GSF or GTF) is calculated over the period 1997-2001 (11).

(11) $$Avg = \frac{\sum_{i=1997}^{2001} Gross_i}{5}$$

The simple total sample period average assumes that future gross receipts are similar to past gross receipts. An assumption that is not supported by the results presented in Table 22.

The third measure considered was short-term average gross income, (12).

(12) $$S.T.Ave_{1998+j} = \frac{\sum_{i=1}^{1+j} Gross_{1996+i}}{1+j} \forall j = 0,1,2,3$$

In this measure, the average is based upon the number of years for which historical data are available. In this case deposit and withdrawal estimates can be made for all data years except the first. The short-term average measure is arguably more desirable than the simple average (9), but it also has its shortcomings. Because the method builds the average with previous observations, it is likely superior to the simple average measure. In our initial analysis we do not allow a contribution in the first year of the sample, 1997. Our estimate of those earnings would necessarily be the farms actual earnings in that year. The provision for the establishment of a new farm history would correspond closely to this approach. The results reported here do not make this assumption.

The characteristics of our sample (most farms have gross income in excess of $250,000) make the selection of the measure defining contributions less important than might be expected. The results show that most farms contribute $5,000 per year. However, the issue of selection of a target measure for gross income will become critical when estimating withdrawals from the CC accounts.

The farms are able to contribute slightly over $4,000 per year under the various gross income measures (Table 23). The size of the average contribution does not show a meaningful difference for the various alternatives. Contributions based on total farm income were only slightly higher than those based on only schedule F income. The average contributions increase over time as well. This indicates that there is growth occurring in the segment of farms with gross income less than $250,000.

Table 23. Average Contributions to CC Accounts Under Various Measures of Gross Income, 142 New York Dairy Farms, 1997-2001

Year	Average GSF	Roll5 GSF	Short Term Ave GSF	Average GTF	Roll5 GTF	Short Term Ave GTF
Entire Period	$4,347	$4,332	$4,256	$4,383	$4,375	$4,290
1997	Same for all	$4,267	NA	Same for all	$4,313	NA
1998		$4,267	$4,139		$4,311	$4,177
1999		$4,321	$4,256		$4,362	$4,288
2000		$4,380	$4,311		$4,421	$4,344
2001		$4,426	$4,316		$4,469	$4,351

<u>Counter-Cyclical Accounts: Analysis Withdrawals and Benefits</u>

The government's promise to match deposits provides the motivation for contribution to a CC account. However, unlike FARRM accounts, the funds deposited in a CC account cannot be withdrawn at the producer's discretion. Instead, the funds can only be withdrawn when gross income falls below 90% of the farm's rolling average gross income, and then can only be used to increase gross income to 90% of the farm's rolling average gross income. This creates uncertainty for farmers because they might not be able to access funds that they have deposited in the accounts. Specifically, this is a serious concern for farms that are experiencing growth in revenues over time. Although the return to a dollar deposited in the account is 100% (through the matching government deposit), if these funds cannot be accessed in times of need they are likely less valuable to the farmer. The analysis in this section focuses on estimating how frequently farmers can withdraw funds from CC accounts under various measures of gross income, how many dollars they would need to withdraw in order to increase their income to a 90% target level, and how many dollars they have available in the CC accounts.

Before presenting the results it is useful to present the assumptions and methods used to calculate the need for withdrawals and actual withdrawals. First, the analysis presented in this section assumes that farmers can make a deposit and withdrawal in the same period. In other words, the farmer could place a deposit in the account to be matched in the current year. The deposit would be defined by the 2% or $5,000 minimum contribution rule. If the current year income is less than 90% of the target, the farmer could also withdraw enough funds from the account to increase income to the 90% level. The matching government contribution makes it attractive for farmers to contribute and withdraw in the same year. The need for funds to be withdrawn from the accounts is given by (13).

$$(13) \qquad need_i = \max\left[0.9\left(target_i\right) - Gross_i, 0\right]$$

where *target* is the income target generated by one of the measures defined by equations 9, 10, or 11, and *Gross* is the actual gross income in year *i*. Withdrawals in any period are chosen to satisfy the need for income given that the most that can be withdrawn is the sum of the previous periods balance and the total deposits (government and farmer) in the current period (14).

$$(14) \qquad withdrawals_i = \min\left[need_i, balance_{i-1} + 2(cont_i)\right]$$

Finally, the balance in the account at the end of each period is determined by (15).

$$(15) \qquad balance_i = balance_{i-1} + 2(cont_i) - withdrawals_i$$

The first set of analyses examines how frequently farmers would be eligible to withdraw deposited funds from the account. An indicator variable was created for each of the income targets. This variable was recorded as a one if the farmer would be eligible to withdraw funds from the account and a zero otherwise. The analysis shows that the ability to withdraw funds depends critically on the calculation procedure used to establish the income target (Table 24).

Table 24. Frequency that Farmers Qualify for Withdrawals From CC Accounts, 142 New York Dairy Farms, 1997-2001[a]

Year	Average GSF	Roll5 GSF[a]	Short Term Ave GSF	Average GTF	Roll5 GTF [a]	Short Term Ave GTF
Entire Period	20%	2%	3%	20%	2%	2%
1997	75%	7%	NA	77%	8%	NA
1998	15%	0%	0%	14%	0%	0%
1999	4%	0%	1%	4%	0%	2%
2000	4%	1%	6%	4%	2%	5%
2001	2%	2%	4%	1%	1%	1%

[a] The analysis of the rolling average only includes the 89 farms who were in the sample from 1993-2001

The use of the forward looking or "whole period" average results is a much larger estimate of the proportion of farms that would be allowed to withdraw funds, except in the last two years of the study. This is a result of many of the farms undergoing significant revenue growth over the period. The relatively small number of farms that experience a 10% shortfall is somewhat surprising. However, it is important to note that the moving average techniques cannot account for growth in the farm business. It is also important to point out that the 5 years under consideration are years of relatively strong output prices and low input prices. It is interesting to note that based on the net income analysis, 2000 represented a significant drop in profitability. In general, this was one of the years that resulted in some farmers having the ability to withdraw funds from the accounts, yet the proportion was quite small. It would appear that analyzing withdrawals with the simple average is a poor technique, particularly in the early portion of the period.

The previous analysis indicates that there are few times when farmers would be able to actually withdraw their funds from the CC accounts. A series of analyses were also conducted to determine whether the funds available for withdrawal were sufficient to meet the demands of the few farmers who would be qualified to make such withdrawals. Under the simple average rule there were 142 occasions in which farmers were eligible to withdraw from the accounts. This does not mean that all farms were eligible. For instance, under GSF 80% of the farms were eligible for a withdrawal in one or more year and 20% were never eligible.

Under the whole period average target the amount of funds in the accounts was not sufficient to fund shortfalls (Table 25). This results from the shortfalls occurring early in the period while the account balances were quite low. In addition, the growth in farm gross income is reflected in the average at the beginning of the analysis. The funds available for withdrawal were quite adequate under the two short term moving average scenarios. In the case of a short-term average GTF target, account balances were sufficient to meet the needs of all of the farmers. In the case of the rolling average, the balances were on average only able to meet half of the needs when a shortfall occurred. When one considers the average final balances remaining in the accounts it is obvious that most farmers are able to build sizable account balances over a 5-year period. This is understandable as there were very few withdrawals from the accounts. For instance, there were 710 observations in the data set, but only 9 withdrawals took place. It is also interesting that all of the accounts but the short term average GSF found all farmers having an account balance. In all cases, there were several farms that did not withdraw any funds from the accounts and built balances that reflected the maximum contributions and government matches.

Table 25. Number of Withdrawals, Average Needs, and Average Withdrawals from Counter-Cyclical Accounts, 142 New York Dairy Farms, 1997-2001[a]

	Average GSF	Roll5 GSF[a]	Short Term Ave GSF[b]	Average GTF	Roll5 GTF[a]	Short Term Ave GTF[b]
Number of Times Trigger Activated	142	9	15	142	10	15
Average Need	$102,238	$14,042	$7,077	$103,997	$8,157	$4,322
Average Withdrawal	$8,284	$7,592	$6,696	$8,335	$4,648	$4,322
Average Final Balance (all farms)	$35,189	$42,557	$33,338	$35,498	$43,229	$33,792
Minimum Final Balance	$8,669	$3,175	$0	$9,017	$16,356	$6,863
Maximum Final Balance	$50,000	$50,000	$40,000	$50,000	$50,000	$40,000

[a] The analysis of the rolling average only includes the 89 farms who were in the sample from 1993-2001.
[b] Exercise caution in interpreting the size of the final balance in the short-term average accounts. The analysis of the short-term average includes deposits and withdrawals for only 4 years. The other scenarios include deposits and withdrawals for the 5-year period.

Summary of Counter-Cyclical Accounts

There is considerable year-to-year variation in gross income. Although total farm gross income is slightly higher than schedule F gross income, the degree of variability is similar for the two measures. All farms in the sample were eligible to contribute. Most were able to contribute enough to match the maximum government contribution. Deposits were similar regardless of whether the measure of historical gross income was based on the historical rolling average, the whole period average or the short-term rolling average. The expansion of many farms caused the average gross income on those farms to gradually increase. This gradual increase in size resulted in few farms experiencing incomes significantly below the prior five-year average. Thus, few farms were able to withdraw funds from the accounts and the accounts became government subsidized retirement fund balances.

Comparison of FARRM and Counter-Cyclical Savings Accounts
From this analysis, it appears that counter-cyclical savings accounts would be effective in reducing cash flow variability on only 5-10 percent of dairy farms. It would be successful in getting farmers to set aside limited funds each year in accounts that would serve as retirement funds.

FARRM accounts provide a possible income effect from delaying taxes and a possible reduction in taxes. The income effect from delaying taxes is small and may be negative. If a farmer must borrow, or not repay early, $10,000 for 8.5 months (April 15 to January 1 of the next year) at 6% interest to invest in a FARRM account to delay the payment of $2,700 of taxes (27% tax bracket) for one year, which earns 4%, the farmer loses $38. The $10,000 investment earns 4% ($400), the $2,700 earns 6% ($162) and borrowing the $10,000 costs 6% ($600). If the farmer has the funds in another account earning 4 percent, that can be transferred to the FARRM account, the farmer has a $162 gain. Average gains for farms in the study were about $200.

When the farmer is able to withdraw the funds in a year when the tax bracket is lower, the amount of taxes paid is reduced. About 55% of the farms were able to achieve tax savings. Tax savings for all farms averaged about $900 per farm over the five-year period.

The FARRM program would allow about 75 percent of farms to level out their income by moving income from high-income years to low-income years. This involves moving funds in years when income is down, but not down enough to move the farm into a different tax bracket. Given the width of income brackets, such a smoothing of income could be of considerable benefit to some farm families.

Summary and Conclusion
To be of value in managing farm risk, the counter-cyclical savings account would need to be modified. Gross income is not sufficiently sensitive to changes in farmer's fortunes to be used as a trigger mechanism for such programs.

The FARRM savings account program could be of value to farmers. Income effects of delaying payment of taxes are likely to be small or negative. A number of farmers will be able to save some taxes by moving money from high tax years to low tax years. This could provide incentive for farmers to participate. Many farmers should be able to reduce the variability of income by using reasonable income triggers for withdrawal of funds.

Because of the general increase in the size of businesses, using an average of all years of data to provide the historical average level of income for triggers for evaluation of these programs does not work. It is particularly inappropriate when gross income measures are used.

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