



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# **The Effect of Taxes on Capital Structure in Farm Supply and Marketing Cooperatives**

Levi A. Russell and Brian C. Briggeman<sup>1</sup>

SAEA 2014 Annual Meetings Selected Paper Presentation  
January 16, 2014

<sup>1</sup>Levi A. Russell is Assistant Professor and Extension Economist in the Department of Agricultural Economics at Texas A&M University. Brian C. Briggeman is Associate Professor and Director of the Arthur Capper Cooperative Center in the Department of Agricultural Economics at Kansas State University.

## **Introduction**

A key issue for cooperatives is the management of the distribution of the firm's earnings. Since the maximization of the return to the member is the primary goal of the cooperative (VanSickle and Ladd, 1983; Sexton, 1986), board members and managers should use tools and information at their disposal to choose the optimal level of retained earnings and earnings allocated to members.

The decision to retain or allocate funds to members involves balancing member preferences for fixed assets provided by the cooperative and cash returns on their investment in the cooperative. Cooperatives must retain sufficient earnings to replace depreciated assets and invest in expansion of the firm. Expansion allows the cooperative to take advantage of economies of scale, a key part of the purpose of its establishment according to the Competitive Yardstick theory. Allocation of earnings to members is also crucial as members will likely prefer to have a portion of their investment paid out to them to invest in their own operations. This comports with the view that cooperatives raise (lower) the net price received (paid) for the members' product (inputs).

Previous research analyzing the decision to pay relatively large or small portions of refunds in cash has produced mixed results. Research focusing on member cash flows (Royer and Shihpar 1997 and VanSickle and Ladd 1983) and on least-cost financial structure (Dahl and Dobson 1976) suggests that benefits to members are higher under a high-cash-patronage refund regime (Royer and Shihpar suggest that this holds only for younger producers). In contrast, findings from Beierlein and Schrader (1978) suggest that optimal cash patronage is dependent on the relative returns of the farm and cooperative. Since cooperative returns under their model are

higher, cash patronage refunds (which are invested in the farm) should be low. Knoeber and Baumer (1983) supports this finding, suggesting that farmers should invest in the cooperative to the degree that it provides a higher return or lower risk.

Tax rates, to the extent that they have a differential effect on the value of retained and allocated earnings, may also affect the board's decision to allocate or retain earnings. A higher tax rate paid on allocated (retained) earnings reduces the return to the member from allocated (retained) earnings and thus may influence the board to retain (allocate) a larger share of the earnings of the cooperative.

Member risk preferences can influence the board's decision to allocate equity to the extent that returns from retained earnings and allocated earnings are characterized by different risk-return tradeoffs. If returns from allocated (retained) earnings become more risky, *ceteris paribus*, members will prefer a higher percentage of earnings be retained (allocated). The degree to which this effect influences the optimal decision of the board depends on the strength of the members' preference for lower risk. If members are more risk averse, this effect will be stronger than if members were more risk neutral.

This study has two primary objectives. First, we develop a mean-variance portfolio model that explicitly accounts for the effects of income tax rates and member risk preferences on the allocation of equity. Second, we use sensitivity analyses to examine the effects of different tax regimes and member risk-preferences on the optimal allocation of cooperative equity.

Cooperative profits come from two possible sources. Members can buy/sell inputs/outputs with the cooperative; this is called patronage income. Non-patronage income primarily comes from nonmembers and/or investments the cooperative has made in federated cooperatives and other ventures. For patronage income, these earnings can be split into two

categories: allocated and unallocated. An intuitive way to think of this distinction is that allocated earnings are “earmarked” for the member, whereas unallocated equity is not. Also, allocated earnings can be paid in cash, cash patronage refund, or held as equity in the cooperative, retained patronage refund. There are multiple strategies of returning retained patronage refunds or allocated equity to the members (Dahl and Dobson, 1976), but it must be paid to the member in the event of death. Unallocated equity is only paid to the members in the cases of liquidation of the firm.

Though profits from patronage business can be put into retained earnings, this practice is sometimes controversial as it conflicts with traditional cooperative principles (Kenkel, 2012). This is because members want their equity to be returned to them on the cooperative’s revolving schedule or upon death. Unallocated equity stays in the firm unless the assets of the cooperative are liquidated.

Taxation of cooperatives is different from taxation of investor-owned firms. Members pay taxes on “qualified” earnings, whether the member receives them as cash patronage refunds or earnings allocated to them and held on the cooperative’s balance sheet. Cooperatives pay federal taxes according to the C corporation tables on all non-qualified earnings as well as any earnings from non-member sources. To manage the effects of taxation on member returns, the board must be conscious of the effective tax rates of their members and of the cooperative itself. This is a key part of effective management of a cooperative’s equity.

Another responsibility of the cooperative board is to align business practices with the risk preferences of members. Particularly important in this regard is the members’ investment of equity in the cooperative. Cooperative net worth has grown rapidly in recent years. Total U.S. cooperative net worth grew from \$20.57 billion in 2006 to \$31.3 billion in 2011, an average

yearly increase of 9% (USDA). This increase is amplified by the decline in the number of cooperatives from 2,675 in 2006 to 2,285 in 2011, an average yearly decrease of 3% per year. Taken together, the average cooperative's net worth has increased from \$7.45 million in 2006 to \$12.21 million in 2011. Given these increases in member investment, and the associated increase responsibility of the board to manage this equity in accordance with member preferences, the present study will examine the effect of member risk preferences on the allocation of equity.

The present work examines the effects of tax rates and farmer risk preferences on the cooperative board's decision to allocate equity to specific members. We use a standard two-period expected utility model similar to Knoeber and Baumer (1983) and sensitivity analyses to determine the robustness of these effects. Effective tax rates from 2005 to 2010 and empirically-determined farmer risk preferences from Parcell, Featherstone, and Barton (1998) are used in the analysis.

Though a significant amount of research has been conducted regarding optimal equity allocation, taxes have not been treated as a variable of interest. For example, Royer and Shihpar (1997) explicitly state that while taxes are included in their model of patron preferences, the tax rate was treated as neutral to the results of the analysis and was chosen arbitrarily. The primary contribution of this essay is an analysis of the effect of effective tax rates on the optimal share of allocated earnings.

### **Theoretical Model**

The disbursal of cooperative earnings can be complicated. Earnings from patronage of the firm by members who are treated differently from income earned from non-members. All earnings, whether from members or non-members, are then either earmarked specifically to individual members or put into a general equity fund. Allocated earnings are either distributed or

retained in a fund, according to current laws and the board's estimation of the members' preferences. Finally, patronage earnings allocated to members are considered qualified earnings, meaning that the members pay taxes on these earnings. All other earnings are non-qualified, indicating that the cooperative pays taxes.

To simplify this complex decision, assumptions regarding cooperative equity are necessary. Boards of directors and cooperative managers are assumed to be perfect agents of the farmer-members with perfect knowledge of the members' preferences as to the management of the assets of the cooperatives. The preferences of the members dictate the decisions of the managers and board members. This assumption is reasonable for two reasons. First, cooperative boards are made up of the members themselves. Monitoring costs are likely to be low when the members serving on the board are part of the general network of producers in the area. Second, members likely have a high opportunity cost of investing in the cooperative. Funds invested in the cooperative could be used to finance projects on the members' own operation. Since cooperative boards are charged with managing the cooperative's equity, the board will likely align policy with members' preferences.

We assume that all earnings that are designated as unallocated will be reinvested in the cooperative as retained earnings. Therefore, this income will be categorized as non-qualified earnings and taxed at the cooperative level. By law, non-qualified earnings are taxed at the cooperative level, at least in the short term.

Further, all remaining earnings will be allocated to the farmer and therefore taxed at the farmer level. All qualified earnings will be paid as 100% cash patronage refund. This allows us to focus on the short term impact of taxes on patronage distribution policy, and avoid the complexity associated with discounting future cash flows from retained patronage refunds. Still,

the model does allow for inferences of the impact of retaining patronage refunds on the optimal equity allocation decision.

Using the assumptions discussed above, we employ a two-period portfolio model to analyze the effect of tax rates and member risk preferences on equity allocation. The after-tax return on member investment ( $R_{minv}$ ) is decomposed into the return on qualified earnings ( $R_{QE}$ ) and the return on nonqualified earnings ( $R_{NQE}$ ). The return on qualified earnings, by virtue of the 100% cash refund assumption, is approximated by the member's return on assets. This is a reasonable proxy for the return on qualified earnings because the opportunity cost of investment in the cooperative is the member's return on assets. Therefore, it is assumed that the cash patronage refunds will be invested in the member's operation if they were not invested in the cooperative.

Given the return on non-qualified earnings is equal to the cooperative's retained earnings, the return on cooperative assets is a reasonable proxy for return on non-qualified earnings. Thus, after-tax member investment can be decomposed into after-tax return on qualified earnings (the member's return on the assets of their own operation) and after-tax return on non-qualified earnings (the return on the cooperative's assets).

The after-tax return on member investment can be described as follows:

$$R_{minv} = R_{QE}T_f + R_{NQE}T_c \quad (1)$$

where

$$T_f = (1 - t_f), \quad (2)$$

$$T_c = (1 - t_c), \quad (3)$$

and  $t_f$  and  $t_c$  are effective farm and cooperative income tax rates, respectively.

Since  $T_f$  and  $T_c$  are deterministic, we can write the expected rate of return on this portfolio as

$$E(R_{minv}) = \omega E(R_{QE})T_f + (1 - \omega)E(R_{NQE})T_c \quad (4)$$



where  $\omega$  is the initial-period share of the cooperative's equity allocated to qualified earnings. The variance of  $E(R_{minv})$  is

$$\sigma_{minv}^2 = \omega^2 \sigma_{QE}^2 + (1 - \omega)^2 \sigma_{NQE}^2 + 2\omega(1 - \omega)COV_{R_{QE}R_{NQE}}. \quad (5)$$

The board selects  $\omega$  so that the utility of the next period's equity,  $E_1$ , is maximized. It is assumed that the utility function exhibits constant relative risk aversion and is specified as

$$v(E_1) = A - e^{-\lambda E_1} \quad (6)$$

where  $A$  is a constant that restricts the range of the function, and  $\lambda$ , which is positive, is the coefficient of absolute risk aversion (Pratt 1964). Since  $E_1$  is assumed to be a normally-distributed random variable, the certainty equivalent  $z$  is

$$z = E(E_1) - \frac{\lambda}{2} \sigma_{E_1}^2. \quad (7)$$

According to Freund (1956), maximizing  $z$  is equivalent to maximizing expected utility. Since  $E(E_1)$  is equal to  $E_0[1 + E(R_{minv})]$ , and  $\sigma_{E_1}^2$  is equal to  $E_0^2 \sigma_{minv}^2$ , the maximization problem is

$$\text{Max}_{\omega} z = E_0[1 + E(R_{minv})] - \frac{\lambda}{2} E_0^2 \sigma_{R_{minv}}^2 \quad (8)$$

$$s. t. 0 \leq \omega \leq 1.$$

The constraint on  $\omega$  ensures that there are no short sales. Using equations 4 and 5 and noting the restriction on  $\omega$  in equation 8, the first order condition is

$$\frac{\partial z}{\partial \omega} = E_0[E(R_{QE})T_f - E(R_{NQE})T_c] - \lambda E_0^2 \left[ \omega \sigma_{R_{QE}}^2 - (1 - \omega) \sigma_{R_{NQE}}^2 + (1 - 2\omega)COV_{R_{QE}R_{NQE}} \right] = 0 \quad (9)$$

Solving for the optimal portfolio allocation gives

$$\omega^* = \frac{E(R_{QE})T_f - E(R_{NQE})T_c}{\lambda E_0 (\sigma_{R_{QE}}^2 + \sigma_{R_{NQE}}^2 - Cov_{R_{QE}R_{NQE}})} \quad (10)$$

Finally, we find the following comparative statics:

$$\frac{\partial \omega^*}{\partial \lambda} = \frac{E_0 [\omega \sigma_{R_{QE}}^2 - (1-\omega) \sigma_{R_{NQE}}^2 + (1-2\omega) Cov_{R_{QE}R_{NQE}}]}{\frac{\partial^2 z}{\partial \omega^2}} \leq 0 \quad (11)$$

$$\frac{\partial \omega^*}{\partial t_f} = \frac{E_0 E(R_{QE})}{\frac{\partial^2 z}{\partial \omega^2}} < 0 \quad (12)$$

$$\frac{\partial \omega^*}{\partial t_c} = \frac{-E_0 E(R_{NQE})}{\frac{\partial^2 z}{\partial \omega^2}} > 0 \quad (13)$$

Equation 11 shows the effect of risk aversion on the optimal share of qualified earnings. Intuitively, the sign of this derivative is dependent on the variances and covariance of the return on qualified and non-qualified earnings. We expect that a higher variance of returns on qualified earnings will tend to make this derivative negative, while a higher variance of returns on non-qualified earnings will tend to make it positive. A positive (negative) sign on equation 11 indicates that more (less) risk-averse members prefer a larger (smaller) share of qualified earnings.

Equations 12 and 13 depict the effect of personal and corporate taxation on the optimal allocation of earnings, respectively. The negative sign on equation 12 indicates that a lower (higher) effective tax rate on farm profits would increase (decrease) the optimal share of qualified earnings. The positive sign on equation 13 indicates that a higher (lower) effective tax rate on cooperative profits would increase (decrease) the optimal share of qualified earnings. Sensitivity analyses described in the next section will examine the relationships described in equations 11, 12, and 13.

## **Sensitivity Analysis**

To examine the effects of member risk preferences and tax rates on the optimal share of qualified earnings, we use empirically-estimated farmer risk preferences and data on farm, cooperative, and publicly-traded agribusiness firm income and tax rates. Empirically-estimated farmer risk preference information is taken from Parcell et al (1998) in the form of relative risk aversion coefficients used in that study. Four tax scenarios are chosen to illustrate the effect of changes in tax policy on the decision to allocate profits as qualified earnings.

Financial statement data on Kansas farms and cooperatives from 2005 to 2010 from the Kansas Farm Management Association and CoBank are used to estimate effective tax rates and rates of return on equity for farms and cooperatives, respectively. Returns and their variances can be found in Table 1 and summary statistics for the effective tax rates can be found in Table 2. Cooperative returns were both higher and less variable than the farm returns.

Effective tax rates for two publicly-traded agribusiness firms, Syngenta and Archer Daniels Midland, were calculated using the firms' annual reports from 2005 to 2010. Summary statistics for the effective tax rates can be found in Table 2.

The covariance between average returns in the six years of data was roughly zero. Since we did not have access to data that would allow a more robust calculation of the covariance, we selected three covariance values of -0.1, 0, and 0.1. Since cooperative assets are financed, ultimately, by debt or the equity farmers invest in the cooperatives, a positive covariance may be likely. This is because success at the farm level would drive success at the cooperative level. However, for some large cooperatives that are invested in other enterprises not related to production agriculture, it is possible that the covariance of returns between the cooperative and its constituent farmers would be negative.

Support for this low to zero covariance is found in Knoeber and Baumer (1983). They examined the relationship between covariance of farm and cooperative returns and the share of earnings allocated to members. The covariance was not statistically significantly related to the share of patronage refunds retained by cooperatives thus was not a significant factor in determining the board's policy. This indicates that the covariance between the two returns is small.

Approximations of actual returns and variances were used to generate the two scenarios in Table 3. The first scenario assumes that farm returns exceed cooperative returns. An example of this would be a case where the cooperative experienced losses in capturing carry in the grain market or mismanaging farm supply inputs to the extent that they experienced a loss in profit. The second scenario assumes that cooperative returns are higher than farm returns. According to the data, this is the more likely scenario on average.

To determine the effects of changes in the effective tax rates paid by farms and cooperatives on the optimal share of profits allocated to members, four tax rate scenarios were examined. The first used actual data from the KFMA and CoBank. The second assumes that cooperative tax rates increase to the level of farms. The third assumes that cooperative tax rates are equal to the average tax rate for the publicly-traded agribusiness firms. Finally, the fourth assumes that cooperative tax rates are equal to the maximum rate paid by the agribusiness firms.

Results in Table 4 indicate that, using actual returns from KFMA and CoBank, earnings allocated to members should be low and that expectations for returns are high. Values for the optimal share of qualified earnings under the assumption of observed returns ranged from 0.1 to 0.13. This is expected since observed cooperative returns are both higher and less variable than farm returns. The certainty equivalent ranged from 6.6% to 8.3% indicating that expectations for

after-tax returns to cooperative investment are high. In fact, the certainty equivalent is highest under the assumption of observed levels and variances of return on farm and cooperative assets. Under the assumption of observed returns and tax rates, the optimal share of qualified earnings is 0.10 and the certainty equivalent is 8.3%.

The certainty equivalent is particularly important as it indicates the return a member would consider to be equal in a riskless scenario to the risky return presented in the model. Thus, it represents a minimum after-tax return the member requires from his or her investment in the cooperative. A return generated by the cooperative's assets below the certainty equivalent would incentivize disinvestment in the firm.

Under the assumption of relatively high returns and variances for farms, the share of qualified earnings ranges from 0.53 to 0.57 indicating that members prefer that more than half of earnings be designated as qualified earnings when farm returns are relatively high and more variable. This indicates that the higher variance is not high enough to deter members from their preference for the higher returns, given the levels of risk aversion used in the study.

When cooperative returns are relatively high and more variable, the share of qualified earnings ranges from 0.43 to 0.52. In the case of cooperatives paying the maximum tax rate paid by publicly-traded firms, the optimal share of qualified earnings is greater than 0.5. This indicates that, should cooperatives lose the tax advantages they enjoy and be required to pay rates equal to those of publicly-traded firms, members could potentially require more than half of earnings be distributed in cash (by assumption of the model) even when pre-tax returns to non-qualified (and thus retained) are higher than the return earned in their own operations.

The certainty equivalent in the high farm returns and variances scenario ranges from 5.5% to 5.9% and from 5% to 6.2% in the high cooperative returns and variances scenario (Table

4). The certainty equivalent is much lower in the hypothetical scenarios because the coefficient of variation of returns to member investment is much lower in these scenarios.

The effect of changes in the cooperative tax regime on the optimal share of qualified earnings is greatest under the assumption of relatively high cooperative returns and variances. Table 5 shows the differences in the share of qualified earnings and certainty equivalents between the hypothesized changes in cooperative taxes and the actual tax rates paid by cooperatives in the sample. Increases in the optimal share of qualified earnings range from 0.003 under the assumption of equal tax rates between cooperatives and farms and observed returns to 0.088 under the assumption of relatively high cooperative returns and variances. This is intuitive, as higher returns in cooperatives incentivize a higher optimal level of non-qualified earnings and changes in cooperative taxes affect the return on non-qualified earnings.

To further examine the effects of risk aversion on the optimal allocation of net income to members, we specify the following measure of the effect of risk aversion on  $\omega^*$ :

$$\delta = \omega_{4.5}^* - \omega_{1.0}^* \quad (14)$$

where  $\delta$  is the difference between the optimal allocation of net income as qualified earnings under the assumption of the highest risk aversion and the optimal allocation under the assumption of the most risk-neutral preferences. Larger values of  $\delta$  in terms of absolute value indicate a larger impact of risk aversion on optimal net income allocation to qualified earnings. This value is computed for each tax regime. This allows us to determine the effects of risk preferences on the optimal allocation.

Similar to equation 14 above, we specify the following equation to examine the effects of risk aversion on the certainty equivalent:

$$\Omega = CE_{4.5} - CE_{1.0} \quad (15)$$

where  $\Omega$  is the difference between the certainty equivalent under the assumption of the highest risk aversion and the certainty equivalent under the assumption of the most risk-neutral preferences. Larger values of  $\Omega$  in terms of absolute value indicate a larger impact of risk aversion on optimal net income allocation. As above, this value is computed for each tax regime and determines the effects of risk preferences on the certainty equivalent.

Changes in member risk preferences had significant effects on the optimal share of qualified earnings and on certainty equivalents. Table 6 shows values of  $\delta$  and  $\Omega$ . Under the assumption of observed levels and variances of farm and cooperative returns, changes in the optimal share of qualified earnings is small and ranges from 0.037 to 0.049. The largest changes are observed under the assumption of relatively high farm returns and variances of returns. These changes range from a reduction in optimal share of qualified earnings of -0.551 to a reduction of -0.559. The optimal share of qualified earnings increases by factors of 0.358 to 0.442 under the assumption of high cooperative returns and variances of return on retained assets. As effective tax rates on cooperatives increase, after-tax returns of farms and cooperatives begin to converge reducing the effects of member risk aversion.

## **Conclusions**

The complexity of the distribution of earnings in agricultural cooperatives is due not only to the unique rules under which a cooperative operates, but also to the differential tax treatment of its different classes of equity and the need to consider member risk preferences when distributing returns between qualified and non-qualified earnings. Through simplifying assumptions, we developed a portfolio model of the board's decision to either retain net income in the firm as non-qualified earnings (implying that the cooperative would pay taxes on these earnings) or to designate net income as qualified earnings (which places the tax burden on

members). We defined cases that were composed of 5 relative risk aversion coefficients, 4 effective tax rate scenarios, 3 sets of means and variances of returns on allocated and unallocated earnings, and 3 possible covariances of these returns.

The effect of risk aversion was more economically significant than the effect of taxes on the optimal share of qualified earnings. This implies that while boards should be conscious of the differential tax rates paid by members and by the cooperative firm, managing the earnings allocation policy in accordance with member risk preferences is likely to take precedence. Further, there is evidence of an interaction effect between effective tax rates on cooperatives and member risk preferences.

A key assumption in the analysis is that 100% of qualified earnings were paid in cash. Thus, retaining some income as non-qualified earnings would increase the overall return to the farmer in cases where the cooperative return is higher than the farm return. Any funds retained in the cooperative will produce the cooperative's rate of return.

The above analysis indicates that, using observed returns and variances of returns for Kansas farms and cooperatives, the optimal share of qualified earnings is below 0.13 regardless of the potential increases in cooperative tax rates in the study. By assumption, this implies that the optimal share of returns paid in cash to members is also below 0.13. These results are inconsistent with the findings of Royer and Shihpar (1997) for younger producers but are not far from the preferred rate for older producers. They suggest that a 45% cash patronage refund is optimal for younger producers and 20% is preferred for producers in business for more than 14 years. Additionally, the findings in this study are inconsistent with those of VanSickle and Ladd (1983) and Dahl and Dobson (1976). These studies focus primarily on cash flows or the costs of financing the cooperative. In contrast, Beierlein and Schrader (1978), Knoeber and Baumer



(1983), and this study find, focusing on comparison between returns from both the farm and cooperative, find that lower cash payments to members are optimal.

The above analysis is valid insofar as its assumptions are justified. Barring fundamental changes in laws regarding cooperatives, there are two primary issues that could change the results of this analysis. The assumptions regarding effective tax rates rest on the ability of cooperatives and farms to manage their net income in such a way as to minimize their tax burden. A policy change that has no effect on tax rates, such as a change in depreciation rules, may change the ability of farms or cooperatives to effectively manage tax burdens. Of course, a change in tax rates could also affect the results of this analysis. Finally, a change in policy or other outside factors may affect the risk attitudes of farmers. For example, changes in crop insurance policy may change the risk profile of farms, thus impacting a farmer's appetite for financial or production risk. More work is needed to determine the extent to which these and other factors are likely to change and the impact those changes would have on the conclusions of this analysis.

## References

- Boland, M. (2013). *Cooperative Finance and Equity Management*. CHS Center for Cooperatives.
- Beierlein, J. G., and Schrader, L. F. (1978). Patron Valuation of a Farmer Cooperative under Alternative Finance Policies. *American Journal of Agricultural Economics*, 60(4), 636-641.
- Dahl, W. A., and Dobson, W. D. (1976, May). An Analysis of Alternative Financing Strategies and Equity Retirement Plans for Farm Supply Cooperatives. *American Journal of Agricultural Economics*, 58(2), 198-208.
- Freund, R. J. (1956). The Introduction of Risk into a Programming Model. *Econometrica*, 24, 253-263.
- Kenkel, P. (2012, May 24). *Unallocated Equity*. Retrieved June 2013, from eXtension: <http://www.extension.org/pages/64297/unallocated-equity#.UgLqYpLVB-E>
- Knoeber, C. R., and Baumer, D. L. (1983). Understanding Retained Patronage Refunds in Agricultural Cooperatives. *AJAE*, 65(1), 30-37.
- Parcell, J. L., Featherstone, A. M., and Barton, D. G. (1998). Capital Structure Under Stochastic Interest Rates: An Empirical Investigation of the Midwestern Agricultural Cooperative. *Agricultural Finance Review*, 58, 49-61.
- Pratt, J. W. (1964). Risk Aversion in the Small and in the Large. *Econometrica*, 32, 122-136.
- Royer, J. S., and Shihpar, M. (1997). Individual Patron Preferences, Collective Choice, and Cooperative Equity Revolvment Practices. *Journal of Cooperatives*, 12, 47-61.
- Sexton, R.J. (1986). The Formation of Cooperatives: A Game-Theoretic Approach with Implications for Cooperative Finance, Decision Making, and Stability. *American Journal of Agricultural Economics*, 68(2), 214-225.
- USDA – Rural Development – Coops Directory and Data.  
[http://www.rurdev.usda.gov/BCP\\_Coop\\_DirectoryAndData.html](http://www.rurdev.usda.gov/BCP_Coop_DirectoryAndData.html) Accessed Dec. 12, 2013.
- VanSickle, J. J., and Ladd, G. W. (1983). A Model of Cooperative Finance. *American Journal of Agricultural Economics*, 65(2), 273-281.

**Table 1. Average Pre-Tax Returns and Variances of Returns on Assets 2005-2010**

	Mean	Variance
Farm Return on Assets	3.60%	3.70%
Cooperative Return on Assets	8.50%	0.70%

\*Sources: Kansas Farm Management Association and CoBank

**Table 2. Average Effective Tax Rates 2005-2010**

	Mean	Standard Deviation	Median	Minimum	Maximum
Kansas Farms <sup>1</sup>	14.10%	3.70%	13.10%	10.70%	19.90%
Kansas Cooperatives <sup>2</sup>	9.40%	4.00%	10.80%	3.20%	13.20%
Publicly-Traded Agribusinesses <sup>3</sup>	24.50%	6.40%	23.70%	16.40%	32.50%

<sup>1</sup>Kansas Farm Management Association

<sup>2</sup>CoBank

<sup>3</sup>Archer Daniels Midland and Syngenta Annual Reports

**Table 3. Return and Variance of Return on Assets Used in Sensitivity Analysis**

	Return on Qualified Earnings	Return on Non-Qualified Earnings	Variance of Return on Qualified Earnings	Variance of Return on Non-Qualified Earnings
Higher Return and Variance on Qualified Earnings	9%	4%	5%	1%
Higher Return and Variance on Non-Qualified Earnings	4%	9%	1%	5%

**Table 4. Simulation Results: Average Share of Qualified Earnings and Certainty Equivalents**

	Actual Returns		High Farm Returns and Variances		High Coop Returns and Variances	
	w*	CE†	w*	CE†	w*	CE†
Actual Tax Rates	0.107	8.3%	0.535	5.9%	0.436	6.2%
Cooperative and Farm Tax Rates Equal	0.111	8.0%	0.543	5.8%	0.457	5.9%
Cooperative Tax Rate Equal to Average of Agribusinesses	0.119	7.2%	0.560	5.7%	0.496	5.4%
Cooperative Tax Rate Equal to Maximum of Agribusinesses	0.129	6.6%	0.572	5.5%	0.524	5.0%

\*Share of qualified earnings

† Certainty Equivalent

**Table 5. Changes in Average Share of Qualified Earnings and Certainty Equivalents Due to Changes in Taxes**

	Actual Returns		High Farm Returns		High Coop Returns	
	Change in w*	Change in CE†	Change in w	Change in CE	Change in w	Change in CE
Cooperative Tax Rate Equal to Farm Tax Rate	0.003	-0.4%	0.008	-0.1%	0.021	-0.3%
Cooperative Tax Rate Equal to Average of Agribusinesses	0.012	-1.2%	0.025	-0.3%	0.060	-0.8%
Cooperative Tax Rate Equal to Maximum of Agribusinesses	0.021	-1.8%	0.038	-0.4%	0.088	-1.1%

\*Share of qualified earnings

† Certainty Equivalent

**Table 6. Effects of Risk Preferences on the Share of Qualified Earnings and the Certainty Equivalent**

	Actual Returns		High Farm Returns		High Coop Returns	
	$\delta^*$	$\Omega^\dagger$	$\delta$	$\Omega$	$\delta$	$\Omega$
Actual Tax Rates	0.049	1.3%	-0.551	-0.1%	0.442	-0.4%
Cooperative Tax Rate Equal to Farm Tax Rate	0.045	1.3%	-0.562	-0.2%	0.421	-0.2%
Cooperative Tax Rate Equal to Average of Agribusinesses	0.035	1.4%	-0.584	-0.4%	0.384	0.3%
Cooperative Tax Rate Equal to Maximum of Agribusinesses	0.037	1.4%	-0.599	-0.6%	0.358	0.6%

\*Difference between share of qualified earnings with risk aversion coefficient of 4.5 and the share of qualified earnings with risk aversion coefficient of 1.

† Difference between certainty equivalent with risk aversion coefficient of 4.5 and the certainty equivalent with risk aversion coefficient of 1.