Staff Paper

Members' Financial Evaluation and Cooperatives' Decision Processes

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MEMBERS' FINANCIAL EVALUATION AND COOPERATIVES' DECISION PROCESSES

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1. Introduction.

The paper presents an analysis of cooperative investment decision based on the coalition theoretical framework (Staatz 1983, 1987, 1989). According to this framework, cooperatives can be considered as coalitions of groups with different interests. The behavior of any cooperative is determined by the interaction of its many groups (different types of farmers, managers, lenders, input suppliers, buyers, etc.) with different objectives. The group that can impose its will on the coalition will determine the cooperative's strategy. The other parties may accept this leadership, leave the cooperative or try to use their bargaining power to modify the final outcome.

The paper discusses the impact of group bargaining on cooperatives' decision process. In particular, the paper addresses the issues related to the consequences of members' heterogeneity on cooperative efficiency. The proposed model utilizes tools from financial theory already successfully applied in the literature (Peterson 1992, Hendrikse 1998) providing a more detailed insight into the determinants of the cooperative decision process. The paper shows that cooperatives evaluate investments differently from IOFs due to the unique characteristics of their patrons compared to other types of investors. These characteristics raise the transaction costs of

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the cooperative decision process making internal coordination more difficult. The point will be shown through the following process:

1. A model is set up by determining the assumptions and identifying the studied investment decision. (Section 2)
2. The cooperative members' evaluation criterion is described. (Sections 3 and 5)
3. This criterion is compared with IOF shareholders'. (Section 4)
4. The implications of the differences are analyzed. (Section 6)

2. The Model.

The model describes members' behavior and the cooperative decision process by imposing the following assumptions to a general net present value (NPV) approach (Brealey and Myers 1996):

1. *Members' objectives.* Members' goal is the maximization of the Net Present Value (NPV_i) of their personal investment in the cooperative.
2. *Independent evaluation of investment projects.* Each member evaluates each investment project independently. This assumption postulates that a member' evaluation is not influenced neither by the other members or other investment opportunities.
3. *Exit option.* If the cooperative accepts an investment so that $NPV_i < -q_i$, the member will abandon the cooperative. In the equation, NPV_i is the net present value of the member's investment in the cooperative and q_i is the quasi rent value of the member's assets. The quasi-rent value is defined as the difference between the value of the member's assets if used in the transaction with the cooperative and the their value if used in the next best transaction. Thus, the quasi-rent value can be expressed as the loss in wealth that the member would incur if

he/she left the cooperative. If $-q_i < NPV < 0$, the member will not support the project (for example, he/she might vote contrary) but he/she will not leave the cooperative.

4. *Open membership.* Any producer can become a cooperative member simply by paying an equity share at face value. Although additional costs may be charged to members to finance cooperatives' investments, membership is achieved simply by paying an equity share at nominal value. As a consequence, members leaving the cooperative can only have back their investment at face value because they cannot sell the share on the market at a higher price.
5. *All costs and benefits received or allocated by the cooperative can be expressed in economic values.*
6. *Restriction on cost and benefit allocation rules.* Cost and benefit may be allocated among the cooperative groups only according to two non mutually exclusive criteria: either proportionally to equity share or proportionally to patronage.[2]
7. *Separation of the farm production decisions.* The evaluation of the cooperative's investments does not affect the members' production decision for their farm. This assumes that farmers would produce the same goods even if they were not cooperative members and it implies the existence of alternative marketing channel for patrons' products. Also, this assumption postulates that the cooperative investment requires no intermediate investment because members are not required to adjust their production to invest in the cooperative. This assumption, together with the definition of total value, allows us to focus the analysis on the pure financial decision of the cooperative investment.

[2] This assumption is consistent with the current cooperative regulation in many countries: cooperatives' dividends are allowed even if uncommon.

8. *No option value of the investment*. The farmers do not gain any value by postponing the investment. This assumption postulates that the benefits of waiting (i.e. avoiding a possible loss) are offset by the costs (i.e. the missed cash flows).
9. *No taxation.* The cooperative profits are assumed tax-free.
10. *No bankruptcy.* The possibility of bankruptcy is not considered in the model.

Now, assume that the cooperative is considering an investment with the characteristics summarized in equation [1]. The study question is to determine if the cooperative should accept the project, assuming that the cooperative goal is the maximization of members' wealth.

$$NPV_C = \sum_{t=1}^{N} \frac{M_t}{(1+k_c)^t} - E_0 > 0.^{3} \qquad [1]$$

where:

NPV_C is the net present value of the investment calculated according a standard CAPM technique.

N is the horizon of the investment;

M_t represents the "total value" produced by the cooperative in the year t. The "total value" is the sum of all the benefits produced by the cooperative to the members plus the cooperative net income (Staatz 1989). It may include price differentials, services, cooperative profits, patronage or income retention, etc.

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[3] In order to provide a homogeneous comparison with the following equations, the formula [1] expresses the NPV of the members' equity investment. The formula is equivalent to the more traditional formulation of the NPV of an investment: $\sum_{t=1}^{N} \frac{R_t}{(1+k_w)^t} - I$, where k_w is the interest rate calculated according to the Weighted Average Cost of Capital technique, R_t is the sum of the total value produced by the cooperative (M_t) and the interest expenses and I is the total cost of the project including debts. The equation [1] takes into account the effect of the leverage through the evaluation process of the interest rate k_c.

E_0 is the value of equity required by the investment;

k_c represents the interest rate to be used in the discount process. k_c is calculated according the usual Capital Asset Price Model (CAPM) formula: $k_c = k_0+(k_m-k_0)\beta_L$, where k_0 is the return of the risk free assets, k_m is the return of the market portfolio and β_L is the beta coefficient for the cooperative, given the specific leverage level[4] (Sharpe 1964, Lintner 1965). It must be pointed out that, according to the CAPM framework, k_c is independent from members' preferences.

Financial theory states that, under the condition of fully diversified investors, the project described in equation [1] should be accepted because it maximizes the value of the present wealth of the investors (Brealey and Myers 1996). In this paper, the proposed financial model will show that this rule does not hold for cooperatives. Actually, in these organizations, the members' wealth maximization is achieved through different decision criteria. To prove this point, section 3 describes the evaluation process of the project from the members' point of view.

3. Cooperative Members' Investment Evaluation Criteria

Given the hypothesis of the model, the evaluation of the ith member of the investment project described in equation [1] can be model by equation [2]. The equation illustrates the decision process of a farmer who is already a member of the cooperative and must decide if he/she should support the initiative or not. As assumed, the member will support the project if $NPV_i>0$, will

[4] According the CAPM the beta coefficient value is given by the formula: $\frac{\mathrm{cov}_{t-1}(y_t^m, y_t^c)}{\mathrm{var}_{t-1}(y_t^m)}$ i.e. the expected covariance of the return of the market portfolio and the cooperative returns, divided by the expected variance of the market portfolio.

oppose the project if $NPV_i<0$ (he/she will vote contrary) and will leave the cooperative only if $NPV_i<-q_i$ (the quasi-rent value of the investments).

$$NPV_i = \sum_{t=1}^{H_i} \frac{w_t s_i M_t + (1-w_t) p_{it} M_t}{(1+k_i)^t} - \left(1 - \frac{1}{(1+k_0)^{H_i}}\right)\left[w_{t_0} s_i E_0 + (1-w_{t_0}) p_{it_0} E_0\right] \quad [2]$$

in which the present value of the cash flows obtained by the member (represented by the summation value) is compared with the value of the required individual equity investment. Specifically:

$w_t s_i M_t + (1-w_t) p_{it} M_t$ represents the total cash flows obtained by the member in the year t. The value is calculate by multiplying the total value produced by the cooperative (M_t) by a series of parameters representing the rules for benefit allocation and the individual characteristics of the member. In particular:

- w_t is the share of total value allocated among members in proportion to the equity share in the year t,
- s_i is the equity share of the ith member (constant across time by assumption).
- $1-w_t$ is the share of total value allocated among members in proportion to patronage in year t,
- p_{it} is the share of total patronage delivered by the member in year t.

H_i represent the temporal horizon for the member, with H_i=min (investment horizon N, number of years the member expects to be patron of the cooperative),

$w_{t_0}s_iE_0+(1-w_{t_0})p_{it_0}E_0$ is the member's initial equity investment: the w_{t0} percentage of the cost of the investment (E) is allocated among the members in proportion to the equity share (s_i), while the remaining $(1-w_{t_0})$ percentage is allocated in proportion to the patronage at year 0 (p_{it_0}),

$\frac{w_{t0}s_iE_0 + (1-w_{t0})p_{it_0}E_0}{(1+k_0)^{Hi}}$ is the present value of the equity investment that the member receives back at the moment he/she leaves the cooperative ($t = H_i$). The value is discounted at the risk free rate, given the no bankruptcy assumption.

k_i represent the interest rate used by the member in his/her decision process. The formal evaluation of the coefficient is discussed in section 5. For now, it is sufficient to state that it is determined by the members' preferences and it may be different from k_c.

Equation [2] describes individual members' evaluation of the cooperative project. It results in two important preliminary conclusions. First, individual patrons can have different evaluations of the investment: a project acceptable for the ith member is not necessarily acceptable for the jth member ($NPV_i \neq NPV_j$; with $i \neq j$.). Second, in a cooperative, an investment with the characteristics described in equation [1] is not necessarily acceptable for every member. ($NPV_C > 0$ does not imply that $NPV_i > 0$ or $NPV_i > -q_i$).

These results are determined by three factors:

- Difference in the investment horizons ($H_i < N$ and, also, H_i not necessarily equal to H_j, with $i \neq j$). Members may plan to stop patronizing the cooperative in different times and possibly before year N. In this case, members may oppose a positive NPV project if they do not plan to patronize the cooperative for a time period sufficient to gain enough returns from the investment to cover the initial expenses (Vitaliano, 1983). This issue is a direct consequence of the open membership of the cooperative. The absence of secondary markets for cooperative shares consequential to the application of this principle prevents member from recovering the present value of the future cash flows through the share selling price;

- Multiplicity of rules for cost and benefit allocation. Combination of p_{it}, s_i, w_t, and p_{t_0}, such that the member bears a share of cost greater than his/her benefit share. The equation shows that members consider the dynamics of the personal interaction with the cooperative in the evaluation process, which usually differs across patrons. Specifically, members that plan to increase their share of patronage (p_{it}) over time should be more favorable to the investment, while members that plan to reduce their patronage are more likely to have a negative evaluation. Base capital plans usually are able to manage this problem and they can be included in the model by imposing specific relations between the parameters p_{it}, s_i, w_t, and p_{t_0}.
- Diversity in the opportunity cost of money for members ($k_i \neq k_j \neq k_c$). Members may apply different interest rates in their individual investment evaluation. This condition will be formally discussed in section 5.

4. Comparison with IOF Shareholders' Evaluation Criteria.

In a cooperative, members may have different evaluations and their appraisal of the investment may diverge from the classical NPV rule presented in equation [1]. Instead, shareholders of IOFs are expected to have more consistent evaluations. This statement can be supported as follows. From the formula [2], assuming that $w_t = w_{t0} = 1$ (all the value is distributed in proportion to equity shares owned) and that the shareholders leaving the IOFs receive a market price V_H for their shares, we have the following equation representing the evaluation of the investment for the sth shareholder of an IOF:

$$NPV_s = \sum_{t=1}^{H_s} \frac{M_t s_s}{(1+k_s)^t} + \frac{V_H}{(1+k_s)^{H_s}} - s_s E \qquad [3]$$

Where V_H is the salvage value of the investment at time H_s, M_t is the total additional value produced for the owners by the firm and k_s is the interest rate determined according the standard CAPM method.

Under the assumption that the market price for the equity share at time H_s is based on the NPV of the expected cash flows of the investment $\left(V_H = \sum_{g=1}^{N-H_s} \frac{M_t s_s}{(1+k_s)^g} \right)$, we have that:

$$NPV_c > 0 \Rightarrow NPV_s > 0 \quad \forall s \qquad [4a]$$

$$\text{and} \quad \frac{NPV_z}{s_z} = \frac{NPV_s}{s_s} \quad \forall s, z \qquad [4b]$$

The equations [4a] and [4b] show that, in a IOF, under the condition of fully diversified investors, the general NPV rule leads to the maximization of the present value of each shareholder's wealth. Then, shareholders' evaluations are expected to be consistent with each other and with the general NPV rule.

In other words, if equation [1] holds for the firm, it holds for each individual IOF investor. No bargaining process among investors is necessary in investment decision making. This is not true for a cooperative. Equation [1] vs. equation [2] implies that the cooperative decision process is expected to have higher transaction costs because of the divergent evaluations of the members. In a cooperative, a bargaining activity is necessary among the members in order to choose the proper course of action and to determine possible compensation for members with divergent evaluations. This process is superfluous in the IOFs, given the homogeneity of shareholders' evaluations.

The consequences of this point will be fully analyzed in section 6, but first the factors influencing the determination of the discount rate for cooperative members will be discussed. In fact, the results achieved in this section assumed that the interest rate applied by cooperative members in their evaluation is influenced by individual preferences. The next section provides the formal derivation of this statement and discusses some of the implications.

5. Members' Required Returns and Cooperative Investment Evaluation

The determination of the interest rate used by members in their decision process may be derived from the "fundamental equation for asset evaluation" (Constantinides, 1989) which states:

$$E_{t-1}\left(y_t^c\right) = \frac{-E_{t-1}\left[U''\left(W_t\right)\right]}{E_{t-1}\left[U'\left(W_t\right)\right]} cov_{t-1}\left(W_t, y_t^c\right) \qquad [5]$$

where:

E_{t-1} is an operator representing the expectation conditional on information available at t-1

y^c_t represent the risk premium on the evaluated asset c

U' and U" are the first and second derivatives of a concave utility function

cov_{t-1} is the covariance operator conditional on information available at t-1

W_t is the investor wealth.

Assuming that the investor owns the market portfolio,[5] the equation [5] leads to the CAPM determination of the interest rate used in equation [1]. However, Murray (1983) and Condon and Vitaliano (1983) argued that patrons of cooperative are unlikely to have a diversified portfolio given the relevance of their farm investments. Hanson and Myers (1995) stressed that farmers

usually "do not hold diversified portfolios, preferring to concentrate most of their assets in on-farm investments and less risky financial investments such as treasury bonds and certificates of deposit." Given these studies, the market portfolio hypothesis appears not applicable to cooperative patrons and a limited portfolio approach is required. Then, assuming that the patrons' investment portfolio includes only the farm operation, the participation in the cooperative and risk free assets, we have that:

$$cov_{t-1}(W_t, y^c_t) = x^f_{t-1}\, cov_{t-1}(y^f_t, y^c_t) + x^c_{t-1}\, var_{t-1}(y^c_t)\ .^{6} \qquad [6]$$

where y^f_t is the risk premium for the farm operation and x^f_{t-1} and x^c_{t-1} is the investment share in the farm operation and in the cooperative, respectively. Then by substituting the equation [6] into the [5] it is possible to derive the expected return for the member's participation in the cooperative.

$$E_{t-1}\left(y^c_t\right) = \frac{-E_{t-1}\left[U''(W_t)\right]}{E_{t-1}\left[U'(W_t)\right]}\left[x^f_{t-1} cov_{t-1}\left(y^f_{t-1}, y^c_{t-1}\right) + x^c_{t-1} var_{t-1}\left(y^c_{t-1}\right)\right] \qquad [7]$$

Then, k_i used in equation [2] can be defined as $k_0+E_{t-1}(y^c_t)$ and it represent the return of the investment required by the ith member, conditional to the a priori information about the project

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[5] The market portfolio is a combination of asset so diversified that the specific risk of the single investment does not influence the variance of the total returns of the portfolio.

[6] Formula [6] can be derived according the following procedure:

$W_t = r^f_{t-1} x^f_{t-1} + r^c_{t-1} x^c_{t-1} + r^0(1 - x^f_{t-1} - x^c_{t-1})$

$cov_{t-1}(W_t, y^c_t) =$

$$E_{t-1}\left\{\left[r^f_{t-1} x^f_{t-1} + r^c_{t-1} x^c_{t-1} + r^0(1 - x^f_{t-1} - x^c_{t-1}) - \bar{r}^f_{t-1} x^f_{t-1} - \bar{r}^c_{t-1} x^c_{t-1} - r^0(1 - x^f_{t-1} - x^c_{t-1})\right]\left(y^c_{t-1} - \bar{y}^c_{t-1}\right)\right\}$$

remembering that $y^a = r^a - r^0$ and that r^0 is constant (being risk-free), we have:

$$cov_{t-1}(W_t, y^c_t) = E_{t-1}\left\{\left[\left(y^f_{t-1} x^f_{t-1} - \bar{y}^f_{t-1} x^f_{t-1}\right) + \left(y^c_{t-1} x^c_{t-1} - \bar{y}^c_{t-1} x^c_{t-1}\right)\right]\left(y^c_{t-1} - \bar{y}^c_{t-1}\right)\right\} =$$

$$x^f_{t-1} cov_{t-1}\left(y^f_{t-1}, y^c_{t-1}\right) + x^c_{t-1} var_{t-1}\left(y^c_{t-1}\right).$$

(i.e. available at time=t-1),[7] The result is consistent with the financial literature about required returns in presence of non diversifiable assets (Mather, 1972).

The equation stresses the two main strategies a cooperative may implement to produce benefits for the members: creation of differential returns and risk management (Peterson and Anderson 1996). The dichotomy is pointed out by the fact that a member, for a given level of risk aversion, will accept lower differential returns if they are negatively correlated with the farm returns, reducing the overall risk level of the patron's operations.

The formula shows that required return of the cooperative investment for a patron with a limited portfolio depends on:

- the share of the personal wealth invested in each asset (x^f_{t-1}, x^c_{t-1} and implicitly $x^0_{t-1} = 1 - x^f_{t-1} - x^c_{t-1}$)
- the expected variance of the cooperative returns
- the expected covariance between the cooperative and the farm operation returns
- the relative risk aversion of the farmer represented by the coefficient $\frac{-E_{t-1}[U''(W_t)]}{E_{t-1}[U'(W_t)]}$.

The required return from the cooperative participation depends on individual and personal preferences of the members and the characteristics of his/her farm. In the coalition framework,

[7] In the formula [2] is implicitly assumed constant across time, however the formula [7] shows that that the model allows for a variable interest rate, given the variability of the farmers' portfolio, of their preference and of the value of the risk-free interest rate.

this implies the possibilities of different groups within the members characterized by different evaluations of the project due to differences in the applied interest rate.

6. Consequences for the Cooperative's Investment Decisions.

The heterogeneity of the required returns for members has major implications in the decision processes of cooperatives. In fact, given the differences between the members' required returns, an acceptable investment should be able to grant at least the following return, which represent the average of members' individual required returns weighted with their percent claim on the total value produced by the cooperative:

$$k_w = \sum_{i=1}^{T} \alpha_i k_i \qquad [8]$$

where T is the number of members; α_i is the percent share of total value that a member can claim.[8] Then, k_w is the required return for a cooperative investment. However, the application of the formula [8] in the decision processes is subjected to two conditions. First, information regarding members' farm characteristics and their preferences (risk aversion) must be known. Second, the cooperative must be able to discriminate perfectly in the remuneration of patronage. In fact, equation [8] assumes that the cooperative could give to each member exactly the individual minimum required return (k_i). If the cooperative cannot discriminate then the members with higher risk aversion or higher covariance between the farm and the cooperative returns will receive a lower surplus or will suffer a deficit.[9] A cooperative not able to

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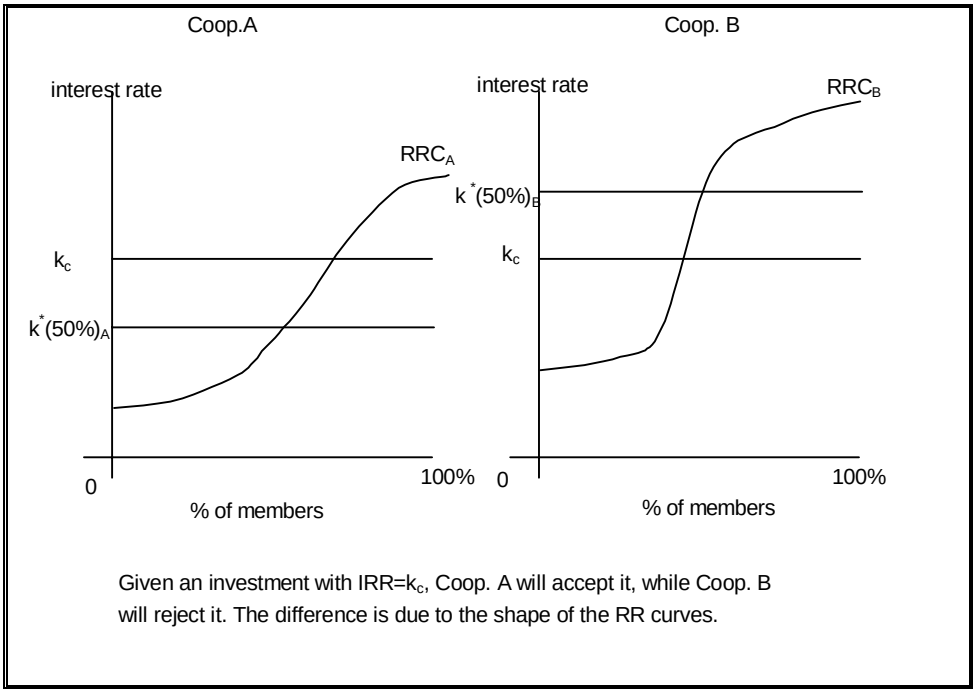
[8] Equation [8] implies that, in each year, $\alpha_i k_i M_t = w_t s_i M_t + (1-w_t) p_{it} M_t$. Then, the interest rate to be used in cooperatives' investment evaluation is expected to vary across time non only because of the possible change in the risk-free returns and in the market risk premium but also because of the changes in the dynamics of the relationships between members and the cooperative.

[9] Given the assumption, in the worst scenario the loss will be equal to q_i, the quasi-rent value of their assets; in fact, if the loss should be greater than qi the member will leave the cooperative.

discriminate has to adopt a fixed interest rate k^* such as that a target percentage of member will be satisfied. For example, if the goal is to satisfy of all patrons then $k^* = \max(k_i)$.

The concept can be graphically illustrated through the notion of the required return curve (RRC) which is determined by calculating the return of the investment able to satisfy the target percentage of members in a non discriminating cooperative. Given equation [5], the shape of the RRC is determined by each member's risk aversion, portfolio composition and covariance between the returns of the farm and the cooperative. The figure 3.1 illustrates two examples of RRC in the case of non discriminating cooperatives. In figure 3.1, k_c represents the internal rate of return (IRR) of the cooperative's investment described in equation [1], $k^*(50\%)$ is the return able to satisfy at least 50% of the members. Assuming democratic rules in the cooperative (one vote for each member and equidistribution of the contractual power), we have that an investment will be approved by the members if it grants a return higher than $k^*(50\%)$. It must be pointed out that the return on investment must be adjusted to take into account the possible exit of members due to losses higher than the quasi rent value of the assets, in the case the project is approved.

Figure 3.1: Influence of the Members' Required Returns on the Cooperative's Investment Decisions



According to formula [7], members of cooperative A may be characterized by low risk aversion, low covariance of farm and cooperative returns, high incidence of the risk free asset in the farmers' portfolio. In this case, the cooperative may accept investments that present a negative value according to the general NPV rule if their returns are actually higher than $k^*(50\%)A$.[10] On the contrary, cooperative B (where members may have high risk aversion, high covariance of farm and cooperative returns, low incidence of the risk free asset in the farmers' portfolio) may reject investments even if they are acceptable according to the general NPV rule.

In a non-perfectly discriminating cooperative, the difference between the expected return of the investment and the return required by the member represents the member's surplus or deficit. This implies that every project with a return lower than max(k_i) causes a transfer of wealth between members. Thus, in a cooperative, the adoption of an efficient investment is not necessarily a Pareto-efficient strategy. In order to avoid a Pareto-inefficient solution, two conditions must be respected. First, financial compensation across members must be possible; second the sum of individual surpluses for members must be at least equal to the sum of individual deficits plus the transaction costs originated by the process of determining and paying the necessary compensations. According to the proposed model, a cooperative's strategy may be Pareto-efficient if it grants a return k_e able to satisfy each member and cover the cost of the negotiation and compensation processes, i.e. :

$$k_e \geq k_w + \delta \qquad [9]$$

where k_e is the minimum return for a Pareto efficient strategy, k_w is the required return for a perfectly discriminating cooperative (equation [8]) and δ is the increase in the required returns due to the transaction costs in the compensation process.

Finally, it must be pointed out that the actual investment decision of the cooperative depends also on the distribution of the negotiation power across members.[11] In fact, according to democratic rules, a project should be approved or rejected if its Internal Rate of Return (IRR) is higher or lower than $k^*(50\%)$. However, the effective negotiation power of minorities can determine the

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[10] A project with a negative NPV actually grants a lower return than k_c. However, if the return is higher than $k^*(50\%)A$, member will approve the project even if it does not meet the general NPV rule (i.e. the market grants higher returns for the same risk level).

nature of the compensation and the value of δ. If the IRR of the project is lower than k_e, then full compensation is not possible and the strategy of the cooperative is determined by the distribution of negotiation power within the members.

Table 3.1 summarizes the results of the model. The two matrices report the outcomes of the decision processes in the case that the expected return of the investment is able to satisfy the majority of members (matrix A, IRR> k^*(50%)) and in the case that only a minority of members is satisfied (matrix B, IRR< k^*(50%)). In the two situations, the minorities have different interests. In case A, the minority is represented by the members with the higher required returns who have interest in rejecting the project. In case B, the minority is represented by the members with the lower required returns who may want to approve the investment. The matrices show that the investment decisions change according to the distribution of the negotiation power depending also on the returns offered by the project.

[11] For the purpose of this analysis, negotiation power is defined as the ability of a group to impose their preferences on the whole coalition using any means, for example majority of votes in the meetings, control of the managers and board of directors, control of the marketing channels, threat of exit, etc.

Table 3.1: Cooperative Decision Matrices

Matrix A: Decision Matrix for a Cooperative Investment With IRR> k^*(50%)

		negotiation power of minorities (members with higher required returns)	
		weak	strong[12]
IRR of the project	IRR<k_e	project approved, no compensation	project rejected
	IRR>k_e	project approved, no compensation	project approved with compensation

Matrix B: Decision Matrix for a Cooperative Investment With IRR< k^*(50%)

		negotiation power of minorities (members with lower required returns)	
		weak	strong
IRR of the project	IRR<k_e	project rejected	project approved no compensation
	IRR>k_e	project approved with compensation	project approved no compensation

Then, in a cooperative the interest rate applied in the decision process is not based on the assessment of the systematic risk but it depends on the rules for the benefit allocation and the preference structure of members. In the model these conditions were represented by the possibility of discrimination in return allocation, the farmers' risk aversion and the covariance between the returns of the farms and the cooperative.

7. Transaction cost implications of the model.

The results of the analysis show the limits of the effectiveness of cooperative organizations. According to the institutional approach, cooperatives are coordination tools useful to reduce the

[12] In the determination of the negotiation power, a group's threat of leaving the cooperative (causing loss of profits for the other groups) is a relevant factor (Staatz, 1983). In the proposed matrices, a strong power of the minorities

transaction costs in the interaction between the farmers and the market (external transaction costs). Through cooperatives, farmers are able to achieve better vertical coordination and reduce their subjection to opportunistic behavior (Staatz 1989, Saccomandi 1992).

However this improved coordination is achieved at the expense of the efficiency of the decision processes, which results in internal transaction costs. The financial analysis showed that the internal transaction costs influence the determination of the required returns for the cooperative's investment evaluation and make the cooperative decision process inconsistent with an IOF under similar circumstances.

The effectiveness of a cooperative organization is determined by the relative size of the two typologies of transaction costs. If the benefits coming from the reduction of the external transaction costs exceed the higher internal transaction costs (due to the bargaining process) then a cooperative results in an efficient organization. The performance of the cooperative is determined by the trade off between more costly internal coordination and improved external coordination.

8. Conclusions.

The traditional financial models show that IOF investment decisions depend mostly on the expected returns and on the risk of the project (Fisher 1930). The coalition framework and the financial model proposed in this paper, showed that, in a cooperative, the decision is influenced by additional factors. Specifically:

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assume that they can make a credible threat (due for example to low asset specificity) while the majority cannot

- *factors related to members' individual preferences.* These factors include the members' risk aversion, the composition of their investment portfolio and the covariance of the farm and cooperative returns.
- *institutional factors.* Cooperative decisions are conditioned by the institutions determining the rules for the bargaining process among the coalitions' groups. Examples of these factors are the voting rules, the mechanisms for the elections of the directors and their attributions.
- *distribution of the bargaining power across members.* The financial model shows that members may have different evaluations of the project and the application of the compensation principle proposed by the Coase Theorem may be costly. Thus, members' power within the cooperative may determine the emergent strategy.

The additional factors influencing members' investment evaluations invalidate the general NPV rule applied by IOFs. However, the transaction cost approach shows that potentially higher internal transaction costs (due to members' heterogeneity) do not imply an absolute competitive disadvantage with respect to other organizations: the potential inefficiency of the decision process may be compensated by a more effective external coordination.

Finally, the model presented in this paper raises several issues for further research. In this paper, the focus was on members. The coalition framework stresses the relevance of other groups such as managers or the board of directors. A complete description of the cooperative decision processes should include an analysis of the influence of these groups on the strategies. The

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(high asset specificity).

problem is particularly relevant because of the heterogeneity of the objectives of the members that makes the determination of the incentive structure for managers and directors more difficult. Also, the model utilizes strong assumptions. Particularly, the assumptions of independent evaluation of investments, no option value and of independence of the farm production decisions limit the application of the model. The introduction of real options techniques may be used to overcome these problems.

Bibliography

Brealey R. and Myers S. 1996. *Principles of corporate finance.* McGraw Hill

Coase R. 1960. "The problem of social cost" in *Journal of Law and Economics* n.1, 1960: 1-44

Condon A. and Vitaliano P. 1983. *Agency problems, residual claims and cooperative enterprise.* Virginia Polytechnic and State University, Department of Agricultural Economics, VPI Working Paper n. 4, July 1983.

Constantinides G. M. 1989. "Theory of valuation: overview and recent development" in Bhattachrya S. and Constantinides, G. M. (editors) *Theory of valuation*, Totowa, New Jersey 1989.

Fisher I. 1930. "The theory of interest" Macmillian, New York 1930

Hanson S. and Myers R. 1995. "Testing for a time varying risk premium in the returns to US farmland" in *Journal of empirical finance* n. 2, 1995: 265-276

Hendrikse G. 1998. "Screening, competition and the choice of the cooperative as an organisational form" in *Journal of Agricultural Economics* vol. 49, n.2 Spring 1998: 202-217

Lintner J. 1965. "The valuation of risk assets and the selection of risky investments in stock portfolios and capital budget" in *Review of Economics and Statistics* n. 47 February 1965: 13-37.

Murray G. 1983. "Management strategies for corporate control in British agricultural cooperatives" *Agricultural Administration*, 14, 1983: 51-63 (Part I) and 81-94 (Part II).

Peterson H. C. 1992. "The economic role and limitations of agricultural cooperatives: an investment cash flow derivation" in *Journal of Agricultural Cooperatives* vol. 7, n. 61 1992.

Peterson H.C. and Anderson B. 1996. "Cooperative strategy: theory and practice" in *Agribusiness* vol. 12, n. 4, 1996: 371-383.

Saccomandi V. 1992. *Il management delle imprese cooperative* [cooperative management]. Etaslibri, Milano 1992.

Sharpe W. F. 1964. "Capital Asset Prices: a theory of market equilibrium under condition of risk" *Journal of Finance* n. 19 September 1964: 425-442

Staatz J.1983. "The cooperative as a coalition: a game-theoretic approach" *American Journal of Agricultural Economics*, 65: 1084-1089

Staatz J. 1987. “A game-theoretic analysis of decision-making in farmer cooperatives” in Royer J. (editor) *Cooperative theory: new approaches* USDA, ACS Service Report n. 18 Washington, DC, July 1987.

Staatz J. 1989. *Farmer cooperative theory: recent development.* USDA Agricultural Cooperative Services Report n. 84, June 1989

Vitaliano P. 1983. “Cooperative enterprise: an alternative conceptual basis for analyzing a complex institution” *American Journal of Agricultural Economic*, 65: 1078-1083.