Tournaments in religious organizations with investment in religious human capital: choosing the pope

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1. INTRODUCTION

All religious organization, as any other firm, have their objectives, among which are ways to attract new converts. To attain their aims, each religious organization is endowed with a diversity of options among several organizational strategies. To be successful in achieving these objectives will be conditioned, in great measure, to the skills and performance of those who are responsible for the leadership of the organization, regarding the commitment of these persons with what has been planned. It is of the utmost importance for the religious firm that its clerics, in their several hierarchical levels, superiors and subordinates, exercise a level of effort suitable with the results expected from each one of them.

The contracts established between religious organizations and its clerics (workers) may be inserted in the approach of the principal-agent problem. Within this context, the firm would be the principal and its clerics, the agents. Therefore, according to Zech (2001, p.328) this relationship principal-agent would not be immune to problems such as *moral hazard* – in the case of *shirking* behavior on the part of the workers – adverse selection – with *hidden information* – and dislodgement of objectives – where the workers might exert an effort, but in activities which are not those having priority for the firm.

The clerics, in the lack of appropriate incentives, would rather reduce their efforts to a minimum, acting in their own benefit. These problems tend to become worse when the monitoring costs are high. Evidently, the more detailed and complete the contract between the agent and the principal, the nearer they will be to the optimum relativity of the equationing of the interest of both parties involved in the contractual relationship, this means, a *"first-best"* contract. However, this contract would be conditioned to the nonexistence of *hidden information*, to measurability and to the observability of the agent's behavior, the absence of risk or of reduced risk, as well as the possibility of the principal imposing severe penalties on the agent, in the case of the agent not complying with the contract. When this is not possible, the alternative is to create a "*second-best*" contract.

After this introduction, we discuss, in next section, the model of Câmara (2002) modified to religious organizations, through the inclusion of non-monetary income or psychic income, with two clerics skills and a homogeneous phase. The objective of this procedure is the modification, for the purpose of this work, that considers a Tournament between two clerics, who possess homogeneous skills and abilities, to be applied to the case of a religious organization, especially, the Roman Catholic Church and religious firms with similar hierarchical structures.

2. Tournaments In Religious Organizations With Investment In Religious Human Capital.

In this section, we will present a version, modified, of Câmara´s *Tournaments* model (2002), which includes the possibility of the participants in the promotion tournament to invest in human capital. However, here we will consider an adaptation of the model for the purpose of this work, specifically for religious organizations. Instead of the wider concept of human capital, considered by Câmara in his work, the concept of religious human capital will be considered. The main modification is the inclusion of psychic income or non-monetary income in the model.

The model has one stage and two competing clerics, j and k, who present a differentiated production function given by $f = f(\mu, R)$, where μ represents the effort, R is the religious capital of the cleric, $f(0,0) = 0$ and $\partial f / \partial \mu > 0$, $\partial f / \partial R > 0$, $\partial^2 f / \partial \mu^2 < 0$, $\partial^2 f / \partial R^2 < 0$. The cost function is given by $C(\mu, R) = C_\mu(\mu) + C_R(R)$ in which $C_\mu(0) = C_R(0) = 0$, $C_\mu'(\mu) > 0$, $C_R'(R) > 0$, $C_\mu''(\mu) > 0$, $C_R''(R) > 0$. The clerics have identical functions, both in terms of production and cost, presenting in this way, homogeneous abilities. Besides, they present neutrality to risk.

The religious organization will observe the production q of each cleric participating in the *tournament*, which will be a function of $f(\mu, R)$, multiplied by a random error a common to both clerics participating in the *tournament*. Here, we consider the common error and not individual and independent errors, since the heavier the weight of the common error the higher the efficiency of the *tournament*. In this way, clerics j and k, will present the following individual productions:

$$q_j = f(\mu_j, R_j)a$$

$$q_k = f(\mu_k, R_k)a \tag{1}$$

The probability $P(J,K)$ of cleric j overcoming cleric k will be given by:

$$P(J,K) = \frac{f(\mu_j, R_j)}{f(\mu_j, R_j) + f(\mu_k, R_k)} \tag{2}$$

Where the random factor a, that is common to both clerics and has the propriety of being multipliable, is annulled, and does not affect the probability of the two clerics to win the dispute.

For the problem of maximization of each one of the clerics, an alteration of Câmara's (2002) model will be made, which is the inclusion of non-monetary differential between clerics. This non-monetary income is also known as psychic income according to Thurow (1978) and Zech (2001, p.331; 2007, p.738), originating in status, privileges, use of titles and insignias, satisfaction in pleasing and serving God and fellow men,

testimony of eternal salvation through a faithfully professed priesthood, etc[1].

Therefore, we have that:

$$\max_{\mu_j R_j} P(J,K)(M_1 + A_1) + [1 - P(J,K)](M_2 + A_2) - C(\mu_j, R_j) \qquad (3)$$

Here, M_1 and A_1 represent, respectively, the monetary and non-monetary income of the cleric who obtains the first place in the Tournament (that of Bishop or Supervisor); M_2 and A_2 represent the same thing for the cleric classified in second place (assistant). With that, the remuneration of the Supervisor or Bishop will be $W_1 = M_1 + A_1$, and the remuneration of the assistant will be $W_2 = M_2 + A_2$. Besides, as in the previous case, having $M_1 > M_2$, $A_1 > A_2$ and consequently $W_1 > W_2$, for the marginal effort to be positive. Substituting (2) into (3) we have that:

$$\max_{\mu_j R_j} \frac{f(\mu_j, R_j)}{f(\mu_j, R_j) + f(\mu_k, R_k)}(M_1 + A_1) + \left[1 - \frac{f(\mu_j, R_j)}{f(\mu_j, R_j) + f(\mu_k, R_k)}\right](M_2 + A_2) - C(\mu_j, R_j) \qquad (4)$$

The first order conditions will be given by:

$$\frac{\frac{\partial f(j)}{\partial \mu_j} f(k)}{[f(j) + f(k)]^2}(\Delta M + \Delta A) = \frac{\partial C(j)}{\partial \mu_j} \qquad (5)$$

$$\frac{\frac{\partial f(j)}{\partial R_j} f(k)}{[f(j) + f(k)]^2}(\Delta M + \Delta A) = \frac{\partial C(j)}{\partial R_j} \qquad (6)$$

Where:

$$f(j) = f(\mu_j, R_j)$$
$$f(k) = f(\mu_k, R_k)$$
$$C(j) = C(\mu_j, R_j)$$
$$\Delta M = M_1 - M_2$$
$$\Delta A = A_1 - A_2$$

Rewriting equations (5) and (6), the result is:

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[1] See also Savych, 2005, p.55-63.

$$\frac{f(k)(\Delta M + \Delta A)}{[f(j) + f(k)]^2} = \frac{\dfrac{\partial C(j)}{\partial \mu_j}}{\dfrac{\partial f(j)}{\partial \mu_j}} \qquad (7)$$

$$\frac{f(k)(\Delta M + \Delta A)}{[f(j) + f(k)]^2} = \frac{\dfrac{\partial C(j)}{\partial R_j}}{\dfrac{\partial f(j)}{\partial R_j}} \qquad (8)$$

In this manner, the first order conditions (F.O.C) will be respected when:

$$\frac{C'_\mu(j)}{f'_\mu(j)} = \frac{C'_R(j)}{f'_R(j)} = \frac{f(k)(\Delta M + \Delta A)}{[f(j) + f(k)]^2} \qquad (9)$$

Where $C'_\mu(j) = \frac{\partial C(j)}{\partial \mu_j}, C'_R(j) = \frac{\partial C(j)}{\partial R_j}, f'_\mu(j) = \frac{\partial f(j)}{\partial \mu_j}$ and $f'_R(j) = \frac{\partial f(j)}{\partial R_j}$

The conditions of the second order require that the one derived from the clerics maximization function j, given by equation (4), be a negative semi defined Hessian matrix.

In this way, we have that:

$$C'_\mu(j)\left\{\frac{f''_\mu(j)}{f'_\mu(j)} - \frac{2f'_\mu(j)}{[f(j) + f(k)]}\right\} - C'_\mu(j) < 0$$

$$(10)$$

$$C'_R(j)\left\{\frac{f''_R(j)}{f'_R(j)} - \frac{2f'_R(j)}{[f(j) + f(k)]}\right\} - C'_R(j) < 0$$

The same reasoning is applied for cleric k. Rewriting equation (9) we have that:

$$\frac{f'_R(j)}{f'_\mu(j)} = \frac{C'_R(j)}{C'_\mu(j)} = \frac{f(k)(\Delta M + \Delta A)}{[f(j) + f(k)]^2} \qquad (11)$$

The equation above indicates that, in a situation of balance, the marginal substitution rate (MSR) between μ_j and R_j, this is to say, between the effort of cleric j and his religious capital, must be equal to his marginal substitution cost (MSC). It also informs that those variables depend upon the spread between prizes, whether monetary or non-monetary.

Equation (11) indicates that the values related to effort and religious human capital chosen by cleric j, given respectively by μ_j and

R_j, will depend on the spread between monetary income and non-monetary income (psychic income), given, respectively, by ΔM and ΔA. Here, differently from the Câmara (2002) model, where ΔM should be positive, due to the inclusion of the non-monetary income, ΔM may assume a null value, but only if ΔA is positive for the clerics who participate in the tournament to have incentives to do their best and invest in religious human capital. This is: $\Delta M = 0 \leftrightarrow \Delta A > 0$.

Besides, it can be observed in (9) and (11) that a lower spread in monetary income can be compensated by higher spread in non-monetary income and vice-versa. Even if $M_1 = M_2$, this is, spread in monetary income is null, when the candidates receive equal monetary income, or if $M_1 = M_2 = 0$, this is, even if the candidates do not receive any monetary income, the spread in psychic income might be sufficient as a stimulus for the effort of the clerics participating in the promotion tournament. Such is the case of catholic clerics who belong to Institutes of Consecrated Life (Code of Canon Law), of the Roman Catholic Church, who must take a vow of poverty (together with those of obedience and chastity) and do not receive a monetary salary. This is not a reason, for a novice who enters an order or a Catholic Institute of Consecrated Life, for example, not to seek becoming a high-ranking abbot within this organization, for example.

In other words, when dealing with promotion tournaments applied to clerics, the spread in monetary income might be of little importance or even, not make any difference at all in stimulating the clerics to the effort. This is because, according to the exigencies made to those who wish to dedicate themselves totally to a religious life, the most significant factor, in order to extract the maximum performance from the participants of the tournament, might be the expansion in spread of the psychic income and not an increase in monetary remuneration, as it happens in secular organizations.

In these, the stimulus to increase the effort of the workers may come not only from the spread of the monetary income but also from non-monetary income, in forms such as prestige, influence, hierarchical power and *status* of the job, placed as prizes for the promotion tournament, for example. This indicates that, both in the case of religious organizations, the tournament model would need to be only minimally adapted, in order to include the psychic income as well, as it is being done here and, in this way, becoming closer to situations as the one being dealt with in this paper. Besides, it is necessary to take into account that, in situations where the cleric does not receive a monetary income, the importance of include the psychic income is crucial, in order to satisfy (9) and (11). Otherwise, the marginal cost exercise incurred in by the cleric would be equal to zero, in which case a promotion tournament would be nonexistent.

Still observing equation (9) and (11), it can be perceived that an increase either in ΔM and/or in ΔA, increases the ratio on the right hand side of the equation. With the objective of maintaining the equality, the ratio between the marginal cost and the marginal product of μ_j and R_j, on the left hand side, should also increase correspondingly. This means that an increase in ΔM and/or in ΔA gives rise to an increase of the effort

μ_j and of the investment in religious capital R_j of cleric j. Identical reasoning is applied to cleric k.

In equations (9) and (11) the effects of the variations of the production function of cleric k are not constant, since $f(k)$ is present both in the numerator as in the denominator of the equations. Therefore, increases in $f(k)$, when its value is sufficiently small, will imply in corresponding increases in $f(j)$, until there is a balance in $f(k)$. Beyond that point, increases in $f(k)$ will imply corresponding decreases in $f(j)$. This means that cleric k will respond to the increase of effort and of religious capital investment of cleric j equivalently, with the objective of winning the tournament, according to the description in equation (9) until there is a balance. Beyond that point, it will not compensate, in terms of benefit, for cleric k to increase μ_k and R_k, where the cost $C(\mu, R)$ will be so high that the cleric prefers not to continue disputing the tournament.

Equation (11) informs the entire range of optimum choices in terms of μ^* and R^*, in order to satisfy the F.O.C. so to maximize the individual utility of the cleric. In this way, with the aim of obtaining the best response function, each optimal bundle must be substituted, in (4), by a feasible equivalent variable $y = (\mu^*, R^*)$, $\forall \mu^*, R^*$. With this, the function to be maximized would be the following:

$$\max_{y_j} \frac{f(y_j)}{f(y_j) + f(y_k)} (M_1 + A_1) + \left[1 - \frac{f(y_j)}{f(y_j) + f(y_k)}\right](M_2 + A_2) - C(y_j) \tag{12}$$

The F.O.C. conditions will be given by:

$$\frac{f'(y_j) f(y_k)}{\left[f(y_j) + f(y_k)\right]^2}(\Delta M + \Delta A) = C(y_j) \tag{13}$$

The second order conditions will be given by:

$$D = C'(y_j)\left\{\frac{f''(y_j)}{f'(y_j)} - \frac{2f'(y_j)}{\left[f(y_j) + f(y_k)\right]^2}\right\} - C'(y_j) < 0 \tag{14}$$

The reaction function of cleric j will be given by:

$$\frac{\partial y_j}{\partial y_k} = \frac{\left[\frac{f'(y_k)}{f(y_k)}\right]}{-D[f(y_j) + f(y_k)]}[f(y_j) - f(y_k)] \tag{15}$$

The reaction function of cleric k will be symmetrical. Both reactions functions are represented in the following figure:
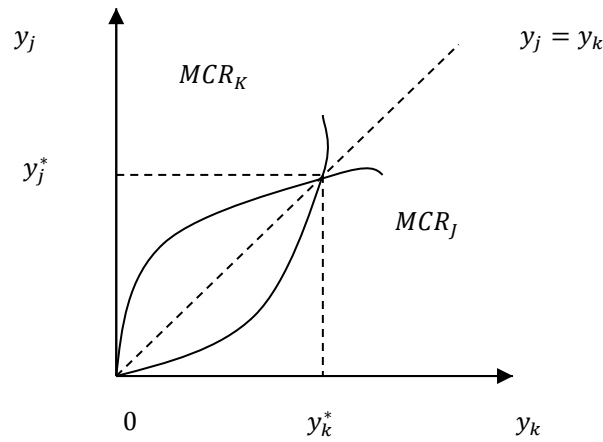

Figure I- Best reply curves of the clerics

Figure I, as well as the reaction function in (15), indicates that, considering the existence of a Nash balance in pure strategies, it will result in

$y_j^* = y_k^*$, which derives in $\mu_j^* = \mu_k^*$ and $R_j^* = R_k^*$. This is, in the balance, both clerics will present the same level of effort and investment of religious human capital, where the probabilities of each one of them winning the tournament will be equal to $P(J,K) = 0,5$.

Final considerations

Remuneration per product is not a rule among organizations to stimulate the effort of their workers, and this is particularly true for religious organizations, considering the intrinsic difficulty in measuring and monitoring the performance of their clerics (Zech, 2001, p.331). Therefore, in this work, we consider promotions as an incentive remuneration mechanism, that is to say, the *Tournaments* Promotion Model, as an explanatory and plausible theoretical framework for the remuneration rules of the workers in religious organizations. Tournaments are commonly used by religious organizations, even if they are not aware of it, in order to stimulate their workers, who act in the scenario of an organizational internal market, where asymmetrical information and relatively high monitoring costs are highlighted, and where promotions are the main form of incentive.

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