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COOPERATIVE, HUMAN CAPITAL AND POVERTY: A THEORETICAL FRAMEWORK

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ABSTRACT. In this article we investigate a simple theoretical model of cooperative organisations which are capable of enhancing its members' human capital through efficient management of all their abilities. Thus, increased human capital has impact on the household's wealth and consumption. Cooperatives can help alleviate poverty in developing countries. However, the model shows that cooperatives cannot increase the number of their members infinitely. They are constrained by managing capacity and the free-rider problem. Also, efficient cooperative is limited by its size.

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Introduction

According to the Millennium development goals, the poverty reduction strategy is one of the top priorities for the UN Organisations. In view of this goal, cooperatives might play an important role (Birchall, 2004). Civil society has contributed greatly to the development of cooperatives in order to strengthen the capacity of people living in poverty (Thorp *et al.*, 2005; Medina, 2000). The roles of women or women's organisations in improving the well-being of households can be underlined in this regard (Galab & Chandrasekhara Rao, 2003). Positive effects of cooperatives are often analysed in economic literature.

The ILO (2002, 2012) defines cooperative as "*an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise".* There are many forms of cooperatives, among which formal financial cooperatives (microfinance) and informal cooperatives (tontines in Africa and the "chit fund" in South Asia) are the best known institutions. Their impact on poverty alleviation has been already quite widely studied.

Besides, there are also associations for social solidarity; while marketing and agricultural cooperatives are not well known and much less studied, agricultural cooperatives seek to determine a balance between economic profitability and satisfaction of personal needs for households (Ortmann & King, 2007). According to the ILO (2012), cooperatives are responsible for creating jobs, wealth and development in rural areas in developing countries. They are greatly beneficial for young people and women since they often create sustainable jobs. Indeed, studies on developing countries provide evidence of all that. Also, the economic structure of cooperatives are able to withstand economic and environmental shocks. Cooperatives give small producers access to the market, credit, natural resources, information and training. Creation of wealth through increased production helps fighting against food insecurity. The UN Organisations are encouraging the creation of cooperatives to alleviate poverty and empower women in developing countries and rural areas especially.

The economic theory of club (Buchanan, 1965) states that the first member increases the club marginal utility and as soon as new members enter the club, the marginal utility decreases while the marginal cost increases. We follow Buchanan's idea as it shows that cooperatives can improve members' human capital and can take them out of poverty. However, the cooperative's ability to improve human capital is restricted by its ability to manage the skills of new members.

The paper is theoretical and focuses on cooperatives whose objective is to improve quantity and quality of products and as a result generates employment. We also seek to determine the process through in which cooperatives contribute to poverty reduction in developing countries. In this article, a simple formalized model is sketched whereby we assume that poverty can be reduced only if human capital is improved in the course of production process. We also discuss the efficiency of cooperatives in terms of increasing wealth and ensuring well-being of their members. Thus, the article argues to what extent cooperatives can be efficient in managing collective resources taking the form of different savoir-faire of their members.

The article is organized as follows: the first section develops the theoretical model. A consumer-producer household is considered a household that aims to maximize its utility and profit. Section 2 analyzes the household's decision to join a cooperative to increase its labour productivity. The cooperative is efficient in increasing labour productivity when the savoir-faire of members is different. In this context, the cooperative maximizes the collective profit. In section 3 we consider a static model to analyze the gain obtained by the members of the cooperative. The gain depends on the cooperative's capacity to manage the pooled resources (human capital). Section 4 presents the conclusion of the theoretical model and discusses the main results.

1. The individual action of households

1.1. The consumption programme

Let *U* be the utility function of a poor household living in extreme poverty in a remote area in a developing country. We consider that the household consumes two goods, C_1, C_2. These two goods are substitutes such as the utility function is:

$$U(C_1, C_2) = \theta C_1^{\beta} C_2^{1-\beta}$$

We assume that the parameter $\beta = 1$ is the coefficient of preference for the consumption goods. Therefore, the household's utility function depends only on C_1. θ is a parameter of wealth associated with C_1 and $\theta > 1$.

$$U = \theta C_1 \qquad (1)$$

The household receives satisfaction from the consumption of good C_1 bought in the market at price *P*. We assume that the household consumes all his income *W* which is mostly the case of households living in poverty. The budget constraint of the household is: $W = C_1 P$. In such a household, saving is nil, therefore the household cannot accumulate wealth to escape from poverty.

1.2. The productive activity of the household

We consider that the household is a consumer-producer. Thus, it operates like a small family enterprise. The household produces *Q* in respective to *K* and *L* which represent capital and labour. We have a Cobb-Douglas production function: $Q = F(K, L) = AK^{1-\alpha} L^{\alpha}$.

We assume that the marginal productivity of factors of production is decreasing. We consider that α = 1 which represents the productivity of labour and 1- α is the productivity of capital. While assuming α = 1 the production of *Q* depends only on labour. It means that the capital use is rudimentary and it has reached its highest capacity, it is therefore impossible to increase the productivity of capital. Assuming *Q* depends only on *L* is not far from being an unrealistic assumption. It reflects the real situation of family enterprises in remote areas in developing countries.

$$Q = F(L) = AL \qquad (2)$$

We assume that *A* is the human capital of the household such that *A*> 0. We assume that A is positive meaning that the individual possesses a certain level of human capital which is used to produce the good. Therefore, the marginal productivity of labour is equal to A, $Q_L^{'} = A$ and $Q_L^{''} = 0$. The marginal productivity of labour depends on the household's human capital which is a constant and evolves at rate *A*. As long as the human capital remains constant, the marginal productivity of labour is flat. The stock of human capital can only improve through education, learning by doing and other processes which can improve the household's human capital. The household seeks to maximize its profit under the constraint of cost of production. The cost constraint is given by the equation of total cost: $CT = WL$. The equation of profit is given by: $\pi = PAL - WL$

$$Max(\pi) = PAL - WL \qquad (3)$$

While solving the profit maximisation programme in relation with L we obtain:

$$\frac{W}{P} = A \qquad (4)$$

The real wage is equal to human capital and it evolves at a constant rate *A*.

Proposition 1: *If A is low then the real wage is low*.

Therefore, in developing countries, the level of human capital of household living in remote areas is low as they lack of human capital. Given the household's real wage, we can determine the level of consumption which maximizes its utility. The household utility is maximized when:

$$C_1 = A \qquad (5)$$

Proposition 2: *The household's consumption depends on its human capital. If the level of human capital is low, as it is often the case of girls and women and in general, for all people living in remote areas in developing countries, then the level of consumption is also low.*

In order to increase the consumption of goods, the household must increase its human capital. Thus, the utility of the household is $U(C_1) = \theta A$. The household's utility is also stable at *A*. It means that the household's poverty is maintained stable, *citeris paribus*, due to its level of human capital. The household's consumption is equal to the real wage and $A\ C_1 = \frac{W}{P} = A$. At this level of consumption, the profit of the household is nil, because it is based on the assumption that the household consumes all the income. In other words, as long as the household cannot accumulate wealth, its living standard remains unchanged and *A* does not evolve. If *A* is led to changing, then the consumption has to move in the same direction as *A*. The living standards in the household can only improve if the wage increases which is determined in the sphere of production.

2. Collective action

Now let us consider that the household is involved in a cooperative to produce *Q*. The aim of this strategy is to increase the productivity of labour so that it can increase its utility of consumption of good *C*. In a cooperative, all the households or individuals put their skills and knowledge in common in order to increase the output through an improvement of the productivity of labour. The collective production function is: $Q_{CA} = F(L) = A\bar{L}$ where $\bar{L}$ is the maximum of worker the cooperative can stand such as $\bar{L} = \sum_{i=1}^{n} L_i$. We assume that *L* is different for each member of the cooperative $L_i \neq L_j, \forall i \neq j$. To estimate the value of $\bar{L}$ we take a reference value L_{ref} and we obtain $\bar{L} = nL_{ref}$. Therefore, a new condition is imposed on *A*. *A* increases with the number of people entering into the cooperative. It is therefore assumed that each individual incorporating the cooperative has a different *A* such as $\bar{A} = \sum_{i=1}^{n} A_i$. We assume that all members have different levels of A such as $A_i = A_j, \forall i \neq j$. We can approximate the value of $\bar{A}$ such as $\bar{A} \cong nA_{ref}$. In order to simplify the notation we assume that that $A \cong A_{ref}$ and $L \cong L_{ref}$.

$$Q_{CA} = F(L) = \bar{A}L = An^2L \qquad (6)$$

The marginal productivity of collective labour is: $F'_{L_{CA}} = An^2$. When the household enters a cooperative, the collective productivity improves, it grows to An^2. The total cost of

the cooperative is given by the wages paid to employees. $\overline{W}$ represents the total wages paid to employees: $\overline{W} = \sum_{i=1}^{n} W_i$.

The cooperative maximizes profit under cost constraint. The solution of the profit maximization programme is given by $\frac{\partial \pi_{CA}}{\partial L} = 0$

$$Max(\pi_{CA}) = PQ_{CA} - CT_{CA} = PAn^2 L - \overline{W}L \qquad (7)$$

$$\overline{W} = n^2 PA \qquad (8)$$

The cooperative distributes an average wage to each employee as $PAn = \frac{\overline{W}}{n} = W^*$

$$W^* = nPA \qquad (9)$$

The average wage received by the household can be multiplied by the number of members within the cooperative allowing the household to maximize its utility. The household has an income constraint which is $PnA - PC_1 = 0$. The household seeks to maximize its utility subject to income constraint.

$$MaxU(C, \lambda) = \theta C + \lambda(PnA - PC) \qquad (10)$$

$$U_C^{'} = \theta - \lambda P = 0 \qquad (11)$$

$$U_\lambda^{'} = PnA - PC = 0 \qquad (12)$$

$$C_{1CA}^* = nA \qquad (13)$$

Proposition 3: *The consumption of good C_1 is increased with n, the number of workers entering the cooperative. Therefore, the consumption is equal to the sum of knowledge of those being part of the cooperative.*

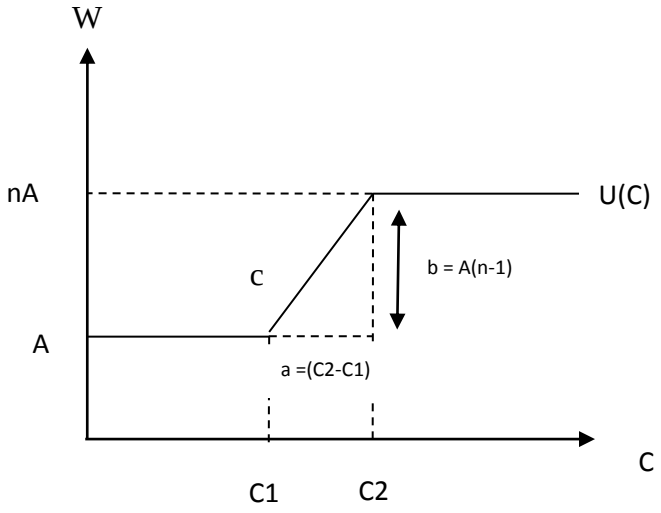

Figure 1. Gain from cooperative

3. The static gains

3.1. Gains in terms of consumption

The gain received by the household from the consumption of good *C* is given by the difference between the consumption when the household enters the cooperative and when the household is alone. Thus we have: $G(C) = U(C_{1CA}) - U(C_1) = (\theta nA - \theta A) > 0$

$$G(C) = \theta A(n-1) \qquad (14)$$

Proposition 4: *When n = 1, there is no difference between a single household and a cooperative. When the number of individuals or households involved in a cooperative is* $n > 1$, *the well-being of the household increases, for A and θ constant, so that* $U(C_{1CA}) > U(C_1)$.

We set a limit to the increase in the number of workers in the cooperative. Thus the number of workers cannot increase indefinitely because it cannot handle the increased number of worker and control the externalities associated with the accumulation of human capital and social capital. It is the cooperative to determine the optimal size of the workforce in order to maximize profit and utility of workers.

Proposition 5: *When the optimum size is reached, the utility and profit remain constant at a higher rate of human capital (nA).*

3.2. Total gain

We can determine the total gain of the household that is given by the triangle (*abc*) in the graphic above. *a* is a distance showing the difference in consumption

$$a = C_{1CA} - C_1 = nA - A \qquad (15)$$

and *b* is a distance representing income received in the production process

$$b = W^* - W \qquad (16)$$

We determined that $\frac{W^*}{P} - \frac{W}{P} = nA - A$. Thus, $W^* - W = PA(n-1)$, We can determine the total gain of the household: $GT = \frac{(C_2 - C_1)(\overline{W} - W)}{2}$. It represents the area of the triangle (*abc*). We can rewrite the equation of total gain by replacing its equivalence:

$$GT = PA^2 \frac{(n-1)^2}{2} \qquad (17)$$

Proposition 6: *Thus, for* $n > 1$, *the total gain is positive* $GT > 0$. *It is in the best interest of the household to associate with others to implement production. The gains they will benefit will be greater than the individual situation*.

If *A* increases such as $A > 0$ then $GT > 0$. An increase in human capital increases the total gain. Moreover, if *P* increases, $P > 0$ then $GT > 0$. An increase in *P* increases *GT*.

If the total gain is positive then the household will consume both goods, thus $\beta \in (0,1)$. Consuming different goods is an indicator of improvement of living standard.

Conclusion

Cooperatives can play an important role in alleviating poverty in developing countries and more specifically, they can contribute to improving the women's living and working conditions, who are the most vulnerable to poverty in remote areas (Galab & Chandrasekhara, 2003). They are also most likely to join a cooperative. These cooperatives can contribute to improve the conditions of women in developing countries in two ways. They may initially improve their human capital, that is to say they can train women to improve their labour productivity, give them access to credit market and improve their living standards (Ghebremichael, 2013; O Wanyama *et al.*, 2008). In our model the productivity improvement is given by the Association of Workers (*nA*). Secondly, women can improve their performance if they associate with other women with different skills or production techniques. Eventually, sharing of knowledge results in improved production in terms of quantity and quality. This case is only possible in an environment of perfect information. If there is asymmetrical information, then the cooperative will fail to accomplish its objectives. We assume that we are in a perfect environment so that all the individuals possess all the information concerning the other members. This assumption is true in villages in rural areas where people know everything about their neighbours. Social capital in rural areas is bonded allowing trustworthy relationships which are necessary to acquire information (Bhukuth *et al.*, 2018). Cooperatives can improve skills in any social and economic context as long as information sharing is perfect among its members and they are committed to perform in respect with the cooperatives' values and norms. Cooperatives promote business ethics, aid development as well as develop social entrepreneurship and social innovation (Novkovic, 2008).

In a second step, we assume that cooperatives can distribute higher wages to individuals mainly to women engaged in such associations. This is possible thanks to the improvement of production in quantity and quality.

We have shown that as new participants enter the cooperative (increase in *n*), the human capital improves as well. Indeed, the new participant provides expertise which are applied in common. Given that the cooperative cannot manage and control the shared knowledge above the optimal size, it is understood that the cooperative cannot increase the number of participants indefinitely. When the number of adhering increases faster than the cooperative control capacity, then appears the free rider phenomenon. Therefore, the members can reduce their effort and enjoy the work of others. To avoid such a problem, the cooperative must determine the optimum size of members.

Knowledge sharing is done in a context of "*bonding social capital*" (Woolcok & Narayan, 2000), that is to say where trust among members is high, human capital accumulation reaches the highest level. This is particularly true in the case where the members are from the same community and are committed to putting their knowhow together without defect and restrictions (Coleman, 1988). The role of social capital in the effective functioning of cooperatives is crucial (Mondal, 2001). Otherwise, the cooperative would become a business like any other. The positive attributes of a cooperative are that it unites members who are guided by a common goal.

Another aspect of cooperative is the relationship between social capital, knowledge sharing and the number of participants. Indeed, in order to make the cooperative efficient, the specialisation of each member should be either substitutes or complementary. If the members

have the same substitute skills then it means it is not necessary to have them in the same cooperative, they would not contribute to improving efficiency in production. To have them in the same unit of production, they must have different skills. Thus, each member can learn from the others to improve their skills which will endeavour in the benefit of the association. Members will share their skills with the others if and only if they trust the other members and trust that the cooperative will lead them to a better economic situation and improve their wellbeing in the village.

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