Incentive Theory of the Third Sector of Economy (Non-Profit Organization)

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Abstract

This article aims to provide theoretical model for analyzing challenge of asymmetric information in the third sector of economy (which is the most important challenge, preventing the growth and development of third sector), using the theoretical foundation of contract theory and incentive theory with regard to the special characteristics of third sector derived by its special structure in Iran. For this purpose, we introduce a conceptual model that provides a new methodology for analyzing contract theory in the third sector, and offer the optimal contract in every transaction and state. To this end, we put forward the transactional segments of asymmetric information and the possibility of adverse selection and moral hazard problems. Then we provide a general incentive theory for the third sector of economy. As a result, it provides a mathematical and theoretical model for optimal contract and makes contribute to solve the adverse selection and moral hazard problems in the third sector transactions. Eventually, we use experimental analysis (lingo software) to show that mathematical model is solvable. Afterwards we calculate the list of optimal contracts with hypothetical prompters. Field study in Iran (Isfahan) shows that the effect of solving asymmetric information problem is about 73% in the scale of third sector of economy which is significant and notable.

Keywords: Third Sector, Non-Profit Organization, Philanthropic Transactions, Contract Theory, Incentive Theory.
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1. Introduction

Economic studies, in last decades, have analyzed the subject of asymmetric information and its challenges, in details and different dimensions. In most of these studies, they were looking for managing incentives in private sector (for-profits) and in some others; they've probed incentives in the public sector. But the question is that, is it possible to develop incentive theory structure for third sector according to theoretical base and models in the first and second sector (private and public)? There are just a few studies that have investigated asymmetric information and incentive problems (moral hazard and adverse selection) in the third sector of economy, because of special characteristics of transactions in this sector. Then we need a general and fundamental model, in such a way that involves all special features of third sector in Iran.

In a new definition, economics has been introduced as knowledge of controlling and managing incentives (Stiglitz, 2006). Controlling and managing incentives have a vast dimensions and details, for example consumption, production, investment, participating in economic transactions, employment, unemployment and other incentives. But managing incentives in production is important from two aspects: first, institutional structure which is reflected in organizational management and institutional economics (that discuss about providing participation in economic activities, maximizing incentives for production and efficiency, how the institutional and organizational structures can be), and second, transactional incentives that have been reflected in contract and incentive theories (that discuss about how to manage and control incentives of parties in a transaction). Contract theory has a close relationship with mechanism design and game theory that other than transactional approach can be used for creating incentives (Bolton & Dewatripont, 2005: 21), and this is the theoretical base of this article modeling.

Contract theory includes three major parts: a) incentive theory, b) transaction costs theory and c) incomplete contracts. Incentive theory analyzes the problems with incentives due to asymmetric information, solve moral hazard and adverse selection, in other words reveal the hidden information and prohibit the hidden action with designing the incentive compatible contracts (Brousseau & Glachant, 2002: 45).

This article is a development in the pure contract theory but it is not enough for analyzing the third sector transactions (nonprofit organizations) and does not answer all of the questions about the incentives in this sector. There are some other specific characteristics that need to be involved in the model for analyzing the third sector, like intrinsic motivations that play an important role in creating nonprofit activities.

Then we need a contract theory that becomes compatible with the specific characteristics of third sector in every country (like Iran). In the Figure 1 we design a conceptual model to make contract theory, compatible with the third sector.

Figure 1: Incentive Theory Conceptual Model in the Third Sector
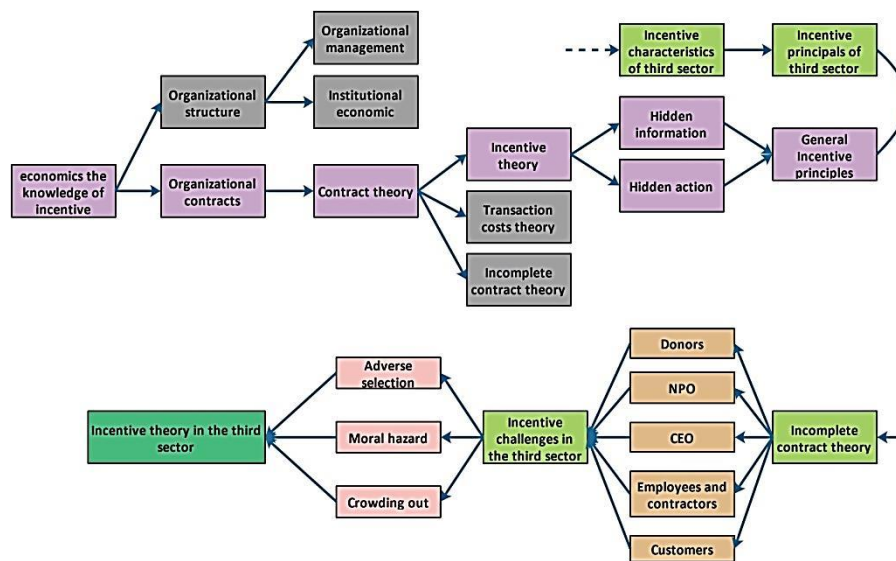
According to Figure 1, traditional incentive theory (generally contract theory) just provides the general principles of incentive system but for precise analyzing, we also need to consider specific characteristics of third sector.

Another important point in the third sector studies is that there is a principal-agent chain in the transactions of third sector that have hierarchical causality in incentives (changing the incentives in one segment, affects the incentives of other segments).

Figure 2: Principal-Agent Chain in the Third Sector[1]
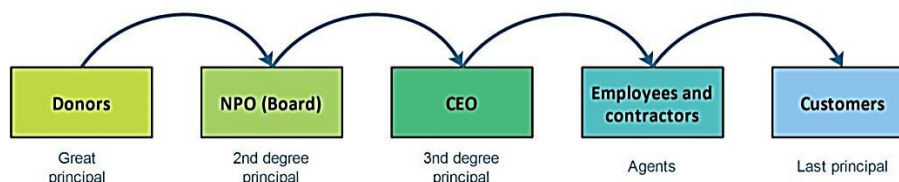
This chain begins by donor (grand principal) that chooses one nonprofit organization as the agent, which spends his/her philanthropic gifts in a specific subject. In this chain, nonprofit organization means the board (not employees and CEOs[1]) that makes the purposes and incentives of the whole organization. This board is originator and owns the nonprofit organization. In this segment, donors want to manage and control the incentives of board so that they spend all of the donations in a way that they want. In the second segment, the board needs to hire a CEO for the nonprofit organization[2]. In this transaction, the board is (second-degree or sub) principal and the CEO is as the agent. In the next segment CEO needs to hire employees or contract with another company. In this transaction CEO is (third-degree or sub-sub) principal and employees are as the agents. Customers that buy the goods and services produced by nonprofit organization (for the sale in the public) are the last segment. The customers are the last principals and the nonprofit organization is as the agent (Steinberg, 2010).

In the transactional chain, there's asymmetric information and incentive problems between segments, hence we need third sector incentive theory to analyze and solve these problems. In the next parts, we will model every segment of the transactional chain in the third sector.

2. Modeling of Incentive Theory in the Third Sector of Economy

In this part, regarding conceptual model and transactional segments in the third sector, we will analyze the Asymmetric information and incentive problems.

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1. Source of figure is article findings.
2. In Islamic studies we call CEO as "Motavalli".

2.1 Asymmetric Information between Donors and Nonprofit Organization (Board)

We know that in the third sector market, there are two types of organizations. First, pure nonprofit organizations (PNPO) and second, non-pure nonprofit organizations (NNPO) that we know them as "nonprofit in disguised" (Weisbrod, 1975). The purpose PNPO is producing social goods and services for the needy people and they spend all of donor's contributions on this purpose. But the real purpose of NNPO is maximizing their own profit and in order to achieve their purpose, they do not spend all of donor's contributions on producing social goods and services. Therefore, we show the share of contributions that devoted to producing social goods and services by θ, so we have:

$$\theta = \frac{Q_i}{Z_i}$$

Z_i is all the contributions of the donor's contributions to the organization, i and Q_i is the value of production in organization i (Steinberg, 2010). We assume that the administration cost is zero ($C = 0$).

According to definition, if $\theta = 1$, the organization is PNPO and if $\theta < 1$ then the organization is NNPO. In the third sector market, the donors can't simply recognize the type of organization producing social goods and services. They randomly give their contribution to one of the organization in the market, and then the expected share of contribution that converts it to the social production is defined as:

$$E(\theta) = \sum p_i \theta_i$$

p_i is the share of each organization in the nonprofit market[2].

The exact contract modeling needs to distinguish between different states hence, we begin with a simple one.

First State: One Principal (Donor) and One Agent (Organization)

Assume there are two kinds of organizations in the market, one which is PNPO and another is NNPO, and also there is just one donor in the market. In this state, we can solve the asymmetric information problem by a simple shot-down policy of contract theory. If donor offers the contract (θ_i, Z_i) to the organization so that $\theta_i = 1$, since the

whole expenditure and production of the nonprofit organization are observable, donor can control the production of NPO and the organization can't use contributions to their advantage. Thus there is no incentive for the NNPO to participate in this contract and only PNPO accept the contract.

Second State: N Principal (Donor) and Two Agents (Organization)
Now in a more real state, assume there are N donors and two nonprofit organizations in the market, which one of them is PNPO and the other is NNPO. The first difference of this state with the previous one is that in the N donors' state, the production and expenditures of NPO are not an observable variable for each donor, because each donor knows about their own contribution (Z_{ij}) and they don't know anything about the whole contributions of each organization $(\sum_{j=1}^{n} Z_{ij})$. Note that θ_i is unknown, and the donors cannot evaluate the marginal effect of contribution in the whole production of NPO. This problem called "contract failure" by Hansmann (1980). Hence the simple contract theory cannot solve the adverse selection in this asymmetric information problem.

In these conditions, donor would rather search about pure and non-pure organization and give their contributions to the PNPO. Searching has some cost equal to S_i that is paid from the contribution. If we call θ^s as the share of contribution devoted to the social production when searching is done by donors, then we have:

$$\theta_i^s = \frac{Z_i - S}{Q_i}$$

In this case, the donors choose between the expected production $E(\theta_i)$ and definite share of θ_i^s. If $E(\theta_i) < \theta_i^s$ then risk neutral donor will search, and if $E(\theta_i) > \theta_i^s$, donor choose randomly one of the organizations in the market. If the donor was risk averse, he replace $E(\theta_i)$ by certainty equivalent (CE) and above relations will be satisfied. If the contribution was separable, then we have third solution. Donor can divide his contribution between two organizations. Then his actual share of contribution that converts to the social production is:

$$Z_j^* = \frac{1}{2}Z_j + \frac{1}{2}\underline{\theta}Z_j$$

So that $\frac{1}{2}Z_j$ relates to PNPO and $\frac{1}{2}\underline{\theta}Z_j$ relates to NNPO, $\underline{\theta}$ is the share of contribution that NNPO converts to the social production ($\underline{\theta} < 1$) and this share for PNPO is $\bar{\theta} = 1$. This actual share is equal to the expected share if the donor chooses the organization randomly. Then for risk-averse donors, compared to choosing the organization randomly, the third solution is better one. The value of information rent (that principal loses because of asymmetric information) is equal $\frac{1}{2}(1 - \underline{\theta})Z_j$. Now if $\frac{1}{2}(1 - \underline{\theta})Z_j < S$ then the donor searchs, and if $\frac{1}{2}(1 - \underline{\theta})Z_j > S$ he doesn't.

The point is that, if θ becomes lower than a given amount ($\tilde{\theta}$) then the donors will not participate in a philanthropic activities at all, because they lose their incentives. Thus, the principal participation constraint is:

$$Max\{\theta_i^s, E(\theta_i)\} > \tilde{\theta}$$

Finally the principal problem is:

$$\max \theta_i$$
$$\text{s.t} \max \{\theta_i^s, E(\theta_i)\} > \tilde{\theta}$$

Third state: N principals (Donor) and N Agents (Organization)
In this state as went before, θ_i is unknown, but the difference is that the expected value of θ is related to the present values of PNPO (v) and NNPO ($1 - v$) in the market regarding in the second state both of them were equal $\frac{1}{2}$. Afterward, the expected amount of contribution related to principal j that's spent for production of social goods and services is:

$$E(Z_j^*) = vZ_j + (1 - v)\underline{\theta}Z_j$$

Provided that θ is difference between NNPO, the average of all θ is equal $\underline{\theta}$. In this case, if the principal divides his contribution to N equal parts and gives each part to every organization in the market, the share of contribution that turn into social production and services is:

$$Z_j^* = \sum_{i=1}^{n} \frac{1}{n}\theta_i Z_{ij} = vZ_j + (1 - v)\underline{\theta}Z_j$$

More share of NNPO in the market (the lower amounts of $\underline{\theta}$), cause

the lower amount of Z_j^*. In this case, the principal has to decide between searching and not searching. Therefore as previous state, if $E(\theta_i) < \theta_i^s$ he will search, and if $E(\theta_i) > \theta_i^s$ he won't.

Fourth Estate: Existence of "Non-Distribution Condition"
In the previous states, the donor was not able to turn into all of his contribution to social production and since θ_i was an unknown variable information rent was so high in such organizations. Therefore there are no incentives for taking compatible contract by agents (organizations). Unknown θ_i reduces philanthropic incentives. Minimum amount of θ required for participating in philanthropic activities shown by $\tilde{\theta}$ is different among people, and has a normal distribution in the society. Reduced θ, which means more share of NNPO in the market, make more costs for searching, will reduce participation and prevent development of third sector in the economy.

The law of "non-distribution condition" makes an opportunity control financial transition of organizations in the third sector by using the government authority. It can be done easily through monitoring the whole amount of contributions donated to every organization in the third sector, and then we can calculate the amount of θ_i for them[3]. Furthermore, by using this law, we can solve the contract failure problem and non-observability of variables. There is still possibility of existence NNPOs in the market; nonetheless they have to bear a lot of cost to be hidden from the government's control.

Another point is that practically, the contribution of donors in this year, will spend in the next year, thus the comparison between income and expenditure in one year (for counting θ_i) is not correct and causes misleading results. In order to come up with a solution, we should use current expenditure and last year income (donor's contribution). Therefore we have:

$$\theta_i = \frac{Q_{it}}{Z_{i(t-1)}}$$

Fifth State: Existence of Administrative Costs
In the last states we have assumed that administrative costs are zero ($C = 0$), but in reality it is not true. In every for-profit and non-profit organization, there are some administrative costs ($C > 0$) so that the

most efficient organizations are determined by the share of these costs in expenditures of organizations. Thus, the last θ_i definition for PNPO isn't true, to be exact. So the new definition of θ_i is:

$$\theta_i = \frac{Q_i + C}{Z_i}$$

The point is that financing and advertising costs in this year will raise contributions in the future years but counted in administrative costs of this year, which may reflect an inefficient organization however maybe it's not true because people participation in philanthropic activities needs public education and the cost of advertisement (public education) spent by one NPO but it will increase the contributions to all NPOs. Consequently the organizations that participate in the public education will seem inefficient. Of course, when contributions are donations in-kind (e.g. real goods), NPO cannot spend it for advertising or other administrative costs and should not count in this share.

Sixth State: Moral Hazard in NPO
NPOs efficiency is different. The administrative costs such as a luxury building and furniture, board's trips, buying luxury cars and using organizational stuff for personal affairs, even though cannot be counted as "non-distribution condition" accordingly neglected by the government's authority, in spite of that it is perks for boards that reduce the organizational efficiency and the share of contributions that turn into social goods and services.

Based on moral hazard theoretical foundation, "effort" for minimizing costs is known as a variable that an efficient contract can influence on amount of that and provide the incentive to efforts. Therefore the first solution is an index for counting the share of administrative cost or inefficiency in each organization. This index known as "price of donor" (p_{di}) can be shown as below:

$$p_{di} = \frac{1}{1 - \frac{C_i}{Z_i}}$$

This formula indicates that, how much donation should be cost for each organization to produce one dollar social goods and services, (Rose-Ackerman, 1982 and Steinberg, 2010). Donors should calculate the amount of p_{di} for every organization and give their contributions

to the organization with less p_{di}, Nonetheless when we encounter N principals (donors) state, Z_i ($Z_i = \sum_{j=1}^{n} Z_{ij}$) is not observable and thus p_{di} is unknown for donors. This asymmetric information gives rise to hidden activities and moral hazard problem.

Assuming that there is a law that forces NPOs to report p_{di} and control by governmental agents or special institutions, so we can solve this asymmetric information and moral hazard problem. Because as long as p_{di} diminishes more, donors will give their contributions to the organization, as a result they have incentive to implement high level of effort for minimizing the cost.

2.2 Asymmetric Information between Nonprofit Organization (Board) and CEO

In the second segment of principal-agent transactions, in the third sector, we should analyze incentive problems occurred between board and CEOs in pure nonprofit organizations. As we mentioned, solving incentive problem in one segment will affect the incentive problems of other segments too. Regarding the philanthropic incentives, the board of NPOs wants to maximize the benefits of nonprofit organizations, in this regard; they can also maximize the production of social goods and services[4]. To this end, expertise and commitment of CEO is so crucial. But the board has not complete information about characteristics of CEOs which is known as asymmetric information.

2.2.1 Adverse Selection

Assuming that there are two level of skill (expertise) among CEOs that shown by $\underline{\theta}$ and $\bar{\theta}$, then a CEO with the probability of v will be an efficient and expert one ($\underline{\theta}$) and with the probability of $(1 - v)$ will be inexpert. Higher expertise will decrease administrative costs and price of donor in NPOs and Therefore, according to "fifth state", it leads to attracting more contributions to organizations. since the board`s mission is to attract more contributions expand activities of NPO and produce social goods and services, it has high incentives to hire the most expert and efficient type of CEOs[5].

q Units of production income will be $S(q)$ for principal (board), such that $S' > 0$, $S'' < 0$ and $S(0) = 0$. The production cost and the probability of that will be:

1) with probability of v $\qquad$ $C(q, \underline{\theta}) = \underline{\theta} q$
2) with probability of $1 - v$ $\qquad$ $C(q, \bar{\theta}) = \bar{\theta} q$

Such that $\underline{\theta}$ and $\bar{\theta}$ are the production cost of every unit of social goods and services, where $\bar{\theta} > \underline{\theta}$.

First Stage: Contract Problem Definition

Contract variable will be production quantity (q) and payment to CEO (t). The transaction with experts CEO social value is equal $\underline{W}^*$ and with inexpert CEO is $\bar{W}^*$. For the parties participate in this contract, the value of $\underline{W}^*$ has to be positive. Utility of CEO from accepting and participating in the contract will be:

3) for expert CEO $\qquad$ $\underline{u} = \underline{t} - \underline{\theta}\underline{q}$

4) for inexpert CEO $\qquad$ $\bar{u} = \bar{t} - \bar{\theta}\bar{q}$

Hence if we want the desired CEO participate in the contract, this utility has to be more than opportunity cost (OC) of accepting the contract. Thus the participation constraint will be:

5) for experts CEO $\qquad$ $\underline{t} - \underline{\theta}\underline{q} - \underline{OC} \geq 0$

6) for inexpert CEO $\qquad$ $\bar{t} - \bar{\theta}\bar{q} - \overline{OC} \geq 0$

Also for solving the adverse selection problem we need to design two contracts (one for experts CEO and another for inexpert CEO) such that experts CEO choose his own contract and don't have incentive to mimic from other type (inexpert) and vice versa. Accordingly the incentive compatibility constraints will be:

7) $\underline{t} - \underline{\theta}\underline{q} \geq \bar{t} - \underline{\theta}\bar{q}$

8) $\bar{t} - \bar{\theta}\bar{q} \geq \underline{t} - \bar{\theta}\underline{q}$

With considering the incentive compatibility and participation constraint the principal (board) problem will be:

$$\max_{\{(\bar{t},\bar{q});(\underline{t},\underline{q})\}} v(S(\underline{q}) - \underline{t}) + (1-v)(S(\bar{q}) - \bar{t})$$

subject to constraints (5), (6), (7) and (8).
We can find the amount of optimal wage (payment) and optimal amount of production (income) in CEO contract that solve the adverse selection problem between board and CEO.

Second Stage: Adding Contract Parameter (Length of Contract)

We can add "the contract length" beside the payment in the agent contract that provide the incentive and solve the hidden information problem. CEOs have a more incentive in a long run contract and provide more utility for him. It would be better to say the utility function of CEO is $u = f(t, q, L)$ which is increasing in L. A simple utility function for CEO will be:

9) for experts CEO $\qquad\qquad \underline{u} = \underline{L}(\underline{t} - \underline{\theta}\underline{q})$

10) for inexpert CEO $\qquad\qquad \bar{u} = \bar{L}(\bar{t} - \bar{\theta}\bar{q})$

The length of contract affects objective function of the principal (board). Long-run contract will increase the risk of contracting with a wrong (inexpert) agent. In the offering contracts, the length of contract for experts CEO will be higher than inexpert CEO then formally $\underline{L} \geq \bar{L}$. Therefore the new principal (board) problem would be:

$$\max_{\{(\bar{t},\bar{q});(\underline{t},\underline{q})\}} \underline{L}v(S(\underline{q}) - \underline{t}) + \bar{L}(1 - v)(S(\bar{q}) - \bar{t})$$

Subject to 2 new participations and 2 new incentive compatibility constraints:

$$\underline{t} - \underline{\theta}\underline{q} - \underline{OC} \geq 0$$
$$\bar{t} - \bar{\theta}\bar{q} - \overline{OC} \geq 0$$
$$\underline{L}(\underline{t} - \underline{\theta}\underline{q}) \geq \bar{L}(\bar{t} - \underline{\theta}\bar{q})$$
$$\bar{L}(\bar{t} - \bar{\theta}\bar{q}) \geq \underline{L}(\underline{t} - \bar{\theta}\underline{q})$$

Third Stage: Adding Intrinsic Motivation (Commitment)

In the third sector organizations, CEO expertise will not be enough, because philanthropic activities beside extrinsic motivation rely on intrinsic one, and the commitment and beliefs of agents are very important in choosing an optimal agent (Benabou & Tirole, 2003). But nobody knows anything about the intrinsic motivation and beliefs of agents, and then it is also hidden information and the principal face with adverse selection problem again. The principal has to find a competence CEO that intrinsically commit to philanthropic and social activities. Intrinsic motivation makes objectives of principal and agent in the same direction, and in this case CEO will be happy. When the

social goods and services production in the nonprofit organization increase, then be signed of payments and length of contract, the utility of CEO will rise simply from doing philanthropic activity and accepting the contract (Kreps, 1997). Thus with the existence of commitment, the utility function of CEO will be $u = f(t, q, L, Z)$, such that Z is amount of utility earned from participating in the contract and philanthropic activities. We assume that for committed CEO $\underline{Z} = 1$, and for uncommitted CEO $\bar{Z} = 0$.

The point is when we identify one added characteristic for agents (CEO) like commitment, different type of agents would be: 1) expert and committed CEO, 2) expert and uncommitted CEO, 3) inexpert and committed CEO and 4) inexpert and uncommitted CEO. Thus the utility function of every type will be:

11) for expert and committed CEO $\qquad \underline{u} = L(\underline{t} - \underline{\theta}\underline{q} + \underline{Z})$

12) for expert and uncommitted CEO $\qquad \underline{u} = L(\underline{t} - \underline{\theta}\underline{q} + \bar{Z})$

13) for inexpert and committed CEO $\qquad \bar{u} = L(\bar{t} - \bar{\theta}\bar{q} + \underline{Z})$

14) for inexpert and uncommitted CEO $\qquad \bar{u} = L(\bar{t} - \bar{\theta}\bar{q} + \bar{Z})$

There is also 4 participation and 4 incentive compatibility constraints. Then the new principal problem will be:

$$\max_{\{(\bar{t},\bar{q});(\underline{t},\underline{q})\}} \underline{L}v(S(\underline{q}) - \underline{t}) + \bar{L}(1 - v)(S(\bar{q}) - \bar{t})$$

subject to participation constraints:
- for expert and committed CEO $\qquad \underline{t} - \underline{\theta}\underline{q} - \underline{OC} + \underline{Z} \geq 0$
- for expert and uncommitted CEO $\qquad \underline{t} - \underline{\theta}\underline{q} - \underline{OC} + \bar{Z} \geq 0$
- for inexpert and committed CEO $\qquad \bar{t} - \bar{\theta}\bar{q} - \overline{OC} + \underline{Z} \geq 0$
- for inexpert and uncommitted CEO $\qquad \bar{t} - \bar{\theta}\bar{q} - \overline{OC} + \bar{Z} \geq 0$

and subject to incentive compatibility constraints:

- for expert and committed CEO $\quad \underline{L}(\underline{t} - \underline{\theta}\underline{q} + \underline{Z}) \geq \bar{L}(\bar{t} - \underline{\theta}\bar{q} + \underline{Z})$
- for expert and uncommitted CEO $\; \underline{L}(\underline{t} - \underline{\theta}\underline{q} + \bar{Z}) \geq \bar{L}(\bar{t} - \underline{\theta}\bar{q} + \bar{Z})$
- for inexpert and committed CEO $\;\; \bar{L}(\bar{t} - \bar{\theta}\bar{q} + \underline{Z}) \geq \underline{L}(\underline{t} - \bar{\theta}\underline{q} + \underline{Z})$
- for inexpert and uncommitted CEO$\bar{L}(\bar{t} - \bar{\theta}\bar{q} + \bar{Z}) \geq \underline{L}(\underline{t} - \bar{\theta}\underline{q} + \bar{Z})$

For uncommitted CEO because $\bar{Z} = 0$, the participation constraint will be the same as before, but for committed CEOs because $\underline{Z} = 1$, a positive number would be added to the left side of participation

constraints and therefore would be satisfied easier than before. Also in the incentive constraint because $\underline{L} \geq \bar{L}$, it will be satisfy easier than before for committed CEO.

In the constraint maximization problems, the more intense constraints will increase the difference between first-best (unconstraint) and second-best optimal answer, so intrinsic motivation and commitment will reduce the information rents and inefficiency of asymmetric information.

The point is that in some of the nonprofit organization the board just wants to hire committed CEO with intrinsic motivations, and between them they want to hire more expert one, and they don't want to hire uncommitted CEO, even he has a lot of expertise in that field[6]. In this case the principal should use "shot down policy" (Laffont & Martimort, 2009: 23). Studies about third sector show that the CEOs in nonprofit organizations have lower payments than the CEO in for-profit organizations. For example Preston (1989) has shown that the range of CEO and professional employees in the third sector in average has gained 15.2 percent lower than the same person in for-profit organization. Also simple workers have 6% lower wages in NPOs. Thus the simple participation constraint in a shot down policy will be:

- for expert and committed CEO $\qquad \underline{t} - \underline{\theta}\underline{q} - \underline{OC} + \underline{Z} \geq 1$
- for expert and uncommitted CEO $\qquad \underline{t} - \underline{\theta}\underline{q} - \underline{OC} + \bar{Z} \geq 1$
- for inexpert and committed CEO $\qquad \bar{t} - \bar{\theta}\bar{q} - \overline{OC} + \underline{Z} \geq 1$
- for inexpert and uncommitted CEO $\qquad \bar{t} - \bar{\theta}\bar{q} - \overline{OC} + \bar{Z} \geq 1$

Because $\bar{Z} = 0$, the participation constraint of uncommitted CEOs would not be satisfied and they don't participate in the contract.

2.2.2 Moral Hazard

When we talk about commitment and intrinsic motivations, it is kind of like hidden actions that happened because of "non-observability of CEO's activity". In general case the CEO can have a high or low effort for maximize the production of NPO. He can try to make their costs spent in the organization more efficient. For example he can try to give social service to the people that need these services more than others. But the first point is that the level of his efforts is not

observable, therefore the hidden action or moral hazard problem happens.

First Stage: Moral Hazard Problem Definition

We know that because of asymmetric information the board cannot observe all of the activities and the level of effort of the CEO, yet we know that higher level of efforts have a positive effect on the level of production. If this relationship between the level of effort and the level of production is completely specified, thus the board does not need to observe the level of effort. They just give the payments to the CEO proportionate to the level of production ($t = t(q)$). In this case with this simple policy, moral hazard would be solved. But in the real world this relationship is not completely clear and the higher level of effort may cause the higher level of production or not[7].

If the effort e take two values $\{0, 1\}$, exerting effort e implies a disutility for the agent that is equal to $\psi(e)$ with the normalizations $\psi(0) = \psi_0 = 0$ and $\psi(1) = \psi_1 = \psi$. The level of production for NPO will be $\{\underline{q}, \bar{q}\}$, such that $\underline{q}$ is high level of production and is more than $\bar{q}$. The realization probability of high level production is $\Pr(q = \underline{q} \mid e = 0) = \pi_0$ and $\Pr(q = \underline{q} \mid e = 1) = \pi_1$, we know that $\pi_1 > \pi_0$. The new utility function of CEO would be:

15) for expert and committed CEO $\underline{u} = L(t(\underline{q}) - \underline{\theta}\underline{q} + \underline{Z} - \psi(e))$

16) for expert and uncommitted CEO $\underline{u} = L(t(\underline{q}) - \underline{\theta}\underline{q} + \bar{Z} - \psi(e))$

17) for inexpert and committed CEO $\bar{u} = L(t(\bar{q}) - \bar{\theta}\bar{q} + \underline{Z} - \psi(e))$

18) for inexpert and uncommitted CEO $\bar{u} = L(t(\bar{q}) - \bar{\theta}\bar{q} + \bar{Z} - \psi(e))$

Note that adding the levels of effort $\{0, 1\}$ will divide every equality into two equality. For simplicity we will neglect the "commitment". So we have:

- Expert CEO that exert ($e = 1$), will reach to $\underline{q}$ by probability of $\underline{\pi}_1$.
- Inexpert CEO that exert ($e = 1$), will reach to $\underline{q}$ by probability of $\bar{\pi}_1$.
- Expert CEO that exert ($e = 0$), will reach to $\underline{q}$ by probability of $\underline{\pi}_0$.
- Inexpert CEO that exert ($e = 0$), will reach to $\underline{q}$ by probability of $\bar{\pi}_0$.

We know that the board wants to maximize the expected level of production, and then they want to give the CEO incentives of the

exerting high effort $e = 1$. As a result, the problem of the board will be:

$$\max_{\{(\bar{t},\bar{q});(\underline{t},\underline{q})\}} v\left[\underline{L}\left(\underline{\pi}_1\left(s\left(\underline{q}\right) - t\left(\underline{q}\right)\right) + (1 - \underline{\pi}_1)(s(\bar{q}) - t(\bar{q}))\right)\right] + (1$$

$$- v)\left[\bar{L}\left(\bar{\pi}_1\left(s\left(\underline{q}\right) - t\left(\underline{q}\right)\right) + (1 - \bar{\pi}_1)(s(\bar{q}) - t(\bar{q}))\right)\right]$$

subject to old participation constraint:
- for expert and committed CEO $\quad\quad\quad t(\underline{q}) - \underline{\theta}\underline{q} - \underline{OC} + \underline{Z} \geq 0$
- for expert and uncommitted CEO $\quad\quad t(\underline{q}) - \underline{\theta}\underline{q} - \underline{OC} + \bar{Z} \geq 0$
- for inexpert and committed CEO $\quad\quad t(\bar{q}) - \bar{\theta}\bar{q} - \overline{OC} + \underline{Z} \geq 0$
- for inexpert and uncommitted CEO $\quad\quad t(\bar{q}) - \bar{\theta}\bar{q} - \overline{OC} + \bar{Z} \geq 0$

and subject to new incentive compatibility constraints:

- for expert and committed CEO $\quad \underline{L}(t(\underline{q}) - \underline{\theta}\underline{q} + \underline{Z}) \geq \bar{L}(t(\bar{q}) - \underline{\theta}\bar{q} + \underline{Z})$
- for expert and uncommitted CEO $\underline{L}(t(\underline{q}) - \underline{\theta}\underline{q} + \bar{Z}) \geq \bar{L}(t(\bar{q}) - \underline{\theta}\bar{q} + \bar{Z})$
- for inexpert and committed CEO $\bar{L}\left(t(\bar{q}) - \bar{\theta}\bar{q} + \underline{Z}\right) \geq \underline{L}(t(\underline{q}) - \bar{\theta}\underline{q} + \underline{Z})$
- for inexpert and uncommitted CEO $\bar{L}(t(\bar{q}) - \bar{\theta}\bar{q} + \bar{Z}) \geq \underline{L}(t(\underline{q}) - \bar{\theta}\underline{q} + \bar{Z})$

With solving this maximization problem, the optimal wage, optimal length of contract and requesting level of production would be calculated, thus we offer the board optimal contract such that can solve moral hazard and adverse selection simultaneously[8].

Second Stage: Contradiction between Intrinsic and Extrinsic Motivations
Frey (1994) for the first time brings the intrinsic motivation to the economic modeling. He said that doing voluntary and philanthropic activities have value for volunteer because of moral or social values of that activity, and this brings utility for volunteer. This is the reason that most of the time voluntary activities are in the charity, social or family relations, scientific and civic activities. He emphasized that money payments existence or regulations (as extrinsic motivation) will crowd out the intrinsic motivations. Now the question is that can we design the extrinsic motivation in such a way that does not cause crowding out in intrinsic motivations?

We have to notice that in the third sector of economy most of activities derived by a lot of intrinsic motivation and when we want to

create the optimal contract and manage the incentives of principal and agent to maximize the social value of transactions, we have to be sure that extrinsic motivation provided by contract parameters, do not crowd out the intrinsic motivation.

Third Stage: Modeling of Crowding out Effect

In the previous section we show the intrinsic incentives by Z and the other parameters in the contract provide extrinsic incentives (like payment, length of contract and requested product)[9]. If we want to be sure that extrinsic incentives in the contract do not crowd out intrinsic incentives, we have to define the function $Z = f(t, q, L)$ such that $\frac{\partial Z}{\partial L} > 0, \frac{\partial Z}{\partial q} > 0$ and $\frac{\partial Z}{\partial t} > 0$. There is no problem for satisfying the first and second condition, because if the CEO has intrinsic incentives, increasing in the length of contract or requested amount of production, reinforces the intrinsic incentives or increases the amount of Z and decreases the inefficiency of asymmetric information problem[10]. But in the third condition we cannot be definitive about effect of increasing in payments (or the type of payment) on intrinsic incentives. It should be noted that when we say "extrinsic incentive (like payment) crowds out intrinsic incentives", it does not mean that increasing in payment will decrease the final production. Because increasing in extrinsic incentives rise the production (direct effect) and crowding out of intrinsic incentives will decrease the final production (indirect effect) and we should sum these effects with each other. The direct effect may be bigger than indirect effect, thus increasing in real payments increase the final production. But the direct effect may be lower than indirect effect, hence increasing in the real payments decrease the final production. In the second case, there is no economic justification for increasing payments. As a result, we can conclude that in the optimal solution (contract) we have $\frac{\partial Z}{\partial t} < 0$, but these negative indirect effects is not bigger than direct effect. Thus we have:

$$\frac{\partial Q}{\partial Z} \cdot \frac{\partial Z}{\partial t} - \frac{\partial Q}{\partial t} > 0$$

where $\frac{\partial Q}{\partial Z} > 0$ and $\frac{\partial Q}{\partial t} > 0$, then $\frac{\partial Z}{\partial t} < 0$ can be, but we should have:

$$\frac{\partial Q}{\partial Z} \cdot \frac{\partial Z}{\partial t} \geq \frac{\partial Q}{\partial t}$$

Of course, according to theoretical foundation of intrinsic incentives, there are principles for crowding out amount[11].

2.3 Asymmetric Information between NPO (Board) and Customers

In general, goods and services have two types of characteristics. First characteristics that are simply observable and controllable (first-type) (Weisbrod and Schlesinger, 1986), and the second type of characteristics are non-observable and the customers cannot control and observe them (second-type) (Steinberg, 2010). For-profit organizations have incentives to change their second-type characteristics such that decrease the cost of production and increase the profit. But "non-distribution constraint" in NPOs washes out the incentives for quantitative and qualitative decreasing in the second-type characteristics.

For example in the nursing centers it is possible to have bad behavior with Alzheimer patients and disrespect them, because they want to decrease the number of employees in that center. In the private prison they may violate the human rights to decrease the cost of guardians. In every example the consumer or buyer of the goods and services of these organizations as a principal, face with hidden information and hidden action[12].

Hirth (1999) distinguished the consumers into two different categories. First category can realize second-type characteristics of goods and services and second category cannot. In a market with only for-profit organizations, some of them provide the second-type characteristics of goods and services as they promised, but the others provided lower than that. The first category of consumer can realize second-type characteristics and buys from the truth-telling organizations. But the second category of consumer chooses organizations randomly and buys from them. When nonprofit organizations come to this market the entire second category consumers will buy from NPOs, because they are more trustable because of non-distribution constraint. Therefore for-profit organizations cannot decrease the second-type characteristics. But

nonprofit in disguised can take advantage of the trust of second category consumers. In this section we will model all of the aspects of hidden information between customers and NPOs.

First Stage: Base Model

We assume third sector market with nonprofit organizations, which some of them will be pure-nonprofit organization, and others are non-pure nonprofit organizations. This section will analyze one organization and in the next section we will analyze the whole market.

For simplicity we make an example from Iran and then start the model. In Iran we have private (for-profit) nursing homes (which take care of old people) with incentives of maximizing their profit, and non-profit nursing homes[1] with philanthropic incentives. In the other hand some of old people have Alzheimer and their children cannot find out quality of services and staff behavior to their parents (second category consumers). Accordingly old peoples that have not Alzheimer, their children can ask them about quality of services and staff behavior to their parents (first category consumers). Consider this example in the following model.

First of all we assume that some of the customers (children) can realize the exact quality of services (their parents have not Alzheimer). We call them "high-cognition customers" and some other customers (their parents have Alzheimer) cannot realize the exact quality of services, then we call them "low-cognition customers". We know that the first type does not face with asymmetric information problem and only second-type will face it and will considered in the model.

In the other hand, some of the customers (children) care a lot about the quality of services and their willingness to pay will change quickly by changing the quality of the goods and services (like good behaving to their parents) so we call them "careful customers" (θ_H) and the others will not so we call them "careless customers" (θ_L). At first, we assume only for-profit Nursing homes (as principal) are in the market which cannot realize every customer type (who care about their parents and who don't) and there is a hidden information problem.

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1. Like NPO Kahrizak nursing home

Solving this problem is very simple and the answer is predictable, but we analyze this transaction as a part of the general model. Seller objective function will be[13]:

$$\max_{p_i, G_i} \pi = p_H G_H + p_L G_L - C_H - C_L$$

where π is profit, p_H is the high quality production price (G_H), p_L is the low quality production price (G_L), and also C_H and C_L are respectively the high and low quality production cost. Merging it into customer's utility function would result:

$$U_H = U_H\big(c(G_H)\big) - p_H$$
$$U_L = U_L\big(c(G_L)\big) - p_L$$

If we want the customers participate in these contracts, the participation constraints must be satisfied too. Therefore we have $U_H \geq U_0$ and $U_L \geq U_0$ such that U_0 is the utility of not participating in the contract[14] (i.e. take care of their parents themselves). Also if we want to follow revelation principle, that provides incentive compatibility in the contract, we should design the constraints that every type of customers chooses their own contract. It means that $U_{HH} \geq U_{HL}$ and $U_{LL} \geq U_{LH}$ should be satisfied. Thus a principal (seller) by solving the following problem will find out the optimal prices that maximize his profit and satisfy the participation and incentive compatibility constraints. The principal problem is:

$$\max_{p_i, G_i} \pi = p_H G_H + p_L G_L - C_H - C_L$$

Subject to:
$$U_i \geq U_0 \quad , \quad i = H, L$$
$$U_{ii} \geq U_{ij}, \quad i, j = H, L$$

We know that with solving this problem we find a higher price for a high quality production and lower price for low quality production. Contracts menu will be $\{(G_H, p_H), (G_L, p_L)\}$.

Second Stage: Bilateral Asymmetric Information

Now we assume bilateral asymmetric information. It means that the customer cannot verify the quality of production before consumption and the seller know this quality, but the sellers don't know anything about the customer type (careful or careless). In this case logically we

have 8 possible states:

1- Customer θ_H buy G_H with price p_H, his utility function will be $U_{HHp_H} = U_H\big(c(G_H)\big) - p_H$

2- Customer θ_H buy G_H with price p_L, his utility function will be $U_{HHp_L} = U_H\big(c(G_H)\big) - p_L$

3- Customer θ_H buy G_L with price p_H, his utility function will be $U_{HLp_H} = U_H\big(c(G_L)\big) - p_H$

4- Customer θ_H buy G_L with price p_L, his utility function will be $U_{HLp_L} = U_H\big(c(G_L)\big) - p_L$

5- Customer θ_L buy G_H with price p_H, his utility function will be $U_{LHp_H} = U_L\big(c(G_H)\big) - p_H$

6- Customer θ_L buy G_H with price p_L, his utility function will be $U_{LHp_L} = U_L\big(c(G_H)\big) - p_L$

7- Customer θ_L buy G_L with price p_H, his utility function will be $U_{LLp_H} = U_L\big(c(G_L)\big) - p_H$

8- Customer θ_L buy G_L with price p_L, his utility function will be $U_{LLp_L} = U_L\big(c(G_L)\big) - p_L$

States 2, 5, 6 and 7 never happens, because in the states 5 and 7 careless customers with low preferences never buy the production with high price p_H and in the states 2 and 6 because a rational seller would not sell high-quality production with low price. We assume that $U_{LL} \geq U_0$, $U_{HL} \geq U_0$, $U_{LH} < U_0$ and $U_{LL} \geq U_0$. Therefore there are just four states possible.

According to this analyses customer θ_L only is willing to pay p_L, and with this price organizations only can sell G_L. Consequently careless (low-preference) customers do not face with asymmetric information at all, and only careful (high-preference) customers faced with asymmetric information. We assume that they can find out the quality of production with searching, and the cost of searching is equal S. We have shown these different states in Figure 3.

Figure 3: Possible States for Customers
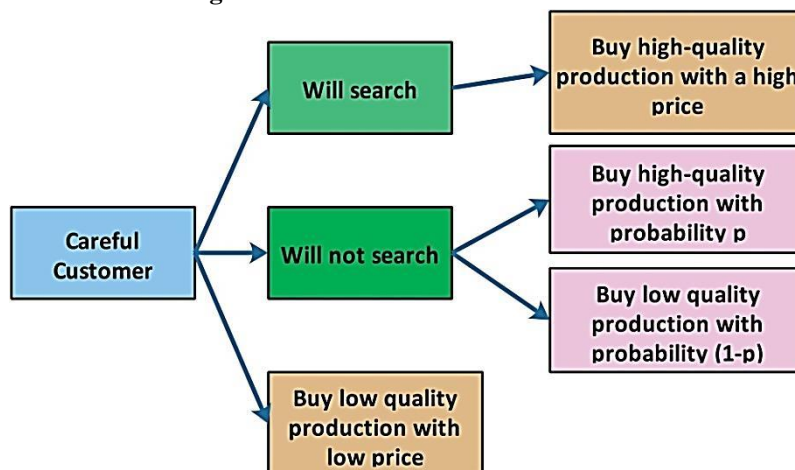
If the customer searches about the quality of services, because $U_{HH} \geq U_{HL}$, he definitely chooses the high-quality one. But if he doesn't search, seller with the probability p sells the high-quality G_H, and with the probability $(1-p)$ sells the low quality G_L with the same price p_H. We know that p is the share of pure-nonprofit organizations in the market. Another answer is that careful customer mimics from type θ_L and buy the low quality production with the low price and in this case there is no asymmetric information anymore. Therefore the possible states will be:

1- Customer search for buying the high-quality G_H, his utility function will be $U^s_{HHp_H} = U_H\big(c(G_H)\big) - p_H - S$.

2- Do not search, and his expected utility function will be $U^e_H = pU_{HHp_H} + (1-p)U_{HLp_H}$

3- Do not search, and mimic from θ_L, his utility function will be $U_{HLp_L} = U_H\big(c(G_L)\big) - p_L$.

If $U^s_{HHp_H} \geq U^e_H, U_{HLp_L}$, the customer will search. This choice depends on the cost of searching S. It is necessary to note that some time searching is not possible at all, so we have to choose between states 2 and 3. Because according to our assumption $U_{HHp_H} > U_{HLp_L}$ and $U_{HLp_H} < U_{HLp_L}$, Customer choosing between these two states will be depended on probability of truth-telling of seller (p). In this case principal (seller) problem will be:

$$\max_{p_i,G_i} \pi = p_H G_H + p_L G_L - C_H - C_L$$

Subject to:

$$U_i \geq U_0 \quad , \quad i = H, L$$
$$U_{ii} \geq U_{ij}, \quad i, j = H, L$$
$$U_H^e \geq U_{HLp_L}$$

With solving this problem we can find out the optimum pricing that will reveal customers actual preference. From this section, we conclude that existing asymmetric information will reduce utility of customers and seller, hence reduce the social welfare. Rising the probability of truth-telling (NNPOs less percentage in the market) will reduce the difference between first-best (complete information) and second-best (U_H^e) solution and vice versa. It means that social welfare will rise in the third sector market contains less nonprofit in disguised.

3. Experimental Analysis

In the first part of the experimental analysis we will show that the model that designed in the previous sections is solvable and the list of optimal contracts is obtainable. In the second part we show that the effects of solving asymmetric information problem by designing the optimal contract are significant and notable.

3.1 Programming of the Model

According to the modelling of the section 2-2, we can solve the asymmetric Information in non-profit organization (both adverse selection and moral hazard) by calculating the optimal contract in one problem. To solve this problem we use Lingo software and hypothetical parameters such as table 1.

Table 1: Hypothetical Parameters

LL ($\bar{L}$)	The length of contract for low skilled agents	One period
LH ($\underline{L}$)	The length of contract for high skilled agent	Two period
Theta H ($\underline{\theta}$)	Cost of production for high skilled agents	3
Theta L ($\bar{\theta}$)	Cost of production for low skilled agent	7
ZH ($\underline{Z}$)	Commitments of committed agents	10
ZL ($\bar{Z}$)	Commitments of uncommitted agent	0
OCH ($\overline{OC}$)	Opportunity cost for high skilled agent	10
OCL ($\underline{OC}$)	Opportunity cost for low skilled agent	6

Source: article findings

Note that the cost of production for high skilled agent is less than low skilled agent;

the length of contract for high skilled agents is more than low skilled one. The result of Lingo software is:

Local optimal solution found.

Objective value:	1070.923	
Infeasibilities:	0.000000	
Extended solver steps:	0	
Total solver iterations:	33	

Variable	Value	Reduced Cost
LH	2.000000	0.000000
V	0.6000000	0.000000
P	100.0000	0.000000
QH	277.7778	0.000000
TH	865.9191	0.000000
LL	1.000000	0.000000
QL	14.79290	0.000000
TL	109.5503	0.000000
THETAH	3.000000	0.000000
OCH	10.00000	0.000000
ZH	10.00000	0.000000
ZL	0.000000	0.000000
THETAL	7.000000	0.000000
OCL	6.000000	0.000000

The results provide two contracts with different wage and production according to high-skilled and low-skilled agents. The contract of a skilled agents is ($Q_H = 277$ و $T_H = 865$) and four unskilled one is ($Q_L = 14$ و $T_L = 109$). Offering these two contracts will provide participation and incentive compatibility constraints simultaneously and solve the asymmetric information problem in the transaction and maximize the benefit of non-profit organization too.

3.2 Field Study

It is necessary to analyze the effect of solving asymmetric information problem (providing transparency) in non-profit organizations to development of third sector of economy in Iran. In the field study we asked people of Isfahan City a questionnaire. Statistical population is 563596 Households of Isfahan City that the number of sample becomes 613 according to Mitchell-Carson table. Methods of sampling were random cluster sampling that distribute in 15 region of Isfahan City.

Making optimal contract by non-profit organizations or reporting the parameters θ_i and p_{di} for all of the non-profit organizations and charities in the third sector of the economy in Iran and ranking them by the government solve the asymmetric information (bullshit information and an action problem). We asked people if the asymmetric information problem solves by one of the above methods, how much you will raise participation in and payments to the non-profit organizations and charities. The answers show in table 2.

Table 2: Results of Fields of Study

	Answers	frequency	Percentage	cumulative frequency
Verified Answers	Do not affect	222	36.2	36.2
	50 percent rise	82	13.4	49.6
	100 percent rise	249	40.6	90.2
	200 percent rise	22	3.6	93.8
	300 percent rise	38	6.2	100
	All answers	613	100	

Quantity	Verified answer	613
	Without answer	**0**
Average		0.7308
Mehdi and		1
Standard deviation		0.77973
Domain		3
Minimum		0
Maximum		3

Source: article findings

According to the table, solving the asymmetric information problem or providing transparency non-profit organizations in the third sector of the economy in the average will raise the scale of third sector of economy about 73%, which is significant and notable measurement.

4. Conclusion

In this article we tried to provide theoretical model for analyzing challenge of asymmetric information in the third sector of economy (that is the most important challenge preventing the growth and development of third sector) using the theoretical foundation of contract theory and incentive theory and involving the special characteristics of third sector derived by its special structure in Iran.

For this purpose we create a conceptual model for providing the new methodology for analyzing contract theory in the third sector, and providing optimal contract in every transaction and state. In the part of this conceptual model we introduce all transactional segments that have possibility to face with asymmetric information and accordingly adverse selection and moral hazard problems. These segments were 1-donors 2-nonprofit organization (board) 3-CEO, 4-employees and contractors and 5-customers.

Therefore we conclude that creating a contract theory for the third sector needs to model all transactional segments. Therefore we analyzed these segments in the different parts and provided mathematical and theoretical model to creating the optimal contract that solve the adverse selection and moral hazard problems.

Finally we had to show that this mathematical model is solvable and list of optimal contracts is obtainable. Then we solved the last model with hypothetical parameters by Lingo software and calculated the list of optimal contracts. Also we needed to show that the effect of solving asymmetric information problem in the third sector of economy is significant and notable. Hence in the field study between 613 people in the 15 region of Isfahan city, we find out that solving the asymmetric information problem or providing transparency in non-profit organizations in the third sector of the economy, will raise the scale of third sector of economy about 73%, which is significant and notable measurement.

5. Note
   a) chief executive officer
   b) p_i is common knowledge for everybody in the market.
   c) For extra information you can see this idea in James (1986), and Krashinsky (1986).
   d) The point is that the purpose of the board is to maximize the reaching of the organizational goal, for example if the organizational goal is helping or feeding the poor people, the board wants to maximize the number of the poor people that are under cover of the services of this organization, or if the organizational goal is to provide the educational services, the board wants to maximize the people to use the high quantity and

quality of services of this organization. Then the maximization of production and profit also will be the purpose of the board in NPOs with this difference that they don't use this profit for the personal advantage, but for the expanding of the services of NPOs.

e) New model is based on Laffont & Martimort (2009: 32) model parameters.

f) In the real world, because in some nonprofit organization they can control and observe the activities of CEO at all, they just want to trust CEO, and then they just want to hire committed one.

g) For example if CEO try to hire the most experts in the NPO between increase the efficiency, maybe can find a better one and increase the level of production, but maybe he cant.

h) Some of the parameters like v are external, and they have to be calculated before the model in the real world.

i) The idea of Frey (1994) adapted to our new model.

j) Because it will improves sense of responsibility in CEO

k) 1-Personal relationship, 2-type of activity, 3-participation, 4-infirmity, 5- type of intervention: reward or command, 6-contingency of reward on performance, 7-message implied by external intervention (Frey, 1994).

l) For extra information you can see Steinberg & Gray, 1993; Ortmann & Schlesinger, 2003; Brown & Slivinski, 2006; see also Glaeser & Schleifer, 2001.

m) Our new model is based on Bolton & Dewatripont (2005: 19) model parameters.

n) Equal utility of money.

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