Audit Firms-Clients Relationships: A Socio-Economic Theory Perspective

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Abstract: Emphasizing the game theory and exchange theory, this study is seeking to justify auditors and clients' types of behaviors with respect to Socio-Economic theory. The most important issue, influencing this relationship is the audit fee. According to the Walrasian stability, many factors such as client size, complexity of company operations, type of auditing, institutional investors ownership, managers ownership, inflation etc are specified by the balanced audit fee. According to sequential rationality and signaling game in auditing, it was also shown that the signals sent by auditors and clients, resulting from their strategies would have important roles in their balance type. Finally, the payoff matrix was employed to determine the optimum level of audit fee. It was indicated that an optimum level could be determined in accordance with auditor-client strategies.

Key words: Socio-economic theory, audit firm, client, audit fee, Iran

INTRODUCTION

In the real world, an individual is faced with others' reactions while making decisions (Krijnen *et al.*, 2015). The outcome of situations in which an individual is placed depends on both his own and others' decisions. The first comprehensive and systematic study on the application of the theory of games in economics was conducted by Neumann and Minow (1994) and published in the book "Theory of Games and Economic Behavior". In this theory, every game consists of a set of rules, procedures and relations known by all players (Gintis, 2000). Most games share a number of features. First, games have a set of rules which shape players actions and relate outcomes to the relevant decisions. Second, each game has a number of rational decision-makers (players) who seriously strive and compete for the best result. Therefore, a player is an individual who makes decisions in a strategic environment. These decisions are based on an individual's rational behavior. Strategy is an action or set of actions chosen by the player based on the available information. In a game, each player has several strategies and can choose the strategy which best fits the situation and objectives. A player might have limited strategies. For example, in a coin flipping game, players can only have two strategies and in the game of chess, players are merely allowed to make a number of specific moves. In general, players have n strategies. Numerical

utility and expected utility maximization hypothesis are of the utmost importance in the theory of games because uncertainty is present throughout the game (Owen, 1995).

According to the stakeholder theory, auditors as part of a firm's stakeholders explain their relationship with firm through enhancing the quality of auditing while maintaining their independence through specific marketing. This in turn will reduce cost of auditors activities and will indirectly cut agency costs and increase stock price of the client firm. As a result, auditors could be effective in improving corporate governance mechanisms known as the game rules of proportionate distribution of benefits (Heath and Norman, 2004). This implies that auditors' approach to auditing and marketing activities can be influenced by their attitudes toward corporate governance. Given the increase in the number of audit firms, we are faced with the following questions: How can we establish a balance between individual and public interests? Will auditors, along with other stakeholders (with an emphasis on the client), participate in a cooperative, non-cooperative, random or strategic game with zero sums? Using stakeholder theory, game theory and exchange theory, the aim of this study was to answer these questions.

Our purpose is to articulate the theory and measurement of audit firms-clients relationships with the concepts of socio-economic theory and mathematical models outlined in the preceding sections. In particular,

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we shall attempt to place the socio-economic paradigm problem within the mathematical models context. We noted earlier that this effort can be taken as analogous to the classical delineation of economic indicators as those indexes of economic activity which demonstrate a historical pattern of timing and co-variation with business cycles. Of course, such economic indicators as the unemployment rate-which may be the result of incorrect interaction entities as audit firm and client-are usually arguments in a social welfare function and thus can be approached from the standpoint of social policy outlined in the preceding subsection.

Audit market in Iran: Mohammad *et al.* (2015), indicate that in Iran, Audit Market increased competition in an unfavorable audit market is more likely to result in unfavorable consequences encompassing price competition (decreasing audit fees) rather than quality competition (audit quality improvement) and increased opportunistic auditor switching Therefore, it is important to investigate the audit market in Iran. In this context tax and trade laws have played a prominent role in the formation of the accounting profession in Iran. Auditing was mentioned for the first time in the Income Tax Law in 1955. The law "accept (s) the professional opinions of official auditors for income tax calculation" (Roudaki, 2008).

Following the Islamic Revolution in 1979, all banks and insurance firms were nationalized and the state became the supervisor of these firms. Consequently, demand for the services of private audit firms decreased sharply. The Nationalized Industries and Plan Organization Audit Firm, the Mostazafan Foundation Audit Firm (Mashayekhi and Mashayekh, 2008) and the Shahed Audit Firm were then established as state and semi-state audit firms for the purpose of auditing the newly nationalized firms (Roudaki, 2008). However, a lack of comparability between the financial statements of client firms and audit reports issued by the three aforementioned semi-state audit firms led to the establishment of the Iranian Audit Organization (IAO) in 1987, following the ratification of an Act by the Iranian Parliament mandating the merger of the three semi-state audit firms (Mohammad *et al.*, 2015). In this regard, privatization of Iran audit market lead to establishment of private audit firms, increase the number of audit firms and competition in this market (Soroushyar *et al.*, 2014). Nevertheless, Bozorg Asl mentions two fundamental problems in the private sector of audit firms the perceived weakness of auditor independence and the low audit fees that had resulted from the high competition existing among private auditors. These factors in turn, cause

Table 1: Number of rercentage of ACPA embers by type of memership at the time of research

Member type	Number	Percentage
Individual independent auditors	77	4
Auditors. Partner of audit firms	896	43
Auditors working at IAQ	229	11
Auditors working at audit firms	245	12
Inactive memers	637	30
Total	2084	100

IACPA members list, October 2014

private firms to have difficulty in expanding their existing pool of human resources by employing more professional employees. The basic question is that what is the role of auditors in the balance in the market? Activities such as marketing can help this balance? Therefore, it is important to investigate the Auditor's attitude toward business, attitude toward corporate governance and attitude toward balance auditing and marketing activities. In Table 1, we report the number and percentage of IACPA members by type of membership at the time of research.

Auditors and market: The marketing of Audit firms is a unique and highly specialized branch of financial services marketing (Mahdavi and Daryaei, 2015). During last decades, international market of audit services has faced with dramatic changes one important of which is the issue of marketing for accreditation services (Arel, 2012). Issues like entering to new markets, improving research and development and reaching new technologies, economical savings, globalization, need to renovated expertise due to complicated businesses of clients and promoting market share are substantially influential in entrance of audit institutions in marketing affaires (Broberg *et al.*, 2013). Change in audits' interests towards marketing was the result of decision made in US Supreme Court in 1977. Clow *et al* (2009), compared motivations of auditors for marketing in 1993 with 2004. Results indicated that negative attitudes of auditors have been modified to positive ones. This positive change was accelerated through using more marketing activities and auditors improved their relations with firms.

Chaney *et al.* (2003) introduced a theoretical model in which the efficiency of relation between audit firm and client in markets with legal and illegal absorption of clients is studied. They indicated that proponents of marketing activities for direct auditing believe that in the case of opportunity for audits to choose possible clients, the clients would be able to select audits more consciously. In auditing markets in which marketing activities are prohibited for auditing, audits are allowed to bid tenders and run auditing operations only when clients ask them. Possible positive effects of limitations on advertisement and activities of absorbing clients are not directly determined in pricing audits. Instead, legislators or

market`s mechanisms should ensure there is an appropriate status for independency in a way that no relation exists between marketing and independence. This can occur in two ways. First, more accurate considerations result in more possibility of exploring mistakes or fraud. Second, increasing fines in case of finding deficits in auditing results in more expenses in establishing problems. Chaney and Jeter considered that in a more competitive environment whether there is any motivation for audits for lying and less attempts comparing to less competitive environments? This study does not present any evidence in terms of relation between marketing activities and auditors' independence.

Problems in the field of auditing in recent years have led to some issues, such as, whether competition in auditing market has weakened expertise and realistic view of auditors. Many authors point to the fact that omitting control of government over advertisements and demands have led to more competition among auditors (Healy and Palepu, 2003). Hay and Knechel (2010) is based on how to separate omitting governmental control on ads and demands which are impacting on prices of auditing. First, they studied the general effects of this process over audit markets. Then, they considered how separating big and small audit firms from governmental control influences over these agencies. Results indicated that no reduction was found in fees after elimination of governmental control over ads. In reverse, prices were boosted in market.

Firms are progressively looking for highlighting their positive cooperation in social operations in order to deliver an ideal picture of the firm and legalize themselves. Legitimacy enables researcher to explain social relations of an organization. Consistent with this definition of mutual relation of organization with society, legitimacy theory is appeared. So, the homogeneity level between firm`s actions and expectations of society is the direct legitimacy of the firm. Ducassy and Montandrau (2015) considered relations between some mechanisms of corporate governance and social responsibility of firms in France. He showed that defining accurate relation between all stakeholders based on the agency theory and stakeholder theory can be effective in strengthening social responsibilities of firms. Among them, some mechanisms, like Ownership concentration and duality of CEO and chairman of the board, have more influence over improving social performance of firms.

The marketing of Audit firms a unique and highly specialized branch of financial services marketing. The practice of advertising, promoting and selling financial products and services is in many ways far more complicated than the selling of consumer packaged commodity, automobiles, electronics or other forms of goods or services. The environment in which financial services are marketed is becoming more competitive, making the task of marketing audit firms increasingly challenging and specialized. Audit firms marketers are challenged every day by the unique characteristics of the products they market. We follow Laeven *et al.* (2015) and Mahdavi and Daryaei (2015) in every period the economy produces a final good or service combining labor and a continuum of specialized intermediate goods or services according to the following production function:

$$Z_t = N_{1-\beta} \int_0^1 A^{1-\beta}_{i,t} X^{\beta}_{i,t} di, \beta \in (0,1)$$

Where X_{it} is the amount of intermediate good or service i in period t with technology level and auditor attitude of N is the labor supply. The final service Z is used for consumption as an input into entrepreneurial and auditing marketing and an input into the production of intermediate services. The production of the final good which we define as the numerical, occurs under perfectly competitive conditions. Thus the price of each intermediate good and service equals its marginal product:

$$P_{i,t} = \beta \left(\frac{A_{i,t}}{X_{i,t}} \right)^{1-\beta}$$

Pricing is one of the most important decisions in the marketing of financial services. Auditor's perspective, a client environment can have an impact on audit fees by affecting the required audit effort and the audit risk. (Mahdavi and Daryaei, 2015). The price can be considered as audit fee that was involved in expression as desired fees for auditor that effect good or bad selection. Audit firms must consider not only the benefits and efficiencies of knowledge gained in the non-auditing consulting market but also the costs, in terms of competition, of providing both services.

Relationship between audit firms and companies (the owner) has agreed the terms of a marketing concept that occurs in a time period. This agreement is an agreement in the form of contract and contract audits to be performed. The sale agreement describes the relationship between the interaction of suppliers and buyers and also suggests strategies to explain how such a phenomenon helps cooperation between suppliers and buyers. Empirical phenomena cooperation strategies is how and why some suppliers to maximize profit, single customer choose while

some customers prefer other suppliers which makes sophisticated strategies come into existence. Create benefits for customers (or consumer) suppliers are necessary to maintain their competitive advantage. The most competitive advantages are on price and quality of the product (or service). There are two ways for the seller (service provider) is to create value for the buyer. An increase profits by reducing costs for the buyer, the buyer reduce costs through increased buyer interest. Mental models for understanding the ways in which the research will be used in fact, these models subjects' perceptions of the causes, events and depicts relevant results.

MATERIALS AND METHODS

Equilibrium in the audit services market: Although accreditation service has its own customers, many clients need to receive audit services due to legal requirements. Nonetheless, there are no specific rules for using particular auditors or limitations restricting auditors in their choice of clients. As a result, the audit services market is not monopolized. However, the important questions are what rules are applied in determining auditor's fees whether there is a specific sum on which either auditors or clients have reached a consensus or the fee is subject to the law of supply and demand and if the latter is true what the principles are. Stable and sustainable equilibrium in the market of a specific service such as X shows that if the market deviates from the equilibrium price or sum (e.g., dumping) or in some cases is bound by some incorrect rules, the forces of supply and demand will guide the market back toward equilibrium. Equilibrium in the audit market, like many other markets is not static. It changes over time (Chaney *et al.*, 2003). It can be quite useful to analyze the dynamics of supply and demand in different situations in this market. As auditors' fees and audit prices are influenced by several factors including client size, complexity of client firm's operations, type of audit firm, institutional shareholders ownership, managerial ownership, inflation, etc (Craswell *et al.*, 2002; Leventis and Dimitropoulos, 2010) and prices are only equated through a price system and not determined by suppliers attempting to create a change in supply, the Walrasian stability can be used to propose an equilibrium price.

For instance in the Walrasian stability, equilibrium is sustainable when an increase (reduction) in the price leads to a reduction (increase) in positive (negative) excess demand so that:

$$\frac{dE(P_x)}{d(P_x)} = \frac{d[D(P_x) - S(P_x)]}{d(P_x)} < 0 \qquad (1)$$

Where:
P_x = Price of a product or service
D = Demand
S = Supply

In other words, equilibrium is sustainable when price changes can reduce excess supply or demand in the market. In the above equation $E(P_x)$ is the excess demand for the product or service.

Now, the Walrasian hypothesis is dynamized.

$$P'_x = f[D(P_x) - S(P_x)], f(0), f'(0) > 0 \qquad (2)$$

In the above equation, means if equilibrium is realized (excess demand is equal to 0) the price will not change.

Additionally, means an increase in excess demand leading to an increase in prices. In fact, the mathematical relation is a first-order differential equation. If we assume that demand and supply functions are as follows:

$$\begin{aligned} D(P_x) &: X = a_0 + b_0 P_x \\ S(P_x) &: X = a_1 + b_1 P_x \end{aligned} \qquad (3)$$

If, according to the equilibrium constant *c*, the price of the product or service is a function of excess demand, then we have:

$$P'_x = c[D(P_x) - S(P_x)], c > 0 \qquad (4)$$

Thus,

$$P'_x = c[a_0 + b_0 P_x - (a_1 + b_1 P_x)] = c(b_0 - b_1)P_x + c(a_0 - a_1) \qquad (5)$$

If P^e is the equilibrium price, supply and demand equilibrium will result in:

$$P^e = \frac{a_0 - a_1}{b_1 - b_0} \qquad (6)$$

So, if we multiply both sides of Eq. 6 by c, then we have:

$$c(a_0 - a_1) = -c(b_0 - b_1)P^e \qquad (7)$$

By placing Eq. 7 in Eq. 6, we have:

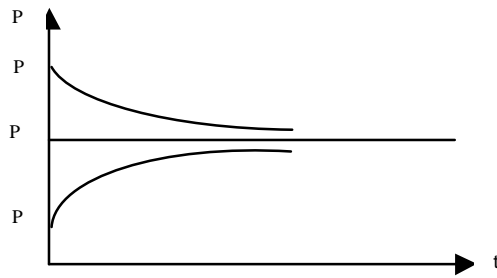$$P'_x = c(b_0 - b_1)(P_x - P^e) \qquad (8)$$

Fig. 1: The time of path price

In fact, the above mathematical relation is a first-order differential equation which when solved will result in:

$$P_{(t)} = Ae^{c(b_0 - b_1)t} + P^e \qquad (9)$$

Hence, equilibrium is sustainable when,

$$b_0 - b_1 < 0 \qquad (10)$$

Thus, the time path of price can be drawn as follows (Walras, 1874) (Fig. 1). Since, audit service is regarded a strategic service many stakeholders are considering auditing as a process which supports accountability. In fact, audit and accountability are present in the monitoring dimension of any system and can be broadly applied in a wide variety of systems from the highest levels of government to the smallest business units. As mentioned before, auditors' fees are influenced by several factors (Craswell *et al.*, 2002; Leventis and Dimitropoulos, 2010; Wu, 2012). As a result, the supply and demand function for audit services must be separately analyzed in each economic environment. This will prompt us to employ the theory of game in answering an important question: How do players' roles and strategies in accreditation activities become significant in explaining the relationship between supply and demand and auditors' fees and how can we justify an audit firm's behavior and a client's decisions based on game theory and other relevant theories

Sequential rationality and signaling game in auditing: In the book "Games and Decision Making", Aliprantis and Chakrabarti (2000) explains the concept of sequential rationality by discussing the used car market. At the end, he concludes that both the buyer and seller of a used car would enter a dynamic game in order to buy or sell the car based on the prices and expected payoffs. In auditing, the audit firm and the client are considered to be two rational players, one of whom has more information than the other.

Obviously, the client has more information about the situation of his own company than the auditor does and knows, for example that his company's poor internal controls might prolong the auditor's job so that the auditor will not be able to complete his job at the deadline mentioned in the audit services contract. In other words, two scenarios can be taken into consideration. In the first scenario, the auditor determines the fee based on his own preliminary estimation of the client firm. If the client provides the auditor with complete information, the real (reasonable) price will be included in the contract. The second scenario comes true when the client provides the auditor with complete information and this, in turn, will lead to a cost estimate lower than the real fee, namely an unreasonable price. Although, according to the Walrasian stability, the prices will reach equilibrium over time, such equilibrium is only realized at the audit market level and cannot occur at a business unit level. Clearly, the client can analyze the price offered by the independent auditor based on the past experience or the estimated cost provided by the internal audit department of the company relating to the estimated duration of the auditing process. The sequential procedure is described in Fig. 2.

The concept of signaling game should be taken into consideration during the aforementioned analysis. After the circumstances of the environment become evident for player 1, he is obliged to send a signal to player 2 to inform him of the information he has received from the environment. Afterwards, player 2 should make a decision based on this information. Since signaling games are games of incomplete information, the perfect Bayesian equilibrium should be reached. In the signaling game, player 1 (information sender/client) knows the game history preceding the signaling and as a result has two sets of information when signaling. Each set of data has only one single decision node. Upon receiving the signal, player 2 (information receiver/audit firm) chooses his own action. However, the following requirements should be met in the assessment of signaling games' equilibrium.

Requirement 1, upon observing S_k, the audit firm should have a belief about the probability of S_k being sent by the client. This belief describes the conditional probability distribution of client records $W\mu(t_i / S_k)$ shown as. Thus, if S_1 is received, the conditional probability distribution (the belief of audit firm about the type of client) will be as follows:

$$\frac{t_2 t_1 t_i}{\mu(t_2 / S_i)\mu(t_2 / S_i)(\mu(t_i / S_i)}$$

If S_2 is received, the conditional probability distribution (the belief of audit firm about the type of client) will be as follows:
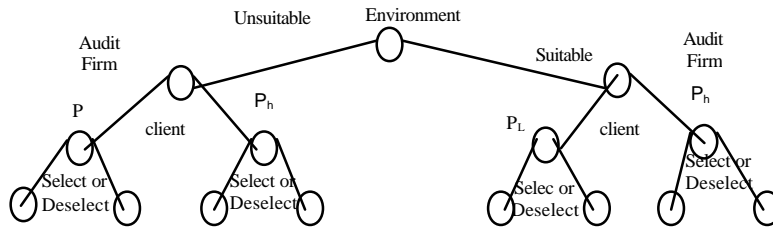
Fig. 2: Past experience and estimated

$$\frac{t_2 t_1 t_i}{\mu(t_2 / S_2)\mu(t_2 / S_2)\mu(t_2 / S_2)}$$

Requirement 2: Based on the beliefs and the received signal, the audit firm should choose an action so that its expected range is maximized.

$$\text{Max}_{aj} \sum_i \mu(t_i / S_k)\mu_2(t_i, S_k, a_j) \qquad (11)$$

The second requirement can also be applied to the client (sender). Since the client is well aware of his own type, he chooses a signal based on his belief about the optimal strategy of the audit firm in order to maximize his own range.

$$\text{Max}_{S_k} u_1(t_i, S_k(t_i), a^*(S_k)) \qquad (12)$$

Requirement 3: For each signal and type audit firm's beliefs about the client are calculated based on the signals sent by the client. The beliefs are calculated according to Bayes' rule:

$$\mu\left(t_i / S_k\right) = \frac{\mu(t_i \cap S_k)}{\mu(S_k)} = \frac{\mu(S_k / t_i)\mu(t_i)}{\sum_i \mu(S_k / t_i)\mu(t_i)} = \frac{p(t_i)}{\sum_i p(t_i)} \qquad (13)$$

Perfect Bayesian equilibrium describes the optimal strategyand $(S^*(t_i), a^*(S_k)$ the belief and satisfies all three aforementioned requirements. Note that each player's strategy is in fact the signals he has sent S_k. In this study, it is assumed that the signals sent to each player are different depending on his type. In other words, according to audit theories, the concept of separating strategy (i.e., different strategies for players with different natures and functions) applies to audit firms and clients. Specifically, clients with a bad record in performing internal controls and observing rules and regulations established based on the auditors' previous annual reports send a signal to auditors implying that the client company's internal control structures are weak and risky. The opposite is also true.

RESULTS AND DISCUSSION

Generalizing Homans's Exchange theory to social institutions: Performance of auditing is determined both by inherent complexities of client firm and also auditing processes and auditor's characteristics. Empirical and theoretical researches in psychology and auditing show that performance of auditing is promoted both by auditors' efforts and establishing efficient rules. To increase efficiency of these rules more endeavor and knowledge are required in the fields of internal, financial and tax auditors. This underscores more pressure over internal structures of auditors, audit institutions and tax officials to understand, manage and design maximum performance of auditions and auditing trainings. It can be said that complexity of auditing activities are inevitable and auditors differ in terms of knowledge, conscious and proficiency. Higher performance can be obtained only through clearly determined combinations of researcher complexities and characteristics of auditing teams (Alissa *et al.*, 2014).

Auditing and auditors are part of society and are influenced by it. Auditing is influenced by material and spiritual changes in society. For example, fast emergence of electronic trade technology led to disappearing of written documents. Today, auditors receive electronic information from their clients rather than written information. Now a days, auditors capable of using electronic information are highly acceptable. This suggests that auditor and client can cooperate in favor of all stakeholders (Adebayo, 2004).

Experimental psychologists and Skinner's theory of learning have played a quite significant role in formulating the fundamental propositions of exchange theory in the field of sociology. Exchange as the axis of business and economics and an expression of social relationships are considered by anthropologists such as Mauss, Malinowski and Levi Strauss to be the historical basis of exchange theory. Monks and Minow define firm as a set of contracts. The nature and essence of contract and exchange are inseparable. In the finance literature,

economic exchanges between economic institutions explain the nature of the institution. In other words, exchange and non-exchange contracts influence the type of accounting system in different institutions. As a result, exchange theory is one of the newest individualistic theories based on behavioral psychology which at the same time has its roots in the empirical debates in anthropology in the nineteenth and the early twentieth centuries. In Homans's exchange theory, the relationship between two individualsis emphasized rather than group or institutional relationships. Basically, this theory focuses on individuals or the relationships between two individuals. However, all sociological theories should also pay attention to the collective units of more than two individuals. According to Homans, social institutions follow the same fundamental principles upon which the exchange behavior of two individuals is based. They only differ in a way that institutions involve a more complex network of relationships resulting from complex activities and indirect exchange relationships. The specialization of tasks is also important because it makes individuals dependent on each other and creates an institutional order. Homans attempts to use exchange theory's propositions in explaining different types of social behaviors from simple behaviors (between two individuals) to much more complex institutionalized group behaviors and tries to describe phenomena such as mutual influence, power, respect, competition, etc. through rational inference.

Many concepts of game theory are employed in Homans'sarguments however, he has not made any references to this theory. For example, the presence of a relationship or exchange based on predetermined rules and principles is one of the requirements of game theory. In addition, the specialization of tasks within a series of conscious relationships is evidence. As a result, game theory and exchange theory can increasingly be helpful in clarifying the relationships between the audit firm and the client (as two institutions in Homans's theory and two players in game theory).

As previously discussed, according to game theory, the behaviors of both sides are binfluenced by the signals sent by the players. As exchange theory suggests, these signals depend on players' attitudes, dos and don'ts. For instance in any interaction between the audit firm and the client, the structure of both sides should be taken into consideration. The type of ownership of the client firm plays a very significant role in formulating its strategy and, in turn, determining the type of interaction it would have with the audit firm.

If institutional owners possess the majority of the client firm's stocks, they will exert political or economic pressures to include a number of considerations in the overall policy-making and strategies of the firm in order to protect interests of the minority. According to Homans's exchange theory, such behavior is influenced by the individual behaviors of minority owners. This suggests that structures like corporate governance which encompasses the relationship context of all stakeholders including the relationship between the audit firm and the client, can have an impact on signal generation and two-way signaling between the auditor and the client. (Fontaine *et al.*, 2013). One of the strategies usually explained by the audit firm in order to influence the relationship is audit fee determination strategy. This strategy can be considered in accordance with the Walrasian stability which was discussed in previous sections.

Optimization of auditor's fee: In section 2, discussions about equilibrium in the audit services market were presented based on the Walrasian stability. In this section, Homans's exchange theory is used to examine the factors which can change auditor's fee according to the signals exchanged between the client and the auditor during the game. Undoubtedly, auditing is a process which can guarantee the reliability and relevance of information included in financial statements (Yuan and Jiang, 2008). Audit an effective mechanism, ensures shareholders whether company managers act in line with their interests or not. The client firm's ownership type plays an important role in explaining the relationship between the two players, namely the auditor and the client. Institutional investors pursue profitability goals and as a result, not only do they intend to control the firm but also they have a fiduciary duty to shareholders to invest their financial resources in the most profitable opportunities (Bushee, 1998). Accordingly, compared to other managers, managers who have invested in their own firms seek to avoid high-risk decisions. As a result, reducing asymmetric information and low-risk, decisions can lead to the reduced demand for monitoring costs (e.g. audit fee) (Jensen, 1986).

In many studies, a significant relationship was found between auditor's fee and client size, complexity of client firm's operations, type of audit firm, institutional investor ownership, managerial ownership, inflation, etc (Craswell *et al.*, 2002; Leventis and Dimitropoulos, 2010; Wu, 2012). Therefore, a decision-maker (either the client or the auditor) cannot independently attempt to optimize his goals. Classic optimization methods including duopoly solutions suggested by Bertrand, Chamberlain, Edgeworth and Cournot are meaningless without taking competitors into consideration.

Assume that the audit firm (A) adopts n different strategies (i) while considering the various factors influencing auditor's fee. At the same time, the client (B) chooses different strategies (j)according to the following payoff matrix:

Strategy type	B_1	B_2	...	B_m
A_1	P_{11}	P_{12}	...	P_{1m}
A_2	P_{21}	P_{22}	...	P_{2m}
...	...	...	...	...
A_n	P_{n1}	P_{n2}	...	P_{nm}

Since, the above game does not have any pure optimal strategy (based on the literature discussed), minimax and maximin criteria cannot be used in the solution process. In this case, assuming that matrix entries are positive, the audit firm acts in a way that the minimum expected value of its strategies' payoff is equal to V In other words, assuming that X_1-X_n are the probabilities of A_1-A_n being chosen, we have:

$$P_{11}X_1 + P_{21}X_2 + ... + P_{n1}X_n \geq V$$
$$P_{12}X_1 + P_{22}X_2 + ... + P_{n2}X_n \geq V$$
$$.$$
$$.$$ (14)
$$.$$
$$P_{1m}X_1 + P_{2m}X_2 + ... + P_{nm}X_n \geq V$$

Both sides of the above relations are divided by:

$$P_{11}X'_1 + P_{21}X'_2 + ... + P_{n1}X'_n \geq 1$$
$$P_{12}X'_1 + P_{22}X'_2 + ... + P_{n2}X'_n \geq 1$$
$$.$$
$$.$$ (15)
$$.$$
$$P_{1m}X'_1 + P_{2m}X'_2 + ... + P_{nm}X'_n \geq 1$$

Note that: $X'_j = \dfrac{X_i}{V}$ and

$$G = \sum_i X'_i = \frac{1}{V}$$ (16)

Hence, the audit firm seeking to maximize V minimizes G .Similarly, the client acts in a way that the maximum expected value of its strategies' payoff through cost reduction is equal to. Thus, assuming that to be the probabilities of to being chosen, we have:

$$P_{11}Y_1 + P_{12}Y_2 + ... + P_{1m}Y_m \leq V$$
$$P_{21}Y_1 + P_{22}Y_2 + ... + P_{2m}Y_m \leq V$$
$$.$$
$$.$$ (17)
$$.$$
$$P_{n1}Y_1 + P_{n2}Y_2 + ... + P_{nm}Y_m \leq V$$

Both sides of the above relations are divided by V:

$$P_{11}Y'_1 + P_{12}Y'_2 + ... + P_{1m}Y'_m \leq 1$$
$$P_{21}Y'_1 + P_{22}Y'_2 + ... + P_{2m}Y'_m \leq 1$$
$$.$$
$$.$$ (18)
$$.$$
$$P_{n1}Y'_1 + P_{n2}Y'_2 + ... + P_{nm}Y'_m \leq 1$$

Note that:

$$Y'_j = \frac{Y_j}{V}$$

and:

$$Z = \sum_j Y'_j = \frac{1}{V}$$ (19)

Hence, the client seeking to minimize V maximizes Z.The comparison of relations (15) and (16) with relations (18) and (19) shows that these two problems are in fact each other's duals. Therefore, by solving one problem and using shadow prices, the optimum values of the other problem can be calculated.

It should also be noted that by solving the above problems, the values of X_i and X_j are determined. The value of V can be calculated by reversing. $\sum_i X'_i$ or $\sum_j Y'_j$ Afterwards X_i and Y_j are calculated by multiplying X'_i and Y'_j by V, respectively.

CONCLUSION

Base on game theory, every game consists of a set of rules, procedures and relations known by all players (Ginits, 2000). According to the stakeholder theory, auditors as part of a firm's stakeholders explain their relationship with firm through enhancing the quality of auditing while maintaining their independence through specific marketing. This, in turn, will reduce cost of auditors' activities and will indirectly cut agency costs and increase stock price of the client firm. As a result, auditors could be effective in improving corporate governance mechanisms known as the game rules of proportionate distribution of benefits (Heath and Norman, 2004).

Auditing market is the game between audit firm and client. Stable and sustainable equilibrium in the market of a specific service such as X shows that if the market deviates from the equilibrium price or sum (e.g., dumping) or in some cases is bound by some incorrect rules, the forces of supply and demand will guide the market back toward equilibrium. Equilibrium in the audit market, like many other markets is not static. It changes over time (Chaney *et al.*, 2003). According to the Walrasian stability, the prices will reach equilibrium over time such equilibrium is only realized at the audit market level and cannot occur at a business unit level.

Exchange theory is one of the newest individualistic theories based on behavioral psychology which at the same time has its roots in the empirical debates in anthropology in the nineteenth and the early twentieth centuries (Homans, 1967). According to Homans's exchange theory, such behavior is influenced by the individual behaviors of minority owners. This suggests that structures like corporate governance which encompasses the relationship context of all stakeholders including the relationship between the audit firm and the client, can have an impact on signal generation and two-way signaling between the auditor and the client. (Fontaine *et al.*, 2013). According to sequential rationality and signaling game in auditing, it was also shown that the signals sent by auditors and clients, resulting from their strategies, would have important roles in their balance type. Finally, the payoff matrix was employed to determine the optimum level of audit fee. It was indicated that an optimum level could be determined in accordance with auditor-client strategies.

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