Strategic Considerations in Auditing : An Incomplete Information Setting

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ABSTRACT

In this study , an auditor - client incomplete information game is introduced to analyze auditor - client interactions . The model formally recognizes the effect of allowing for multiple client types and demonstrates that as long as some sufficient conditions hold , the "standard" strategy of extending the audit and report truthfully can become a pure strategy equilibrium solution of the auditor.

Keywords :Auditor, Client, Multiple Client Types, Incomplete Information Game, Pure Strategy Equilibrium Solution

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I.Introduction

1.1 Literature Review

Historically, there are two major parties in the public accounting profession: auditors and clients. Interactions between these two major "players", not surprisingly, have become the focus of many auditing studies. Accounting literature that directly or indirectly investigates the issue of auditor-client interactions includes, but not limited to, the following: Kaplan [1973], Demski and Swieringa [1974], Kinney [1975], Evans [1980], Antle [1982], Wilson [1983], Fellingham and Newman [1985], Kinney [1986], Baiman, Evans, and Noel [1987], Kinney [1989], Fellingham, Newman and Patterson [1989], Newman and Noel [1989], Melumad and Thoman [1990], Shibano [1990] and Penno and Watts [1991]

Without doubt, all the above-mentioned auditing studies have greatly advanced our knowledge in formulating auditor-client relations. However, Fellingham and Newman's (FN) 1985 model was the first to formally investigate the "behavioral influences" aspect of the auditor-client game. Their study emphasizes the strategic nature of auditor-client interactions and has successfully demonstrated the necessity to allow the audit to influence the client's behavior which in turn influences the planning of the audit.

Nevertheless, based on the sensitivity analysis result of FN's Table 6, one unanticipated phenomenon arises: *"a high auditing level coupled with the correct qualification decision is never a pure strategy for the auditor in equilibrium" (Synopsis).* This unanticipated result of FN's Table 6 seems to contradict the general expectation of the public. Furthermore, some well-documented empirical evidence (e.g. Simunic [1984] and Francis and Simon [1987]) has indicated that larger and more successful CPA firms, such as the Big Six, tend to maintain a higher level of audit quality, when providing attest services to clients, than do smaller CPA firms. Thus if maintaining a higher level of audit quality does not impair larger CPA firms' profitability and/or competitiveness, it seems unreasonable to insist that "extend the audit and issue the report accordingly" is never a pure strategy equilibrium solution of the auditor in the auditor-client game.

However, it should also be noted that FN [1985] never mathematically prove nor formally claim that a pure strategy of extending the audit cannot be an equilibrium

solution of the auditor. Instead, they clearly pointed out that ".... *given the arbitrary nature of the cost parameters in these examples, these results should not be taken literally* ...." (see FN, p.643).

In addition to FN [1985], Fellingham, Newman and Patterson [1989] (hereafter, FNP [1989]) also employed a game-theoretic approach in analyzing the auditor's sampling strategy. Note that the prime result of FNP [1989] is that there exists no pure sampling strategy equilibrium solution for the auditor. Since this result of FNP [1989] is consistent with that of FN [1985], in this study effort will be devoted to reinvestigating the FN's 1985 model only.

1.2 Objective

The objective of this study is twofold. First, to investigate WHY, in FN's 1985 auditor-client imperfect information game, the "standard" strategy of always audit and report truthfully can never be a pure strategy equilibrium solution of the auditor. Second, to identify WHAT sufficient condition(s) might be needed to allow the "standard" strategy of always audit and report truthfully to be a pure strategy equilibrium solution of the auditor. To do so, an auditor-client incomplete information game is introduced. The major difference between the proposed incomplete information game and FN's 1985 imperfect information game is that the former allows for multiple client types, while the latter does not.

The client's type refers to the client's inherent risk (e.g., the ability of the client's internal control systems to safeguard firm assets). For ease of exposition, client types here will be restricted to one of the following two cases: the "good-type" client and the "bad-type" client. The "good-type" client is said to be initially endowed with internal control systems that are able to safeguard firm assets, while the "bad-type" client's endowed systems fail to do so.

The motivation to introduce multiple client types is based on the notion that different clients might initially be endowed with different levels of inherent risk which, in turn, might influence each client's choice of effort level. Furthermore, included in their concluding remarks, FN also urged accounting researchers to look into the potentially fruitful paradigm of the auditor-client incomplete information

game by stating that *"One area which seems particularly appropriate for auditing involves games with incomplete information. For example, the client might be one of "n" types, and each type may be expected to "play" differently."* (see FN, page 648).

The rest of this study is structured as follows. Our proposed auditor-client incomplete information model is introduced in Section 2. Subsection 2.1 describes the model's assumptions and notation. Results derived from the auditor-client incomplete information model are presented in Subsection 2.2. Finally, Sections 3 provides concluding remarks and implications derived form these results.

II.The Auditor-Client Incomplete Information Model

2.1 Model Assumptions and Notation

The auditor-client game adopted here is a two-person single-period incomplete information model in which (1) the client is assumed to be initially endowed with either "good" internal control systems (denoted as the type-G client) or "bad" internal control systems (denoted as the type-B client), (2) the client's type is unknown to the auditor, (3) the client's effort level is either high (denoted by E1) or low (denoted by E2), (4) the auditor chooses to extend or not to extend audit procedures (denoted by A1 and A2 respectively), (5) whenever the auditor adopts A1, then the client's effort level will be perfectly revealed (hereafter, the "perfect revelation" assumption), and (6) the auditor's qualification decision is either a nonqualifying report (denoted as NQ) or a qualifying report (denoted as Q). Note that , the "perfect revelation" assumption is also imposed in FN[1985] imperfect information model.

For the sake of comparability, unless pointed out otherwise, the notation used in the proposed auditor-client incomplete information game will closely follow that of the FN [1985] imperfect information game. All the relevant assumptions and notation of the model are summarized as follows.

- $S_G \equiv \{ E_{1G}, E_{2G} \}$ denotes the "good" type client's strategy set where E_{1G} (E_{2G}) stands for the good-type client who employs a high (low) level of effort respectively.

- S_B ≡ { E_{1B} , E_{2B} }denotes the "bad" type client's strategy set where $E_{1B}(E_{2B})$ stands for the bad-type client who employs a high (low) level of effort respectively.
- S_A ≡ { (A_1, Q, Q) , (A_1, NQ, NQ) , (A_1, Q, NQ) , (A_1, NQ, Q) , (A_2, Q) , (A_2, NQ) } denotes the auditor's strategy set where :

(A_1, Q, Q) ≡ extend the audit and issue a qualifying report no matter wether the client's effort level is E_1 or E_2.

(A_1, NQ, NQ) ≡ extend the audit and issue a nonqualifying report no matter whether the client's effort lever is E_1 or E_2.

(A_1, Q, NQ) ≡ extend the audit and issue a qualifying (nonqualifying) report if the client employs E_1 (E_2).

(A_1, NQ, Q) ≡ extend the audit and issue a nonqualifying (qualifying) report if the client employs E_1 (E_2).

(A_2, Q) ≡ do not extend the audit and issue a qualifying report directly.

(A_2, NQ) ≡ do not extend the audit and issue a nonqualifying report directly.

- t ≡ denotes the auditor's prior belief that the client is endowed with "good" internal control systems.
- 1-t ≡ denotes the auditor's prior belief that the client is endowed with "bad" internal control systems.
- P_G ≡ Prob (material errors occur | E_{1G}) is the probability that there exists material errors in the client's financial statements given that she is endowed with good internal control systems and employs high effort.
- P_B ≡ Prob (material errors occur | E_{1B})
- q_G ≡ Prob (material errors occur | E_{2G}) is the probability that there exists material errors in the client's financial statements given that

(s)he is endowed with good internal control systems and employs low effort.

- q_B ≡ Prob (material errors occur $|E_{2B}$)
- $0 \le P_G \le q_G \le 1$; $0 \le P_B \le q_B \le 1$. These two conditions imply that when the client's type is given, the probability of material errors in the client's financial statements will be reduced if the client employs high effort.
- $0 \le P_G \le P_B \le 1$; $0 \le q_G \le q_B \le 1$. These two conditions imply that when the client's effort level is fixed, the probability of material errors in the client's financial statements will be reduced if the client 's type is "good".

Furthermore, it is assumed that there are two major sources of costs that the auditor must face : (1) the expected out-of-pocket costs of extending audit procedures, and (2) the costs of "type I" or "type II" errors. Notation for these expected costs of the auditor is summarized as follows.

- C_{AG} denotes the auditor's expected out-of-pocket cost of extending audit procedures given the client is endowed with good internal control systems.
- C_{AB} denotes the auditor's expected out-of-pocket cost of extending audit procedures given the client is endowed with bad internal control systems.
- C_I denotes the auditor's type I error costs (i.e., the costs of wrongly rejecting the client's financial statements given there are no material errors).
- C_{II} denotes the auditor's type II error costs (i.e., the costs of wrongly accepting the client's financial statements given there are material errors).

On the other hand, it is assumed that there are three major sources of costs that the client has to face in the auditor-client game: (1) the costs of employing high effort, (2) he expected costs of receiving a qualifying opinion from the auditor, and (3) the expected costs of being sued by shareholders due to the material errors of the client's financial statements. These costs are summarized as follows.

- C_{EG} denotes the client's expected costs of employing high effort given that (s)he is endowed with good internal control systems.
- C_{EB} denotes the client's expected costs of employing high effort given that

(s)he is endowed with bad internal control systems.

- C_Q denotes the client's expected costs of receiving a qualifying opinion from the auditor.
- M_Q denotes the client's costs of being sued for the material errors of financial statements after receiving a qualifying report from the auditor.
- M_{NQ} denotes the client's costs of being sued for the material errors of financial statements after receiving a nonqualifying (clear) report from the auditor.

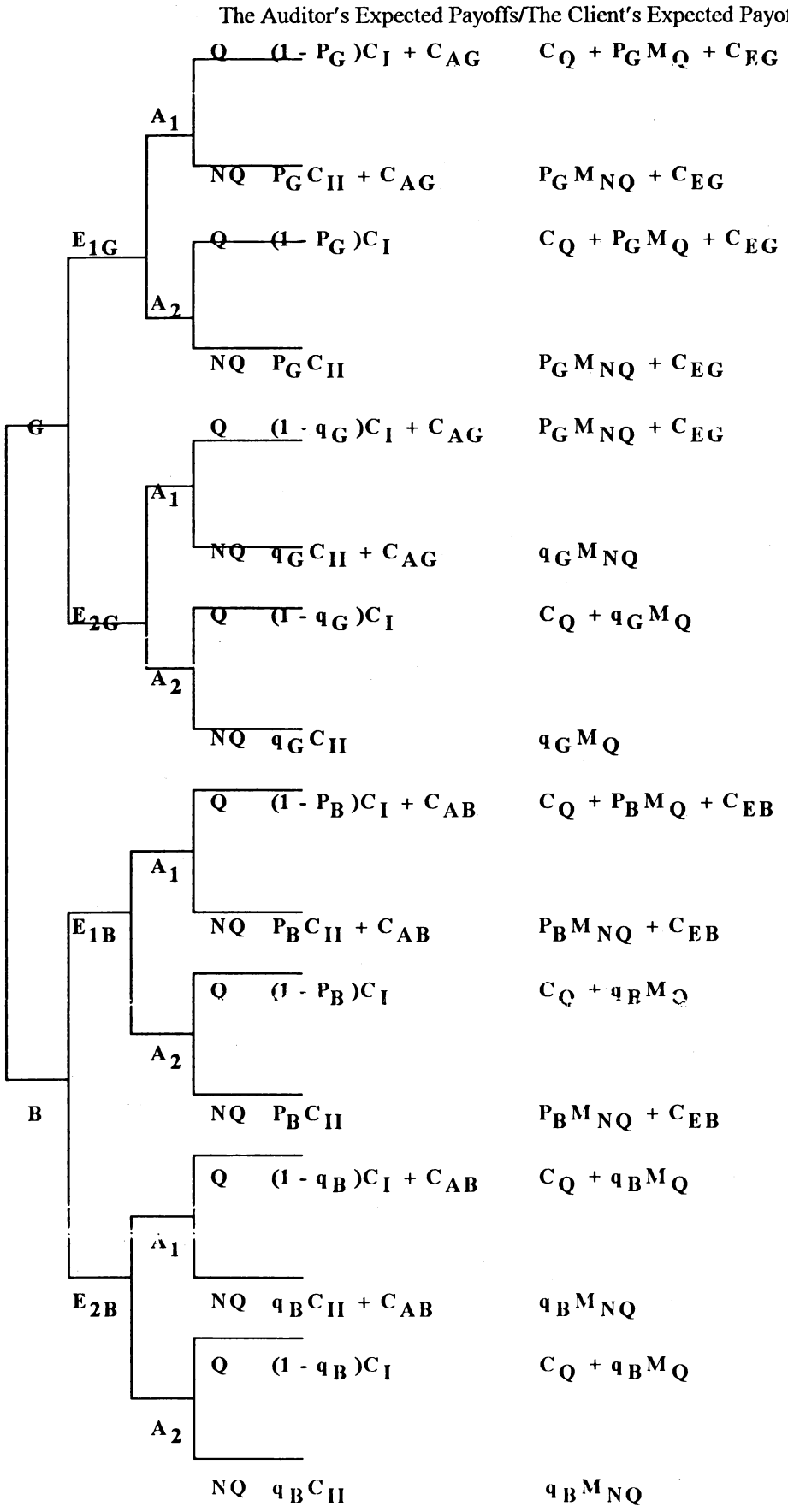
Before proceeding, it is worth noting that both the auditor and client are assumed to agree on all the model parameters and view each other as "rational" decision makers (i.e., both are profit-maximizers). Meanwhile, in order to make the model tractable, the auditor's costs of not extending audit procedures (A2) and the client's cost of employing low effort level (E2) are both normalized to zero.

2.2 Model Results

To assist readers in better understanding the relevant events and time sequence of the proposed auditor-client incomplete information game, an extensive form of the game is provided (see Figure 1). In Figure 1, the client who has private information with respect to his/her own type is characterized as taking the first action. For example, at stage 1, the "good-type" client could choose either E1G or E2G, while the "bad-type" client could choose between E1B and E2B. At stage 2, the auditor chooses either A1 or A2. Through comparing the auditor's expected payoff(s) presented in Figure 1, it is not difficult to tell that among the six strategies available to the auditor some of them are superior to the others. The following Lemma 1 is used to provide insight into this issue.

Lemma 1: In the proposed auditor-client incomplete information game, (A_1, NQ, Q), (A_2, Q) and (A_2, NQ) are the only three undominated strategies of the auditor (for the proof, see Appendix B).

Figure1:The extensive form of the auditor-client incomplete information game



Lemma 1 implies that (A1, Q, Q), (A1, NQ, NQ) and (A1, Q, NQ) are all dominated strategies. Note that FN is 1985 model also demonstrates a similar result. The intuition is that since extending the audit is costly, it makes no sense for the auditor to employ A1 in the first place and then decide to completely ignore the outcomes of the extended audit procedures. In other words, (A1, Q, Q), and (A1, NQ, NQ) will always be dominated by (A2, Q) and (A2, NQ) respectively.

On the other hand, adopting (A1, Q, NQ) seems unreasonable because it implies that the auditor will issue a qualifying (nonqualifying) report when the outcomes of A1 indicate that the client's effort level is E1 (E2) respectively. Based on the result of Lemma 1, the extensive form of the original auditor-client incomplete information game can now be simplified to the new extensive form which is provided in Figure 2.

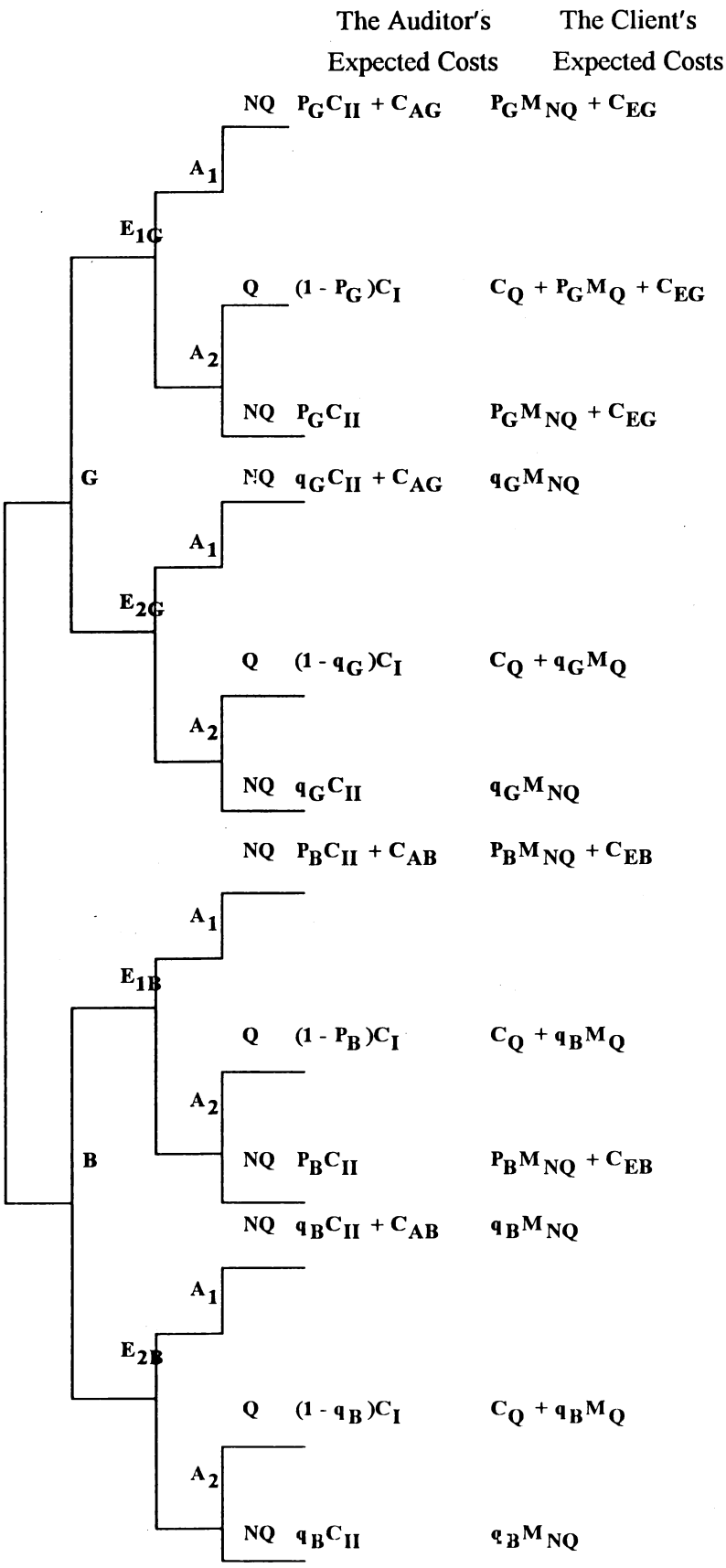
Before proceeding, in this study, based on the client's effort level selection decision, the client is assume to be either a type-blind decision-maker or a non-type-blind decision-maker. The client is said to be a "type-blind" decision maker if and only if the client's choice of effort level is independent of the inherent risk that (s)he is initially endowed with. Meanwhile, the client is said to be a "non-type-blind" decision maker if and only if the client's choice of effort level depends on the inherent risk that (s)he is initially endowed with.

Based on the above definitions, the strategy set of a "type-blind" client will be either {E1G , E1B} or {E2G , E2B}, while the strategy set of a "non-type-blind" client will be either {E1G , E2B} or {E2G , E1B}. Note that due to multiple client types are not allowed, therefore the client of FN [1985] model should be regarded as a type-blind decision maker. Furthermore, Since both multiple client types and "non-type-blind" decision making are allowed for in the proposed auditor-client incomplete information game, the equilibrium concept adopted in our analysis naturally has to be the well-known Bayesian equilibrium solution concept. The following Proposition 1 will analyze how a type-blind client would act in the proposed auditor-client incomplete information game.

Proposition 1: In the proposed auditor-client incomplete information game, if the client is a "type-blind" decision maker, then (A_1, NQ, Q) can never be a pure strategy equilibrium solution of the auditor.

(For the proof, see Appendix C)

Figure 2:The "reduced" extensive form of the auditor-client incomplete information game



The result of Proposition 1 could serve as a formal mathematical proof to the numerical examples of FN Table 6. It demonstrates that the unanticipated results of FN Table 6 (i.e., a high auditing level coupled with the correct qualification decision is never a pure strategy for the auditor in equilibrium) could be driven by the fact that multiple client types are not allowed for in FN's Imperfect information paradigm.

Recall that a second objective of this study is to identify the sufficient condition(s) under which that (A1, NQ, Q) could become an equilibrium solution of the auditor. To do so, the following Proposition 2 is provided.

Proposition 2 : [(E_{1G}, E_{2B}) ; (A_1, NQ, Q)] is a pure strategy equilibrium solution of the auditor-client incomplete information game if all of the following three conditions hold:

(1) $t\,C_{AG} + (1 - t)\,C_{AB} \leq \text{Min}\{t\,(C_I - P_G C_I - P_G C_{II})\,;\,(1 - t)(q_B C_I + q_B C_{II} - C_I\}$

(2) $C_{EG} \leq (C_Q + q_G M_Q - P_G M_{NQ})$

(3) $C_{EB} \geq (C_Q + q_B M_Q - P_B M_{NQ})$

(for the proof, see Appendix D)

Note that (E1G , E2B) implies that the client is "non-type-blind" and employs high (low) effort if (s)he is endowed with good(bad)internal control systems. The result of Proposition 2 states that under some circumstances the "standard" strategy of always work hard and report honestly could be an equilibrium solution of the auditor.

The first condition implies that for the auditor to extend audit procedures (A1), the expected out-of-pocket costs of extending the audit (which is denoted by the LHS term of the inequality) must be less than a certain upper bound (which is referred to the RHS term of the inequality).

The second condition implies that for the "good-type" client to employ high effort (E1G), the expected costs of such an action (CEG) must be less than a certain upper bound (i.e., CQ + qGMQ - PGMNQ).

Finally, the third condition is used to make sure that the expected costs for the

"bad-type" client to employ high effort (CEB) is so high that the "bad-type" client will be better off to choose only the low effort level (E2B).

Now let's analyze the situation in which the non-type-blind client is assumed to employ low (high) while endowed with good (bad) internal control systems respectively.

Corollary 1: [(E_{2G}, E_{1B}) ; (A_1, NQ, Q)] is an equilibrium solution of the auditor-client incomplete information game if all of the following three conditions hold :

(1) $t\,C_{AG} + (1 - t)\,C_{AB} \leq \text{Min}\{t\,(q_G C_{II} - q_G C_I - C_I)\,;\,(1 - t)(C_I - P_B C_I - P_B C_{II})\}$

(2) $C_{EG} \geq (C_Q + q_G M_Q - P_G M_{NQ})$

(3) $C_{EB} \leq (C_Q + q_B M_Q - P_B M_{NQ})$

Note that Condition (1) of Corollary 1 is analogous to Condition (1) of Proposition 2 because the auditor adopts the same strategy (A1, NQ, Q) in both cases. On the other hand, the signs of Conditions (2) and (3) in Corollary 1 are opposite to those in Proposition 2 because the client employs exactly the opposite strategy in both cases. Furthermore, Corollary 1 and Proposition 2 both demonstrate that the "standard" strategy of (A1 NQ Q) can be a pure strategy equilibrium solution of the auditor if certain sufficient conditions are satisfied and if the client is a "non-type-blind" decision maker.

One implication of the results of Proposition 2 and Corollary 1 is that only if the clients is a "non-type-blind" decision maker, the auditor then will have incentive to employ (A1 NQ Q) as a pure strategy in equilibrium. As a matter of fact, the desire to reveal the "non-type-blind" client's private information probably is the driving force for the auditor to employ the standard strategy of extending the audit and reporting accordingly. Furthermore, the fact that "standard" strategy of a high auditing level coupled with the correct qualification decision can become a pure strategy equilibrium solution of the auditor in our auditor-client incomplete information game consists with some well-documented empirical evidence (e.g., Simunic [1984] and Francis and Simon [1987]) which indicates that larger and more successful CPA firms, such as the Big Six, tend to maintain a higher level of audit quality, when providing attest services to clients, than smaller CPA firms.

III.Conclusions and Extensions

3.1 Conclusions

In this study, a stylized model of auditor-client incomplete information game is analyzed to help clear a misunderstanding of FN 1985 imperfect information game: the standard strategy of "extend the audit and issue an opinion accordingly" can never be a pure strategy equilibrium solution of the auditor. The difference between our proposed incomplete information game and the original FN [1985] imperfect information game is that the former allows for multiple client types, while the latter does not.

Two major results of our proposed auditor-client incomplete information game are as follows. Proposition 1 demonstrates that the standard strategy: "works hard and reports truthfully" can never be a pure strategy equilibrium solution of the auditor, if the client's effort decision is independent of his/her type (i.e., the client is a "type-blind" decision maker). Proposition 2 demonstrates that the standard strategy: "works hard and reports truthfully" can be a pure strategy equilibrium solution of the auditor, if the client is "non-type-blind" and if certain sufficient conditions are satisfied.

In sum, this study has demonstrated that if some uncertainty with respect to the client's type is introduced into the original FN [1985] auditor-client imperfect information game, the standard strategy (in which the auditor works hard and reports truthfully) can be a pure strategy equilibrium solution for the auditor.

3.2 Extensions

One limitation of this study is that all auditors are assumed to be identical. In other words, our model ignores the potential effect of auditor types. Without doubt, to capture the essence of auditor-client interactions, the issue of multiple auditor types is just as important as that of multiple client types. Thus the development of auditor-client model, in which not only client types but also auditor types are formally recognized, is crucial to the future research of audit risk assessment.

In addition to allowing for multiple auditor types, another potentially fruitful area of extension to the topic of auditor-client interaction analysis is to allow for dynamic

modeling in which each party could observe the move of its counterpart before determining its own move. As a matter of fact, the result of compliance tests grants the auditor not only the opportunity to reveal the quality of client's internal control systems but also the basis for determining the extend to which audit procedures would be needed. Thus, it seems plausible to model the auditor-client interaction in a dynamic sequential setting in which the concept of signaling equilibrium could be applied.

Finally, even though the game-theoretic approach has provided us a better insight into auditor-client interactions, accounting researchers might want to conduct empirical studies so that theorems derived from game-theoretic models could be further proved empirically and eventually prevail in the accounting profession.

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Appendix B Proof of Lemma 1

Since the proposed auditor-client incomplete information game allows the client's type to be either good or bad, to prove Lemma 1, one needs to consider the following cases.

Case 1 : When the client's type is "good"

- Based on the auditor's payoffs presented in Figure 1, (A_1, Q, Q) is dominated by (A_2, Q) since the following two conditions hold.

  (1) $(1 - P_G) C_I + C_{AG} \geq (1 - P_G) C_I$

  (2) $(1 - q_G) C_I + C_{AG} \geq (1 - q_G) C_I$

- Based on the auditor's payoffs presented in Figure 1, (A_1, NQ, NQ) is dominated by (A_2, NQ) since the following two conditions hold.

  (3) $P_G C_{II} + C_{AG} \geq P_G C_{II}$

  (4) $q_G C_{II} + C_{AG} \geq q_G C_{II}$

- (A_1, Q, NQ) is a dominated strategy for the auditor. This can be shown by contradiction. Let's first assume that (A_1, NQ, Q) is dominated by (A_1, Q, NQ). This implies that the following two conditions must hold.

  (5) $(1 - P_G) C_I + C_{AG} \leq P_G C_{II} + C_{AG}$

  (6) $q_G C_{II} + C_{AG} \leq (1 - q_G) C_I + C_{AG}$

On the other hand, since $P_G < q_G$ (see Section 2.1 Model Assumptions and Notation) conditions (5) and (6) can be rearranged as follows :

$$\{(1 - P_G)C_I + C_{AG}\} \leq \{P_G C_{II} + C_{AG}\} \leq \{q_G C_{II} + C_{AG}\} \leq \{(1 - q_G)C_I + C_{AG}\}$$

This implies $(1-P_G) \leq (1-q_G)$. Thus we have $P_G \geq q_G$ which contradicts the initial assumption that $P_G < q_G$. Therefore, conditions (5) and (6) cannot hold simultaneously.

If condition (5) holds only, then (A_1, Q, NQ) is dominated by (A_2, Q). If condition (6) holds only, then (A_1, Q, NQ) is dominated by (A_2, NQ) Finally, if both conditions (5) and (6) do not hold, then (A_1, Q, NQ) is dominated by (A_1, NQ, Q). Hence one can now conclude that if the client is type G, (A, Q, NQ) is always

dominated by one of the following three undominated strategies (A_2, Q), (A_2, NQ) and (A_1, NQ, Q) .

Case 2 : When the client's type is "bad"

By following the exact same logic, it can be shown that (A_1, Q, Q) and (A_1, NQ, NQ) are dominated by (A_2, Q) and (A_2, NQ) respectively. Furthermore, (A_1, Q, NQ) is always dominated by one of the three undominated strategies.

Consider both Case 1 and Case 2 together, one can now conclude that (A_1, NQ, Q), (A_2, Q) and (A_2, NQ) are the only three undominated strategies of the auditor.

Q.E.D.

Appendix C Proof of Proposition 1

Since the client is assumed to be a "type-blind" decision maker, her/his action can only be one of the following two cases.

- (S)he always adopts high effort (i.e., [E_{1G}, E_{1B}]):

  Since $\{t (P_G C_{II} + C_{AG}) + (1-t)(P_B C_{II} + C_{AB})\} \geq \{t (P_G C_{II}) + (1-t)(P_B C_{II})\}$, from Figure 2 one concludes that (A_1, NQ, Q) is dominated by (A_2, NQ).

- (S)he always adopts low effort (i.e., [E_{2G}, E_{2B}]).

  Since $\{t(C_I - q_G C_I + C_{AG})+(1-t)(C_I-q_B C_I+C_{AB})\} \geq \{t(C_I-q_G C_I)+(1-t)(C_I-q_B C_I)\}$, from Figure 2 one concludes that (A_1, NQ, Q) is dominated by (A_2, Q).

Consider the two cases together, one can conclude that if the client is "type-blind" then (A_1, NQ, Q) is never a pure strategy for the auditor in equilibrium.

Q.E.D.

Appendix D Proof of Proposition 2

Based on the strategic form representation of Table 1, if the client adopts (E_{1G}, E_{2B}) then (A_1, NQ, Q) is the best response of the auditor as long as the following two conditions hold :

(1) $\{t(P_GC_{II}+C_{AG})+(1-t)(C_I-q_BC_I+C_{AB})\} \leq \{t(1-P_G)C_I+(1-t)(1-q_B)C_I\}$

(2) $\{t(P_GC_{II}+C_{AG})+(1-t)(C_I-q_BC_I+C_{AB})\} \leq \{t(P_GC_{II})+(1-t)q_BC_{II}\}$

Rearrange Conditions (1) and (2), we have

(1') $\{t(C_{AG})+(1-t)(C_{AB})\} \leq \{t(C_I-P_GC_I-P_GC_{II})\}$

(2') $\{t(C_{AG})+(1-t)(C_{AB})\} \leq \{(1-t)(q_BC_I+q_BC_{II}-C_I)\}$

From Conditions (1') and (2'), we get

$$\{t(C_{AG})+(1-t)(C_{AB})\} \leq \text{Min}\{t(C_I-P_GC_I-P_GC_{II}) ; (1-t)(q_BC_I+q_BC_{II}-C_I)\} \quad \text{(i)}$$

Since $\{t(C_{AG})+(1-t)(C_{AB})\} \geq 0$, the following two conditions hold.

(3) $\{C_I-P_GC_I-P_GC_{II}\} \geq 0$

(4) $\{q_BC_I+q_BC_{II}-C_I\} \geq 0$

Rearrange Conditions (3) and (4), we have

$$\{P_G(C_I+C_{II})\} \leq \{C_I\} \leq \{q_B(C_I+C_{II})\} \quad \text{(ii)}$$

On the other hand, if the auditor employs (A1, NQ, Q) then (E1G, E2B) are the best responses for the good-type and bad-type client respectively as long as the following two conditions hold.

(5) $C_{EG}+P_GM_{NQ} \leq C_Q+q_GM_Q$

(6) $C_Q+q_BM_Q \leq C_{EB}+P_BM_{NQ}$

Rearrange Conditions (5), (6) we get :

$$\{C_{EG}\} \leq \{C_Q+q_GM_Q-P_GM_{NQ}\} \quad \text{(iii)}$$

$$\{C_{EB}\} \geq \{C_Q+q_BM_Q-P_BM_{NQ}\} \quad \text{(iv)}$$

Hence [(E1G , E2B) ; (A1, NQ, Q)] is a pure strategy for the auditor in equilibrium as long as equations (i), (ii) , (iii) and (iv) hold.

Similarly, follow the same logic of the proof of Proposition 2 one can also show that [(E2G, E1B) ; (A1, NQ, Q)] is a pure strategy for the auditor in the auditor-client incomplete information game.

Q.E.D.

審計之策略考量:不完全資訊競局模型

沈維民*

摘 要

本研究以不完全資訊競局模型的角度來探討審計人員(auditor)和其客戶(client)間的策略性互動。模型中允許「多重客戶類別」(multiple client types)，且假設客戶之類別乃是客戶的私有訊息(private information)。本文的主要結論乃是推翻 Fellingham & Newman (1985, The Accounting Review) 中 「加強審計程序且誠實發佈審計報告」 ("extend the audit and issue the report truthfully "), 不是會計師的純粹策略均衡解 (pure strategy equilibrium solution) 的看法。並証明在合適的條件下, 加強審計程序且誠實發佈審計報告仍是會計師的最佳策略。

關鍵字:審計人員, 客戶, 客戶類別, 不完全資訊競局, 純粹策略均衡解

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