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Tax treatment uncertainty and the IRS individual rulings program—a comprehensive analysis

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Stanford University, 1990

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TAX TREATMENT UNCERTAINTY AND THE IRS INDIVIDUAL
RULINGS PROGRAM - A COMPREHENSIVE ANALYSIS

A DISSERTATION

SUBMITTED TO THE GRADUATE SCHOOL OF BUSINESS

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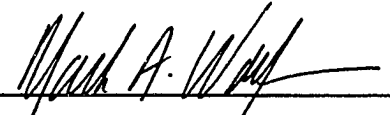FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

By

Eunsang Lee

November 1989

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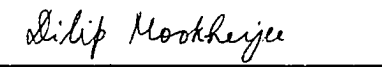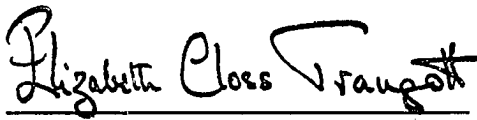
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ABSTRACT

The inherent ambiguity in tax law results in numerous disputes and costly litigation between taxpayers and the IRS. The individual rulings program may reduce the disputes and the informational gap between these two parties. Despite various benefits associated with the rulings program, the IRS publishes a list of areas in which individual rulings will not be issued ("no ruling" areas). This study is a formal attempt to provide explanations for why the IRS may wish to limit the scope of the individual rulings program.

I represent the taxing process as a noncooperative game with incomplete information. Like recent contributions to the literature on income tax compliance, a game-theoretic construct is used to capture the strategic interactions between the IRS and the taxpayer. Unlike other models of the taxing process, factual and legal uncertainties about the application of tax law are explicitly modeled.

Introducing the IRS into game-theoretic models requires the specification of both the actions available to the IRS and the tax enforcement agency's preferences with respect to those actions. This dissertation sets up two models to explain why the IRS may prefer not to issue rulings in some areas of taxation.

The first model is based on the assumption that the IRS is a net revenue maximizer. In this model, the individual rulings program is viewed as an imperfect screening device which brings about savings on auditing costs and alleviates the problem of information asymmetry. Both the taxpayer and the IRS think of the tax liability as a random variable since the court has the final say on how much the taxpayer owes the government. Because using the court to resolve differences of opinion is costly to both parties, pretrial bargaining takes place in a natural fashion and occupies center stage of the first model. To preclude noncredible threat equilibria , the sequential equilibrium concept is employed.

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The conclusion of the first part is that the IRS may not offer the individual rulings program to discourage the taxpayer from undertaking tax-favored projects and that this incentive not to issue rulings becomes stronger as explicit tax savings and audit costs to the taxpayer get larger. This, however, may not be a socially desirable strategy for the IRS to pursue. The tax system is designed not only to raise funds to finance government expenditures but also to achieve various social goals such as redistributing income and subsidizing a variety of economic activities. Congress has created tax preferences to encourage investment in projects that would otherwise not be undertaken. One implication of the first model is that if the IRS is motivated to maximize net revenue, the agency may discourage precisely the transactions that Congress wishes to encourage.

The IRS is supposed to do more than simply protect the revenue, however, and this leads to my second model. The IRS is an important policy maker in the tax system and Congress has made taxpayers increasingly dependent on administrative implementation of the tax law. The IRS officials have emphasized that the agency has no pro-revenue bias and is interested in fair and sound tax administration. The individual rulings program seems to provide an excellent opportunity for more effective administration of the tax law. For example, if there is a doubt that the proposed transaction of the taxpayer is one to which Congress intended to attach favorable consequences, the IRS may rule unfavorably and take an aggressive position to discourage the transaction from being consummated.

My second model is based on an alternative behavioral assumption about the IRS. In this model, the IRS is assumed to maximize an alternative measure of social welfare. Here the IRS is viewed as caring about the types of investment projects that are undertaken for reasons other than their direct tax revenue consequences. This model explores whether such a social-welfare maximizing IRS would exert an indirect influence upon the size of certain segments of the economy by use of the "no ruling" device. The conclusion is that the IRS' refusal to rule is consistent with social welfare

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maximization. This suggests that we can view the individual rulings program not only as an information source of the IRS but also as a fiscal policy tool to encourage socially desirable investment and to discourage socially wasteful activities.

ACKNOWLEDGEMENTS

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I am deeply indebted to my family. This dissertation could not have been completed without the financial and emotional support from my parents and wife. Throughout my graduate studies, they have shown their concern and interest. This work is dedicated to them.

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INTRODUCTORY REVIEW

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"Actual participation in the taxing process is quite different from reading about the myriad

existing tax rules. Books on taxation usually describe it as a series of apparently sterile rules of 'if

A, then B' variety. The reader is tempted to conclude that taxation consists only of learning and

impartially applying all of the many rules. Any reasonable exposure to the real process of taxation

will quickly dispell that notion. Taxation is in fact a very dynamic process of interaction among

people. Tax rules are made, interpreted, and administered in minutely different situations by unique

humans who work with a very imprecise language."   Sommerfeld [1983] p. 348

1.1. Introduction

In the self-reporting system of taxation, the taxpayer faces two kinds of uncertainty.

The first kind of uncertainty arises because failure to report one's full taxable income does

not automatically provoke a reaction in the form of a penalty. If reporting true income is

not a matter of principle and the probability of detection is less than one, an honest income

tax return is only one possible return considered by a taxpayer. Given the tax and penalty

function and the probability of detection, it may be optimal for the taxpayer to declare less

than his actual taxable income. In that case, his payoff will depend on whether or not he is

investigated by the revenue authority. Early modeling studies on tax evasion were

concerned with the effects of this kind of uncertainty.

To the taxpayer's frustration, he may not know with certainty how much his taxable

income is. Owing to the complexity and ambiguity of the tax rules, this sort of uncertainty

arises in many real situations. Without due notice, the rules can be rewritten or reinterpreted

to the advantage (or disadvantage) of the taxpayer. In the 1960s and 1970s nearly a dozen

significant tax reforms were made, and in this decade alone there has been major changes in

the tax law almost every year. Difficulties in interpreting the existing law also introduce uncertainty. Such uncertainty exists, for example, since courts in different jurisdictions may issue conflicting rulings or the taxpayer's particular situation is not the same as the one covered in previous court decisions. The taxpayer may be able to argue successfully that a particular situation is (or is not) within the meaning of certain statutory words and that, therefore, rule A rather than rule B ought to apply. The same is true of the IRS. There is a huge area of confusion and dispute about the tax consequences of a given course of action.

Tax treatment uncertainty or uncertainty about tax liability is a double-edged sword. On the one hand, it imposes tax risk on the taxpayer, if his transaction has complex tax features. Even when the taxpayer is a habitual complier and his deal is legally sound, his tax return might not be accepted as reported. On the other hand, factual and legal uncertainties about the application of the tax law provide ample opportunity for a knowledgeable and resourceful taxpayer to avoid taxes. If there is a "reasonable basis" that the taxpayer's position would be upheld in court, all that the taxpayer risks is the possibility that the tax avoided will have to be repaid with interest and small negligence penalties.[1] The focus of this thesis is on the consequences of tax treatment uncertainty in a strategic setting.

One way for the taxpayer to resolve the tax treatment uncertainty is to request an advance ruling from the IRS. An individual ruling is a written statement of the IRS position concerning the tax consequences of a "proposed" transaction.[2] Although it would be an overstatement to call an individual ruling tax insurance, one of the purposes of the program is to provide taxpayers with a measure of certainty before they engage in transactions that might later lead to tax problems. There is, of course, a risk in requesting the individual ruling. To obtain a reliable ruling, the taxpayer should submit a comprehensive statement of relevant facts and points of law. Although an advance ruling serves to eliminate doubt with respect to the tax treatment of a particular issue, the information about related issues contained in the request may cause the IRS to raise

questions about tax consequences of other parts of the taxpayer's transaction. The IRS has been known to issue adverse rulings on related matters, even though such matters were not incorporated in the original ruling request.

Since the individual ruling can head off potential conflicts, the IRS shares the benefit in terms of reduced audits costs, disputes, and litigation. Moreover, the rulings program is an important information source of the IRS. The information provided by the taxpayers helps the IRS determine the latest transactional developments, including what "gimmicks" are being attempted by tax experts. This research examines the incentives of taxpayers and the IRS to resolve uncertainty due to ambiguous existing tax rules through the individual rulings program.[3]

The IRS has produced, for over thirty years, the tax rulings that give to taxpayers reliable guidance with respect to the tax treatment of their prospective transactions. Since the IRS is the tax collector and the taxpayer's adversary in tax litigation, it seems natural for the taxpayer to seek the Service's advance stamp of approval. Though many administrative agencies offer pretransaction guidance (e.g., "railroad releases" by the Department of Justice)[4], in no other agency has this function assumed such major proportions, in terms of time and staff, or come to be relied upon by the public to such an extent as the Revenue Service's rulings program.[5] Both the IRS and the court recognize that although the rulings program directly affects only a small percentage of taxpayers, it has a broad impact on the national economy and on proper and reasonable tax administration.[6]

Although it is a stated policy of the IRS to answer taxpayer inquiries, the IRS also publishes a list of areas in which individual rulings will not be issued ("no ruling" areas). In recent years, the IRS has updated the list annually. In view of the complex tax laws, taxpayers frequently hesitate to undertake important business transactions without some official assurance of their tax consequences. The IRS' refusal to rule may lead to the total abandonment of some proposed transactions.[7] If the rulings program is beneficial to both taxpayers and the IRS, why would the IRS want to limit the scope of the program? Except

for a few cases (e.g., where pending suits are involved), inspection of the "no ruling" areas does not suggest plausible reasons for restricting the scope of the rulings program. This study was inspired by a research question raised by Mark Wolfson: "Why does the IRS agree to make private rulings in some cases but not in others?"[8]

1.2. Review of Relevant Literature

Since the seminal paper by Allingham and Sandmo [1972], much attention has been paid to the tax declaration problem. Until quite recently, the typical theoretical approach was to model tax reporting as a portfolio problem, deriving the optimal consumption of risky unreported income under the assumption of "fixed" detection and penalty parameters. In this decision-theoretic framework, taxpayers take the tax structure, enforcement efforts, and punishments as given. They know their tax payments due under the law, but may intentionally understate their taxes if the resulting benefits exceed the expected costs of detection.

Early modeling exercises such as Srinivasan [1973], Yitzhaki [1974], and Koskela [1983] fall into this category and their attention has been focused on the likely response of taxpayers to changes in these parameters. Although most of these models yield interesting comparative statics results, they depend on assumptions that have been criticized.[9] For example, the IRS is viewed as a mechanical revenue collection process, although a rational and resourceful IRS seems to be a more compelling behavioral assumption. Yet another example is the assumption that taxpayers have perfect *ex ante* information about their tax liabilities. Given the complexity and ambiguity of the tax law, it seems more reasonable to assume that tax assessments are random.[10] When both taxpayers and the revenue authority have uncertainty about tax liabilities, it is difficult to interpret the results of these early studies on tax evasion since in the absence of a correct tax liability, the standard against which taxpayers' reports can be evaluated is ambiguous.

More recent models have relaxed certain key assumptions to increase realism. For example, Scotchmer [1988], and Scotchmer and Slemrod[1989] explicitly incorporate uncertainty about tax liabilities and examine how taxpayers respond to varying degrees of uncertainty about tax liabilities. They show, under the assumption of a net revenue maximizing IRS, that greater uncertainty about tax liability generally creates incentives for taxpayers to increase reported income and, as a result, enhances revenue collected.[11] Alm [1988] analyzes the effects of uncertainty about individual income tax policies on taxpayers' behavior and social welfare. His principal finding is that increased uncertainty has substantial allocative effects on the decisions to invest in tax shelters, to underreport one's income, and to trade off leisure against income. This conclusion is hardly surprising. A secondary, but more interesting, result is that under some plausible restrictions on taxpayers' preferences, tax uncertainty may increase tax revenues and, therefore, the government will be able to change tax rates so that social welfare increases, despite the presence of greater uncertainty. This result is reminiscent of the analysis of Weiss [1976] and Stiglitz [1982] which determines the conditions under which random taxation leads to a Pareto improvement in a one-consumer economy. These authors note that tax evasion increases the uncertainty of future income since the taxpayer either avoids an audit and successfully evades the tax or gets caught and must pay a penalty in addition to the underpayment. For some utility functions, this extra source of uncertainty creates an incentive for the taxpayer to work harder than otherwise. As a result, efficiency gains from the increased labor supply may more than offset the costs of the greater uncertainty to risk-averse taxpayers.

All of these studies, however, have assumed that taxpayers view the audit probability as fixed with respect to the amount of taxes declared. Since a taxpayer is required to file a tax return which is a preliminary accounting of their behavior, tax evasion is different from other criminal activites. This preliminary round of information transmission may differentiate taxpayers and enable the IRS to condition the probability of audit on the

information contained in the tax return. Because the strategic interaction between IRS policies and taxpayer reporting behavior is ignored, the limitations of these decision-theoretic exercises are obvious.

Thanks to the development of information economics and game theory, many researchers have been able to construct models in which the IRS acts strategically under conditions of asymmetric information. One branch of research along this line is a so-called principal/agent model in which the tax authority is designated the pricipal and the taxpayer the agent. In this model, the government is assumed to play the role of a Stackelberg leader in choosing the tax structure and audit policy which taxpayers take as given in deciding what levels of taxable income are to be reported. Reinganum and Wilde [1985], Border and Sobel [1986], and Mookherjee and P'ng[1986] have studied the optimal choice of tax code, penalty structure, and audit policy when fines cannot exceed income and the tax authority can bind itself to an enforcement strategy. This formulation permits the enforcement agency to adjust its enforcement action in light of the information contained in a taxpayer's report, and thereby treats IRS behavior as endogenous to the model. The solutions computed in these models, however, require the government to announce and commit to an audit policy before receiving tax returns. This audit policy suffers from credibility problems since it will typically prove suboptimal once tax returns are filed. Subsequent to the submission of tax reports, the government has an incentive to deviate from its announced policy. As a result, taxpayers will anticipate such deviations and will not believe the previously announced policy.

To alleviate the credible commitment problem, Melumad and Mookherjee [1987] have suggested that audit decisions be delegated to an independent auditor whose rewards are based on gross revenue and the deviation of aggregate audit costs from prespecified budgets. They have shown the existence of contracts that enable the government to delegate taxing authority to a third-party auditor as a means of commitment to optimal audit policy. Since delegation schemes involve commitment to the use of pure strategies and are based

on publicly-observable variables, the credibility of the government's policy is enhanced. However, the government still must commit to allowing the auditor sufficient discretion and to not reneging on the preannounced contract with the auditor and, therefore, the concern about credible commitments is not completely eliminated.

The other approach taken in the literature follows the natural temporal sequence of decisions and requires that the government's audit policy be a best response to the taxpayer's reporting behavior. Under this approach, noncredible commitment is not permitted. Reinganum and Wilde [1986], Beck and Jung [1989b], and Graetz et al. [1986] fall in this category and employ sequential equilibrium (Kreps and Wilson [1982]) as the solution concept. The problem with these models is how to specify the objective of the revenue authority. The conclusions of these game-theoretic models are dependent upon the specification of the enforcement agency's objective, but it is not clear what the appropriate assumption regarding the objective function for the agency is. Furthermore, still missing in these models are important institutional and legal constraints that prevent the IRS from applying what otherwise appears to be theoretically desirable.

Graetz and Wilde [1985] review the current state of theoretical and empirical findings regarding tax compliance and allude to the importance of institutional and legal constraints in understanding the tax reporting process. Neither criminal sanction nor even a civil fraud penalty can be imposed unless the IRS proves, beyond a reasonable doubt, that the tax understatement was willful. Proving that a tax understatement was deliberate behavior is extremely difficult and, as a practical matter, the criminal sanction is ineffective for all but a very few cases. Regardless of any potential economic advantage, life imprisonment is simply not in the feasible set of punishments for tax evasion. Differences in individual circumstances are supposed to be taken into account and strong rights of appeal are provided as a protection against arbitrary application of the law. An economic analysis of the tax declaration problem should take into account such institutional constraints on the level of punishments and detection.

1.3. Preview of Analysis

The models presented here are designed to capture the following institutional features. The tax law is too ambiguous to indicate clearly how a particular transaction is to be taxed. The taxpayer has superior, though not perfect, information about the tax implications of his own transaction. He is also willing to take advantage of tax rule uncertainty because of insufficient penalties and/or ineffective auditing. The IRS has trouble distinguishing abusive tax cases from legally well-prepared ones. The potential disputes between the taxpayer and the IRS due to ambiguities in the tax law can be resolved by having a binding ruling *ex ante,* or by appealing to the court *ex post.*

The main purpose of this thesis is to investigate incentives for the IRS not to rule in a strategic setting with the institutional features outlined above. I incorporate infomation asymmetry issues into a model of the taxing process and represent the taxing process as a noncooporative game of incomplete information. In Chapter 3, I incorporate into the model factual and legal uncertainties about the application of the tax law. This is accomplished by modeling both the taxpayer and the IRS as viewing the tax liability as a random variable. Neither party is assumed to be able to make a credible commitment to a particular strategy. The court has the final say on how much the taxpayer owes the government. Using the court to resolve differences of opinion is costly for both parties, and this provides incentives to engage in pretrial bargaining to reach an agreement.

As mentioned before, the rulings program provides valuable information about taxpayers. Since the factual and legal requirement of the individual ruling inevitably reveals strengths and weaknesses of the taxpayer's position, one can think of the rulings program as an imperfect screening process. Under the assumption that the IRS maximizes revenue net of audit costs, Chapter 3 shows that the IRS might prefer not to have such a screening device even if it were free.

The IRS is often accused of using the no-ruling device as a weapon to discourage transactions to which the agency is hostile but to which the tax law attaches favorable tax consequences.[12] This begs the question of why the IRS is hostile to a certain type of transaction. The results of Chapter 3 suggest that this hostility is due to potential revenue losses. But is that the only reason? Since we do not know, for sure, what the objective function of the IRS is, we do not have a definite answer to this question. Aside from the IRS rhetoric that the agency's objective is not to maximize the amount of collected revenue, but instead to assure fair and consistent application of the tax law, the Service may be naturally concerned with implementing the legislative intent of Congress since its performance is continually monitored by Congress. To analyze incentives for the IRS to not rule under such circumstances, in Chapter 4, I specify a broader objective that the IRS seeks to achieve. It is shown that even a social welfare maximizing IRS may refuse to rule and the no-ruling policy can be a fine-tuning tool for fair and effective application of the tax law.

Footnotes

1. If a taxpayer substantially understates income tax for any taxable year, a monetary penalty equal to 20% of the understatement and interest thereon can be imposed. In this substantial understatement case, the taxpayer's position should be supported by "substantial authority," a higher standard of proof than a "more likely than not" standard. See Regulation Sec. 1.6661-3 (2), IRS Income Tax Regulation, March 1989.

2. Following the usual convention, I will use the terms, individual ruling, private ruling, and letter ruling, interchangeably. As will become clear, the IRS may not be sure of the tax consequences either. The important point is that the parties have the chance to agree on the tax treatment, ex ante. For more institutional details, see Chapter 2.

3. There are other ways to insure against unfavorable tax treatment. Purchasing professional legal opinions provides partial insurance against adverse changes in tax status. Another form of insurance available to individual taxpayers is audit insurance policies which have been offered by a few insurance companies. These institutional arrangements deal with uncertainty over the existing rules. As mentioned before, one's tax liability may also be uncertain because of unexpected legislative changes in the tax law. Scholes and Wolfson [1990] discuss ways of insuring this uncertainty.

4. A railroad release represents the Justice Department's position in an antitrust case. This decision is issued to a prospective scheme with potential antitrust implications and the procedural framework is similar to that of the individual rulings.

5. Cited from Goodman [1964], pp 81-82. He provided 1964 data to show the significance of resources allocated to the rulings program. The Tax Ruling Division was functionally divided into ten branches with a staff of 428. The IRS publishes its Annual Report and one can see the significance that the ruling function assumes. Almost every year, more than 30,000 individual ruilngs have been issued. For details on informal guidance procedures of other administrative agencies, see references in Goodman [1964], footnote 1.

6. See Technical Information Release 610 [1964], *Goodstein v. Commissioner* (1959), and *International Business Machines Corp. v. United States* (1965).

7. For an example of transactions permanently discouraged due to the no-ruling policy, see the article on Warwick Fund in Journal of Taxation, Oct. 1963.

8. Cited from Wolfson [1981], p.212.

9. Lewis[1982] and Schmidt and Witte [1984] citicized these models as too simplistic to capture the tax evasion decision. Pencavel [1979] relaxed the assumption of a linear tax schedule and introduced the work/leisure decision to the analysis of tax evasion. He concluded that previous analytic results are sensitive to restrictive assumptions.

10. Taxpayers' perception that tax assessments are random was documented in the survey conducted by Yankelovich, Skelly and White, Inc. [1984].

11. This result corroborates the intuition of Roberts [1979], who argued that uncertainty about tax liability would ensure conservative decision-making by risk-averse taxpayers and therefore may be preferable to a revenue-maximizing IRS, compared to the alternative of having explicit rules for every possible situation. Beck and Jung [1989a] also investigate the effects of uncertainty about tax liabilities on taxpayers' behavior. They rely on different modeling assumptions, and their results are somewhat mixed. Their major finding is that greater tax liability uncertainty may or may not increase reported income, depending on the parameters of the model including taxpayer risk-taking attitudes, penalties, and the perceived audit probability.

12. See Wormser [1964]

CHAPTER TWO
INSTITUTIONAL BACKGROUND ON THE RULINGS PROGRAM

2.1. Definition

An individual ruling is a written statement issued to a taxpayer by the National Office of the IRS that interprets and applies the tax laws to a specific set of facts.[1] Rulings are issued in a private letter reply to a specific request by the taxpayer. The IRS issues rulings only on actual (rather than hypothetical) transactions which are proposed or have been completed prior to the filing of tax returns. The Internal Revenue Code explicitly makes such rulings a prerequisite to certain types of transactions and even if a letter ruling is not required by law, it is frequently a practical necessity.[2]

Individual rulings which are of both sufficient importance and general interest may be published as Revenue Rulings. Although the primary source of Revenue Rulings is the individual ruling, a Revenue Ruling is different, both in form and in substance, from an individual ruling dealing with the same subject matter. An individual ruling consists essentially of a detailed recital of the relevant facts followed by a statement of conclusions. The rationale and reference to authorities is directed to what is necessary to support the specific conclusion, and no attempt is made to formulate specified decisions into a stated principle or rule. On the other hand, when an individual ruling is processed for publication as a Revenue Ruling, extensive editing is necessary and a thorough examination of the facts are made so that all relevant facts may be stated accurately. Names and detailed descriptions are revised to protect the identity of the party which requested the individual ruling. Consideration is given to all the possible situations which might fall within the basic framework of the ruling and necessary distinctions and limitations are drafted to insure the proper application of the ruling to other cases with similar facts. A Revenue Ruling is an

official interpretation by the Revenue Service that is published in the Internal Revenue Bulletin.[3]

The rulings program is said to be advantageous to both the government and the taxpayer. The benefits for taxpayers generally include:

(1) Advance knowledge of the IRS position, which enables taxpayers to determine whether to consummate a proposed transaction;

(2) Choice of a course of action which will avoid further controversy and litigation with the IRS on the transaction;

(3) Assistance in properly reporting the transaction once consummated; and

(4) Advance arrangement of the details and plan of the transaction to assure an orderly consummation of the plan.

The rulings program is not a one-way street and the IRS receives its share of benefits. Among these are:

(1) Advance rulings may reduce the volume of litigation or the number of disputes with revenue agents which would otherwise result;

(2) The rulings programs constitute a source of valuable information to the IRS by keeping it aware of transactions which are being consummated or considered by taxpayers;

(3) The work of the IRS agent is simplified; he needs only verify that the facts of the consummated transaction correspond to the facts in the ruling; and

(4) A high degree of uniformity in the application of the law and the regulations can be attained.

2.2. Evolution of the Present Program

The desirability of issuing advanced rulings on the tax treatment with respect to prospective transactions was first recognized by Congress in 1938 when it passed a statute providing for "closing agreements."[4] This device was a formal contractual arrangement

under which the Commissioner of the IRS promised to tax the transaction in an agreed-upon manner, and the taxpayer promised that the facts would not change from those specified in the agreement. What Congress did not foresee was that a rulings procedure involving pending transactions must be expeditious and devoid of cumbersome formalities to be useful. Though seldom used,[5] the closing agreement does represent public and legislative recognition of the desirability of advance guidance.

In 1940, after the drawbacks of the closing agreement became apparent, the IRS initiated the individual rulings program under which requests for rulings were treated as potential requests for closing agreements. The informal letter in reply to the taxpayer's request indicated what the IRS would do if the taxpayer requested a formal closing agreement. That state of affairs continued until 1953 when the IRS formally announced the existence of the individual rulings program.[6] In 1954 the Commissioner announced his policy of considering himself bound by rulings issued, thereby rendering explicit what had obtained in practice (Rev. Rul. 54-172).

The procedural framework in which the rulings program operates, as well as the areas in which advance rulings will be issued, is formulated by the Commissioner and published in the form of Revenue Procedures. The Commissioner derives general authority to issue rulings under section 7805(a) of the Revenue Code, which vests descretionary authority in the Commissioner to provide all rules and regulations deemed necessary for the enforcement of the Code. Within this broad authorization, periodic changes in the procedures have occurred.

2.3. When a Ruling Will (Will Not) Be Issued

The issuance of an individual ruling by the IRS depends upon three factors: (1) the area of tax law involved; (2) the status of the transactions to be ruled upon (whether completed or merely proposed); and (3) whether a return has been filed for the year in which the

transactions occurred. In estate tax matters, the IRS will issue rulings on transactions affecting the estate tax of a decedent, provided that the estate tax return has not been filed. The IRS will not rule, however, on estate tax matters relating to property or the estate of a living person. With regard to income tax matters, the Service will issue rulings on prospective transactions and on completed transactions before the return is filed. Rulings will not ordinarily be issued, however, if the identical issue is present in a prior year return of the taxpayer that is under examination or audit.

Although the taxpayer might desire advance assurance of the tax consequences of all transactions, and while it is a stated policy of the IRS to answer taxpayer inquires, there are certain areas in which the IRS will not issue advance rulings ("no ruling" areas). Since 1960, the IRS has released formal pronouncements concerning both specific and general "no ruling" areas.[7] The "no ruling" list can be divided into three basic categories: (1) where the matter is inherently factual (e.g., questions of whether a corporation has unreasonably accumulated its surplus, the reasonableness of corporate officers' salaries, and the market value of property) ; (2) where the Commissioner's position is unsettled (e.g., where the IRS is awaiting judicial guidance as in a pending suit); and (3) where the Commissioner's concept of "sound tax administration" dictates that he not rule.[8]

2.4. Reliance and Revocation [9]

To get a relevant and informed response from the IRS, a taxpayer should provide a comprehensive statement of facts, the points of law to be covered in the ruling, and documentation of relevant authorities to support the desired ruling.[10] The individual ruling may be relied upon only by the taxpayer who has actually requested and received it.

A ruling represents the current opinion of the IRS on the tax consequences of a particular transaction with a given set of facts. Since individual rulings are instituted by administrative action, they do not have the force and effect of law and are not immutable.

As a theoretical matter, therefore, if an individual ruling is found to be in error or no longer in accord with the position of the IRS, the Commissioner may revoke or modify the ruling retroactively whether or not the taxpayer has relied upon it. As a practical matter, however, the Commissioner considers himself bound by his rulings and revocation or modification will be retroactive only under certain clearly defined and well-publicized circumstances.[11] The Commissioner permits taxpayer reliance on individual rulings even though they may not be legally binding. However, it must be emphasized that only the taxpayer to whom the individual ruling is addressed is entitled to rely on it. This policy of the Service to limit reliance upon individual rulings to the recepient of the ruling is supported by numerous court decisions. Still, the rulings clearly provide guidance to other taxpayers facing similar situations.

2.5. Public Disclosure of Individual Rulings

Individual Rulings of the IRS have been denied public disclosure since the program's inception in 1938. This practice was based on the contention that the rulings were a form of tax return (and therefore confidential information), the disclosure of which is specifically prohibited by the Internal Revenue Code.[12] The individual ruling was a private deal between the taxpayer and the IRS. This position was successfully challenged by taxpayers as being in violation of the Freedom of Information Act.[13] Due to this litigation, the Tax Reform Act of 1976 inserted new provisions that compels the IRS to make available to the public such communications to private taxpayers. Newly enacted Section 6110 of the Code requires that the text and background file documents relating to written determinations of the IRS be open to public inspection once identifying details and certain confidential information have been deleted.[14]

As mentioned before, individual rulings do not have the effect of law and cannot be used as legally binding precedents, although they provide guidance for taxpayers engaging

in similar transactions. Since all individual rulings are now placed in the public domain, taxpayers may look to those rulings for clues to possible rulings on a particular issue. In fact, tax experts follow closely these IRS decisions through a variety of reporting services such as that offered by Commerce Clearing House or through data bases such as News Net and Westlaw. In spite of the IRS's repeated emphasis that the law does not permit individual rulings to be used as precedents, attorneys and a few judges have begun referring to individual rulings in tax cases, though they carefully avoid citing the rulings as precedents.[15]

The precedent issue coupled with public disclosure of individual rulings irritates the IRS, and former Commissioner Egger has warned that if the frequency with which private rulings are cited in court decisions continues, the IRS may have to take action to require that individual rulings go through a higher level of review which would cause delays and limit the number of rulings issued. For the individual rulings program to be effective, the Service must be prepared to rule not only on the black and white areas but also on those questions which fall within the gray areas. Unlike Revenue Rulings which are issued after a through review, most individual rulings are "signed off by the first-line supervisor who is familiar with only small segments of Revenue Code."[16] Because of this limited review in the National Office, individual rulings may turn out to be wrong. If individual rulings are granted the status of legal precedents, IRS officials have argued that the entire rulings program could grind to a halt.[17]

Footnotes

1. Revenue Procedure 72-3, Sec. 2.02,. 1972-1 C.B. 698.

2. Examples of the mandatory areas (in which the taxpayer is required to apply to the Commissioner for a ruling) include (1) application for change in accounting period, (2) application for change in accounting method, and (3) the imposition of tax on transfers of stock or securities by a domestic individual or entity to a foreign entity. For more details, see Norwood et al. [1987].

Although not specifically required by the statutes, there are many transactions for which an advance ruling is almost automatically requested. For example, a request for ruling is usually made with respect to the tax consequences of corporate reorganizations and liquidations. As a general rule, Taylor [1963] suggests that an advance ruling should be requested for any transaction with potentially disastrous tax consequences, although this advice is overly simplistic.

3. Rev. Proc. 72-3, Sec. 2.06.

4. Revenue Act of 1938, Ch. 289, Sec. 801, 52 Stat. 573. For the early history of the rulings program, see Caplin [1962].

5. For fiscal year 1963, there were two requests made for closing agreements and two such agreements were consummated. In fiscal year 1964, the IRS received requests for only four closing agreements as compared with 40,000 requests for private rulings. See IRS Annual Reports.

6. Revenue Ruling 53-10, 1953-1 C.B. 488.

7. Rev. Proc. 60-6, 1960-1 C.B. 880.

8. For examples of each category, see Goodman [1964] or Norwood et al. [1987].

9. This subsection is based on Rogovin [1965].

10. Because of this requirement, even a routine request costs $10,000 to $25,000 on average and some requests, especially those involving complicated multinational

corporate reorganizations, can be much more costly . For additional information and representations required by the IRS, see Rev. Proc. 72-3.

11. This position was first announced in Rev. Rul. 54-172, 1954-1. C. B. 394. The clearly defined and well-publicized circumstances include: (1) when there has been a misstatement or omission of material facts; (2) when the facts subsequently developed are materially different from the facts upon which the ruling is based; (3) when there has been a change in the applicable law; (4) when the ruling was originally issued with respect to a prospective or proposed transactions; and (5) when the taxpayer acted in good faith in reliance upon such ruling and the retroactive revocation would be to his detriment.

12. See Internal Revenue Code Secs. 6103 (a) (1) and 7213 (a) (1).

13. *Tax Analysts and Advocates v. Internal Revenue Service*, 505 F. 2d 350 (D.C. Cir. 1974), 34 AFTR 2d 74-5731; *Freuhauf Corporation v. Internal Revenue Service*, 522 F. 2d 284 (6th Cir. 1975), 36 AFTR 2d 75-5089, vacated and remanded by the Supreme Court, 425 U.S. 1085 (1977), 39 AFTR 2d 77-761. The arguments for public disclosure are summarized in Rogovin [1965]. For more detailed legal discussion, see Reid [1972] and Oran [1973].

14. Written determinations are specifically defined as rulings, determination letters, or technical advice memoranda. A determination letter is a written statement issued by a District Director in response to a written inquiry by a taxpayer that applies to the particular facts involved, the principles, and precedents previously announced by the National Office. The principal usage of determination letters today involves qualification of employee pension and other plans under Sections 401 and 405 of the Code. Technical advice is guidance as to the interpretation and proper applications of the tax laws and regulations to a specific set of facts. It is furnished by the National Office upon request of a district office in connection with the examination of a taxpayer's return.

Background file documents include the request for a written determination, any written material submitted in support of the request, and any related communication between the IRS and persons outside the Service.

15. For examples of private rulings being cited in court cases, see Emory et al. [1982].

16. Belluck [1985], quoting O.J. Sebastian, deputy associate chief counsel for the Service's technical division.

17. C. Morgan III, an associate chief counsel at the IRS is quoted in Andresky [1985] to say, "Instead of having just a group chief sign off a ruling, it would have to be approved by a section chief, a superior level division chief, the Chief Counsel's Office, the Commissioner himself, and then the Treasury Department."

CHAPTER THREE

TAX TREATMENT UNCERTAINTY AND THE INDIVIDUAL
RULINGS PROGRAM - REVENUE MAXIMIZING IRS

3.1. INTRODUCTION

"The tax effects of a man's economic behavior are a determinant of his actions both
in choosing among alternatives and in deciding whether or not to proceed with a
pending transaction. Yet, the Internal Revenue Code is so complex and comprehensive
that it is often impossible for tax counsel, let alone laymen, to predict the tax
consequences of transactions. The uncertainty engendered by these business facts of life
represents a disruptive factor in economic planning and, occasionally, can cause the
total abandonment of the proposed transaction."   Goodman(1964) p. 81

Tax laws are characterized by ambiguity and uncertainty. It is in a constant state of
flux, and the number of rules is ever increasing. Over the past decades, legislative
uncertainty has become the rule rather than the exception. Even when the statutory law
remains the same, reinterpretation by the IRS and by the courts may bring about significant
changes in the tax treatment of a given course of action. The subjective and inconsistent
application of judicial doctrines is another familiar feature.[1] The inherent ambiguity in the
tax laws results in numerous disputes between the taxpayer and the IRS and gives rise to
the active involvement of the courts to resolve the disputes.

One way to resolve tax treatment uncertainty is to ask the IRS for an advance binding
decision called an individual ruling. Individual rulings are issued by the IRS National
Office in response to requests for a determination of the tax consequences of contemplated
transactions. Although individual rulings are desirable because of the tax certainty they
provide, there are risks in requesting the advance rulings. In order to obtain a reliable

ruling, the taxpayer should provide a comprehensive statement of the relevant facts and points of law. Aside from the fact that a routine request costs $10,000 to $25,000 in professional fees to meet the factual and legal requirements, it is possible to receive unfavorable responses from the IRS. When the possibility exists of unfavorable issues being raised, a ruling request may serve merely to alert the IRS to the questionable treatment. If the taxpayer kept silent and went ahead with his plan, the IRS might not pursue potentially unfavorable issues.There is a tradeoff between early resolution of tax treatment uncertainty and the leakage of the taxpayer's private information.[2]

The taxpayer is not the only beneficiary of the individual rulings program. As mentioned in Chapter 2, IRS officials claim that it provides them with several advantages: the promotion of efficient and economical voluntary compliance; greater uniformity in the application of the law through centralized interpretation; the provision of information to the IRS, in advance of audit, as to the types of problems that are likely to arise; simplification of examining agents' work; and finally, a decrease in the amount of litigation that would otherwise result. Despite these alleged benefits, the IRS refuses to rule in certain areas of taxation. In this chapter, I analyze the incentives of taxpayers and the IRS to resolve tax treatment uncertainty through a pre-transaction binding individual rulings in a strategic setting.

Recent literature on the strategic interaction between the taxpayer and the IRS in the context of tax administration has been divided into two distinct approaches. One approach uses the pricipal/agent model in which the government moves first by committing to a particular enforcement policy. The other approach represents the taxing process as a noncooporative game of incomplete information and employs sequential equilibrium (Kreps and Wilson [1982]) as the solution concept. I adopt the second approach, assuming that neither party of the game is able to make a credible commitment to a particular strategy. Predicting IRS behavior in this game-theoretic model requires the specification of the agency's objective. In this chapter I assume that IRS' objective is to maximize revenue net

of costs. In Chapter 4, I adopt an alternative objective function that is more closely tied to social welfare.

The effects of tax treatment uncertainty on taxpayer behavior have only recently been examined. Discussing the relations between tax law complexity, uncertainty, and compliance, Slemrod [1981] argued that greater uncertainty about tax liability was likely to increase reported income. The results of subsequent studies such as Scotchmer [1988] and Scotchmer and Slemrod [1989] generally confirm this argument under the assumption that taxpayers view the probability of audit as invariant with respect to the amount of reported income. In an experimental context, Friedland [1982] found that increasing taxpayers' uncertainty about enforcement policy enhanced compliance but Milliron [1985] found that increased tax law complexity did not have a consistent directional effect on reporting judgments. All of these results are based on the assumption that the audit probability is fixed and the IRS does not act strategically. Although Beck and Jung [1989] investigate the consequences of tax liability uncertainty in a strategic setting, no one has ever examined the desirability of mitigating the tax uncertainty *ex ante*.

Since previous models typically take the tax liability as certain, there is no room for such institutional features as bargaining or appeals processes which occur during and/or after an audit. To address explicitly these factual and legal uncertainties about the application of tax law, I model both the taxpayer and the IRS as viewing the tax liability as a random variable. The court has the final say on how much the taxpayer owes the government. While uncertain about his tax liabilities, the taxpayer in this model is assumed to have private information about the transactions underlying his taxable income that enables him to make a better assessment of the trial's outcome. Since using the court to resolve differences of opinion is costly for both parties, pretrial bargaining takes place in a natural fashion.[3]

Following current tax law, I assume a proportional penalty on taxpayers' underreporting. When uncertainty exists regarding tax liabilities, taxpayers may be able to

argue successfully that their position is supported by substantial authority and, thereby, avoid the statutory penalty. Under these circumstances, however, taxpayers still have to incur the opportunity cost of time spent preparing for the audit, professional fees paid to tax experts, and nonpecuniary costs associated with the unpleasant audit experience. These costs would not vary proportionately with the amount of underpayment and would not be transferred to the IRS. I view these costs as representing audit costs to the taxpayer and investigate their strategic effects on both enforcement policies and reporting decisions.[4]

The role of the individual rulings program in this model is three fold. First, a favorable ruling gives the taxpayer complete tax insurance. Second, since a ruling request provides information about the taxpayer's transaction, the rulings program is viewed as an imperfect screening mechanism which enables the IRS to assess better the validity of the taxpayer's desired tax treatment. Finally, the rulings program is assumed to reduce audit costs of both players because the work of the IRS agent is simplified. Despite all these benefits, it is shown that a net-revenue-maximizing IRS may refuse to rule in some areas of taxation.

The rest of this chapter is organized as follows. Section 3.2 develops a model and provides an overview of the multistage tax game. Section 3.3 characterizes the equilibrium of the bargaining process, the last stage of the game. Section 3.4 establishes the major results of the model and, finally, Section 3.5 contains concluding remarks.

3.2. THE MODEL

This section lays out the basic framework for the analysis. The taxing process envisioned here consists of three distinct stages: first, at the planning stage, the taxpayer does extensive research on tax savings schemes, given the rules hammered out by Congress and various judicial doctrines established by case law; second, at the reporting and auditing stage, the taxpayer reports his taxes and the IRS makes sure that the taxpayer satisfies the factual and legal requirements of the law; lastly, at the bargaining stage, any disagreements between the taxpayer and the IRS are resolved by settlement or trial.

3.2.1.   Main Assumptions

3.2.1.1.   Prior Information

Suppose that after extensive research the taxpayer has identified two investment projects. One project yields a positive pre-tax return of r_f and is safe in the sense that there is no tax rule uncertainty whatsoever and the IRS will share the gross return according to a proportional tax rate, τ (e.g., interest income on a savings account). The other project yields a gross return of R which is subject to taxation under an ambiguous set of tax rules. In particular, it is uncertain whether the gross return is tax-exempt or fully taxable at rate τ (e.g., it is unclear whether the investment qualifies as being immediately deductible for tax purposes or must be capitalized).[5] I will call this project risky. Note that the terms "safe" and "risky" refer to tax treatment. To keep the analysis simple, I assume that the pre-tax returns are certain.

The IRS is assumed to know, at the reporting stage, which project the taxpayer has chosen. This would appear to be a reasonable assumption, given all the classification techniques, information reporting, and audit capabilities at the IRS's disposal.

If the taxpayer chooses the risky project, the after-tax result depends on the legal strength of his case since the court has the last word. If we assume that the taxpayer has

superior information about factual and legal issues relevant to estimating the expected outcome of a trial, it follows that the taxpayer can make a better assessment of the trial's outcome. Let p denote the taxpayer's estimate of how likely the IRS is to win a trial.[6] The taxpayer with an estimate p will be called type p. The IRS does not know the taxpayer type p but does assess a distribution function $F(\cdot)$ with density $f(\cdot)$ of taxpayer types. I assume that the support of $F(\cdot)$ is an interval [a,b], with $0<a<b<1$. To obtain the explicit equilibrium payoff to each player, I further assume that $f(p)$ is uniform in the interval[a,b].

3.2.1.2.   Reporting and Auditing.

I assume that if the taxpayer chooses the safe project, the only feasible report is $r_f\tau$ and the IRS will not audit.[7] Therefore, the strategic interaction between the taxpayer and the IRS occurs only when the taxpayer chooses the risky project.

If the taxpayer chooses the risky project and reports the full tax, τR, there can be no conflict with the IRS. If the taxpayer reports no tax, he may be selected for an audit. So, the taxpayer has three pure strategies and the IRS has two: for the taxpayer $\{r_f\tau,0,\tau R\}$ and for the IRS {audit, no audit}.   Given the continuum of taxpayer types, I will not consider mixed strategies of the taxpayer. However, I allow for mixed strategies of the IRS. R is assumed to be less than r_f. This reflects the natural assumption that competitive forces in the capital market would take the tax preference into account and tend to equate after-tax rates of return of all assets

The IRS audit is basically a fact gathering process which assesses the validity of the taxpayer's claim. The IRS has the administrative power to demand any information which the agency considers necessary to validate the taxpayer's claim. I assume, however, that IRS auditing is imperfect for the following reasons.

First, as long as the taxpayer has the incentive to conceal unfavorable factual and legal issues, which is of course the case, it would be very costly for the IRS to arrive at the same informational position. Second, there is an informational externality problem on the part of the taxpayer. If the taxpayer is a low-p type, it will be in his best interest to eliminate the

information asymmetry and to have the IRS realize that his case is not worth auditing and litigating. But such a statement by the taxpayer will be disregarded by the IRS since a high-p type can make a similar statement given the factual and legal uncertainties. That is, it is assumed that the taxpayer does not have access to a verification technology which would guarantee that he is a low-p type.

To reflect that the IRS's auditing is imperfect, I assume that the IRS audit provides a partition among taxpayer types. This partition, denoted by P^A, consists of two intervals of taxpayer types, low type group [a,c) and high [c,b].[8] Let AC_t and AC_s denote the auditing costs of the taxpayer and the Service, respectively. Another exogenuous parameter is π which is a proportional fine. If the IRS assesses a deficiency of τR, and if the taxpayer accepts it or if the court's decision is in favor of the IRS, the taxpayer's payment is $(1+\pi)\tau R$, excluding auditing and litigation costs.

3.2.1.3. Bargaining: Settlement or Trial

If the taxpayer and the IRS cannot resolve the difference of opinion on their own, the court will decide whether the return of R is taxable or not. According to the American rule, each party is assumed to bear its own litigation costs. For the taxpayer and the IRS, these costs are LC_t and LC_s, respectively.

Since litigation is costly, both parties have an incentive to settle out of court. The bargaining over the settlement amount is assumed to unfold in the following way. The IRS chooses a settlement amount and offers it to the taxpayer on a take-it-or-leave-it basis. The taxpayer then decides whether to accept the offer. If the taxpayer accepts it, he has only to pay the offered settlement amount. If the taxpayer rejects the IRS offer, there will be a trial.

The assumed bargaining procedure (a take-it-or-leave-it offer by the IRS) may seem unrealistic. In reality, there will be richer interactions of alternating offers and counteroffers between the IRS and the taxpayer. The problem with the assumed procedure is twofold. First, the uninformed party is assumed to move first (i.e., the IRS makes the settlement

offer), so opportunities for strategic information transmission are not featured at this stage of the game. Second, the assumed sequence of moves gives the IRS a bargaining advantage and is likely to lead to a settlement amount that is more favorable to the IRS.[9] Rubinstein [1985] points out that the main difficulty with the strategic approach to the bargaining problem is the need to specify the moves in the game, and he suggests that any bargaining game can be accused of being too special owing to the researcher's exogenous specification of players' moves.

My justification for the assumed procedure is as follows. First, the institutional arrangement is such that the IRS has the administrative power to assess and demand the deficiency, and the option of whether to go to court belongs to the taxpayer. So, the assumed sequence of moves basically corresponds to the observed institutional arrangement. Second, since my model abstracts away from time preferences, allowing for richer bargaining interactions would not help the taxpayer reveal his information as long as the IRS makes the settlement offer.[10] Third, my main concern is not with the absolute level of the settlement amount. Of primary concern is that there exist strict gains from the settlement.[11]

3.2.1.4. Behavioral Assumption.

To concentrate on the information asymmetry, I assume that both the IRS and the taxpayer are risk neutral and maximize expected net revenue and expected net income, respectively. When taxpayers are risk neutral, compliance becomes a more serious problem than when they are risk averse since the threat of detection and associated punishments is less effective.

The assumption of a net-revenue maximizing IRS may seem inapproporiate. Since the IRS is an important player on the policy-making team in the tax system, one might expect it to have other objectives that incorporate equity and uniform application of the tax law.[12] However, the IRS in this model can be viewed as an independent income-maximizing auditor working for a social-welfare-oriented government. Indeed, Melumad and

Mookherjee[1989] suggest the efficiency of such an arrangement. In their model, the delegation of audit decisions to a third party whose rewards are based on gross revenue collection is shown to be Pareto efficient.[13] In Chapter 4, an alternative objective function for the IRS is considered, one that incorporates more directly a broader social-welfare perspective on the part of the IRS

3.2.1.5. The Role of the Individual Rulings Program.

The individual ruling is a written statement of the IRS position that interprets and applies the tax law to a specific set of facts. The individual ruling is binding upon the IRS unless, upon subsequent audit, the IRS finds a misstatement or substantial discrepencies between the facts in the ruling request and the actual situation.

This study views the rulings program as an imperfect screening device which induces a partition among taxpayer types and reduces the audit costs of both players. As described in the previous chapter, the taxpayer must provide, in his ruling request, a comprehensive statement of facts and documentation of relevant points of law. The factual and legal requirement of the individual ruling helps the IRS determine what to look for to assess the validity of the taxpayer claim and enables the IRS to distinguish more effectively between taxpayer types.

I assume that this screening is imperfect for the analogous reasons that the IRS auditing is imperfect. Even if the taxpayer should provide a comprehensive picture of factual and legal issues involved, he will not provide all unfavorable information. The actual transaction undertaken may not be exactly the same as the one proposed , and there is room for the high-p types to imitate the low-p types. I assume that through the ruling process, the IRS observes an exogenous partition among taxpayer types. Let P^I denote this partition and have two elements, $[a,e)$ and $[e,b]$.[14]

The ruling process not only serves the screening purpose but can also reduce audit costs to both parties. The reason is as follows. Suppose the risky project in my model is a novel and complex transaction. Since the IRS always faces difficulty in keeping abreast

with the latest transactional developments, the agency may not have a good idea of what facts and legal points are relevant to assessing the taxpayer's claim. Therefore, the information demand of the IRS would be broad and sweeping and the audit process could impose heavy costs on both parties.

Now suppose that the taxpayer has explained the principles of his transaction and has provided the relevant points of law through the ruling process before the parties engage in auditing and litigation. With the knowledge gained from the ruling process, the IRS will have a benchmark against which to determine the tax consequences of the taxpayer's transaction and the information demand will be better focused and less costly to both parties. So, the ruling process is assumed to change not only the information structure but also the cost structure.

I assume that if the IRS audits the taxpayer who has requested a ruling, the audit costs will be δAC_i, i=t,s , $0<\delta<1$. The IRS is assumed to observe the join of the individual rulings and auditing partitions, P^I and P^A, if the IRS audits the taxpayer who has requested a ruling.[15] Let P^{IA} denote the finer partition. To save notation and dramatize the benefits of the ruling process, I assume that there are no direct costs associated with the ruling.

3.2.2. The Time Sequence and Solution Concept.

To recapitulate the model, the time sequence is as follows and this multistage game is depicted in Figure 1 (notice that nature's move to choose the taxpayer's type is omitted for brevity).[16] For a summary of notation and exogenous factors, see Table 1.

1. The IRS first decides whether to offer the rulings program. This decision amounts to choosing which subgame to play. The subgame in which there will be no ruling will be refered to as Subgame 1 and the other Subgame 2.

2. If the IRS chooses to play Subgame 1 (no rulings program), the taxpayer first makes the project choice and reports his tax. Then the IRS decides whether to audit, based on the taxpayer's report. If the taxpayer chooses the safe project, the game is over. If the taxpayer reports the full tax or the IRS decides not to audit the taxpayer's tax return, then the taxpayer pays his tax as reported and again the game is over. After an audit, the IRS can either drop the case or challenge the taxpayer's claim. If the case is dropped, the game ends. Otherwise, the parties engage in bargaining. Since the sequence of moves in the bargaining/litigation stage is clear enough, I will not repeat it (see Subsection 3.2.1.3).

3. If the IRS chooses to play Subgame 2, the taxpayer can either request a ruling or simply report his tax. In the latter case, the sequence of moves will be the same as those beginning with the taxpayer's first move in Subgame 1.

4. If the taxpayer requests a ruling, then the IRS renders the decision of whether the return, R, is taxable or not. The ruling is binding upon the IRS if the taxpayer has relied on it and acted accordingly. The taxpayer can still report no tax even if the ruling does not grant tax exemption. Again, the rest of the game unfolds in the same way as in Subgame 1.

The solution concept employed here is that of sequential equilibrium (Kreps and Wilson[1982]); each player's strategy must be a best response to the other's strategy given their probablistic beliefs of the state of nature; at any stage of the game, the players must act optimally given their beliefs, for the remainder of the game. Therefore, players are unable to commit to strategies they would not want to carry out if actually called upon to do so. Since sequential rationality is required, my analysis will begin with the last stage of the game and proceed backward.

FIGURE 1   GAME TREE 1

▢ : the IRS's turn to move

◯ : the Taxpayer's turn to move

( ) : payoffs

no rulings
program
(Subgame 1)   ▢ IRS
offer the rulings program
(Subgame 2)

choose the
safe project
( )────◯ σ

choose the
risky project

no ruling
request

ruling request

report
the full tax
(a)
( )

report
no tax

◯

remaining moves
as in Subgame 1
at the node σ

grant
exemption

do not
grant
exemption

▢

audit

no audit

( )

▢

remaining moves as in
Subgame 1 at the node
σ of the tree

drop
(a)

challenge
(b)

( )

▢

settlement
offer

◀───Bargaining /Litigation
Stage

(a) dominated strategy
(b) may depend on the outcome of the audit

<div align="center">TABLE 1</div>

Exogenuous Factors	Taxpayer	The IRS
1. Audit Costs	AC_t	AC_s
2. Litigation Costs	LC_t	LC_s
3. Prior Information on the likelihood of IRS winning at trial	p	f(p)
4. Auditing Partition(P^A)		$\{[a, c),[c, b]\}$
5. Ruling Partition(P^I)		$\{[a, e),[e, b]\}$

6. Other Parameters

Tax Rate = τ, Proportional Fine = π ,

Tax due if the IRS prevails and a fine is assessed=$W = (1+\pi)\tau R$,

Potential gains from settlement as a fraction of the potential revenue=k

$$= (LC_t + LC_s)/(1+\pi)\tau R,$$

Audit Costs Reduction Multiplier = δ,

Pretax Return of "Safe" Project = r_f

Pretax Return of "Risky" Project = R, where "safe" and "risky" refer to tax treatment.

3.3. Equilibrium Strategies of the Bargaining Stage

This section characterizes the equilibrium strategies of the bargaining stage. The methodology of this section is largely based on Bebchuck [1984]. I have freely borrowed from his work in much of my analysis in this section.

Recall that the IRS does not know the taxpayer type p but that p is distributed with a density function $f(\cdot)$ and a distribution function $F(\cdot)$. The support of $F(\cdot)$ is an interval [a,b], with $0<a<b<1$ and $f(\cdot)$ is uniform in the interval [a,b]. I further assume $a(1+\pi)\tau R - LC_s \geq 0$. This assumption eliminates the need to consider whether the IRS will threaten to go to trial even if the expected revenue net of litigation cost is negative. Because of this assumption, the IRS will always challenge the taxpayer's claim after an audit (i.e., dropping the case after an audit will be a dominated strategy).[17]

Let us first consider the taxpayer's decision when the IRS demands a settlement amount S. The taxpayer knows that if he rejects the offer, there will be a trial. The expected cash outflow from such a trial to the taxpayer of type p is $p(1+\pi)\tau R + LC_t$. Thus, the taxpayer will accept the settlement offer if $S \leq p(1+\pi)\tau R + LC_t$, or equivalently, if and only if $p \geq (S - LC_t)/[(1+\pi)\tau R]$. Let W denote $(1+\pi)\tau R$ from now on.

The taxpayer will accept an offer S if his type is equal to or higher than q(S), where q(S) is defined by $q(S) = (S - LC_t)/W$. The value q(S) will be referred to as the "borderline type" of an offer S.

The settlement offer of the IRS depends on how much information about the taxpayer's type has been revealed at previous stages. Take, for example, the case in which the IRS observes P^A. Here, the IRS knows the element of the partition to which a particular taxpayer type belongs. Suppose $p \in [a,c)$. The IRS knows that if it makes a demand S, the probability that the taxpayer will accept this demand is $1 - F^c(q(S))$, where F^c is the conditional distribution function. If the taxpayer rejects the offer, which will be the case if his type is lower than q(S), then there will be a trial. The IRS's likelihood of winning will

be $\int_a^{q(S)} x f^c(x)dx/F^c(q(S))$, where $f^c(\cdot)$ is the conditional density. Therefore the IRS's

expected revenue net of litigation costs will be:

$$NR(S)=\{1-F^c(q(S))\}S+F^c(q(S))\{W \int_a^{q(S)} x f^c(x)dx/F^c(q(S))-LC_s\} \text{ and the IRS will}$$

choose S to maximize NR(S).

Proposition 3.1.(Bebchuk[1984])

Suppose that it is common knowledge that $p\epsilon[x,y]$, $a\leq x<y\leq b$. Assume that f(p) is

uniform in the interval [a,b]. Let k denote $(LC_t+LC_s)/W$. Then the equilibrium borderline

type $q^*(S)$ and settlement amount S^* are unique and characterized as follows.

$$k < y\text{-}x => q^*(S)=y\text{-}k, \ S^*=q^*W+LC_t$$
$$k \geq y\text{-}x => q^*(S)=x, \ S^*=xW+LC_t$$

Proof: This follows almost immediately from Bebchuk[1984] Proposition 1. For the

reader's convenience, however, I will provide a sketch of the proof. Differentiating

NR(S) and rearranging terms, we obtain

$$\frac{d\,NR(S)}{d\,S} =\{1-F^c(q(S))\}- f^c(q(S))[(LC_t+LC_s)/W] \tag{3.1}$$

The first term in (3.1) is the benefit to the IRS of a marginal increase in S. The second

expression in (3.1) represents the cost to the IRS of a marginal increase in S. The

increase in S would raise the likelihood of litigation by $d\,F^c(q(S))/d\,S = f^c(q(S))/W$ and

litigating against the borderline type q(S) instead of settling for an amount S would

involve a loss of (LC_t+LC_s). Notice that high litigation costs of either party result in

high marginal cost to the IRS of increasing its settlement demand (this is a manifestation

of the fact that the bargaining game has been designed so that the IRS capture all gains

from the settlement). This implies that when litigation costs are high, the optimal

borderline type $q^*(S)$ will be low and *vice versa*. Since we assume the uniform

distribution, we have $F^c(q)=(q-x)/(y-x)$ and $f^c(q)=1/(y-x)$. If q^* is interior, the increasing hazard rate property of the uniform distribution ensures that the second order condition will be satisfied. Unlike in Bebchuk, q^* here can be a left-hand corner solution. This occurs when litigation costs are very high (i.e., $k \geq y-x$). The reason is that because of a different distributional assumption, one cannot use Bebchuk's continuity argument at $q=x$.

The intuition behind Proposition 3.1 is as follows. The IRS' settlement offer will be accepted by a taxpayer whose private information is unfavorable and rejected by a taxpayer for whom this is not the case. If the litigation costs are too high, the players are better off by settling out of court. Why would the players ever fail to realize the gains from settlement? The reason for the possible failure to settle is the presence of an informational asymmetry. If the IRS knew the taxpayer's type, the IRS would make a settlement offer that the taxpayer would not reject. The IRS, however, does not know the type p but only the distribution from which it is drawn. Therefore, the IRS' optimal settlement offer will be such that the taxpayer will reject the offer if his type is sufficiently low.

Since the equilibrium settlement amount is unique for each element of any partition that the IRS observes, it is now straightforward to calculate the IRS's expected payoff given the information structure and the taxpayer's strategy. Suppose, for example, that all taxpayer types report no tax. If the IRS audits, the expected payoff to the IRS will be:

$\{(c-a)ENR_1+(b-c)ENR_2\}/(b-a) - AC_s$, where ENR_i is the maximized expected revenue (net of litigation costs) from the ith element of P^A. Before leaving this section, let us establish a simple observation. For expositional convenience, let $ENR\{[x,y]\}$ denote the maximum expected net revenue from the taxpayer whose type is distributed uniformly on the interval $[x,y]$.

Observation 3.1.(Monotonicity of the IRS Payoff)

Suppose the IRS faces two different uniform distributions of taxpayer types, one supported on [f,g] and the other [h,i], with $f \leq h$ and $g \leq i$.

Then, $ENR\{[f,g]\} \leq ENR\{[h,i]\}$.

Proof: Consider an interval [u,v], where u=h and v=g. Since $v+u \geq g+f$ and $v-u \leq g-f$

$$ENR\{[u,v]\}-ENR\{[f,g]\}=W[(v+u)+k^2/(v-u)-(g+f)-k^2/(g-f)] \geq 0.$$

Now suppose that $k \leq v-u \leq i-h$. Then, since $k^2 \leq (i-h)(v-u)$,

$ENR\{[h,i]\}-ENR\{[u,v]\}=W[(i+h)+k^2/(i-h)-(v+u)-k^2/(v-u)] \geq 0$, which implies

$ENR\{[f,g]\} \leq ENR\{[h,i]\}$.

If $v-u \leq k \leq i-h$ or $k \geq i-h \geq v-u$, then it is easy to see that $ENR\{[f,g]\} \leq ENR\{[h,i]\}$.

3.4. Equilibrium of the Multistage Tax Game

This section analyzes the equilibria of the whole game including the IRS decision of whether to offer the individual rulings program, the taxpayer's reporting strategy, IRS auditing strategy, and the players' bargaining strategies.

3.4.1. Equilibrium of Subgame 1 (Without Rulings Program)

In this kind of model, the problem of multiple equilibria is more the rule than the exception. I impose some restrictions on parameters so that the resulting equilibrium will have desirable properties and bear a close resemblance to empirically observed phenomena. First, I assume

$$ENR\{[a,c)\} < \delta AC_s. \qquad (3.2)$$

This ensures that there always exist some types whom the IRS does not want to audit and litigate. Recall that if a ruling request is made, the audit cost to the IRS in Subgame 2 is δAC_s, with $0<\delta<1$. This assumption indirectly captures the extant institutional constraints on the level of punishments and detection described in Graetz and Wilde[1985].

Second, to ensure nontrivial auditing in equilibrium and to capture its deterring effect on the taxpayer's underreporting, I assume,

$$[(c-a)ENR\{[a,c]\}+(b-c)ENR\{[c,b]\}] / (b-a) > AC_s \qquad (3.3)$$

$$R - [(b-k)W+LC_t+\delta AC_t] < r_f(1-\tau) \qquad (3.4)$$

Inequality (3.3) means that if all the taxpayer types report no tax, it is worthwhile to audit them all and (3.4) states that if the probability of audit is equal to 1, the highest type will be better off by investing in the safe project and reporting $r_f\tau$.

Let us first consider the taxpayer's reporting decision, given the probability of audit p and the bargaining strategy of the IRS characterized by Proposition 3.1. Note that choosing the risky project and reporting the full tax is dominated by undertaking the safe project since

$r_f > R$. Let α denote the highest of taxpayer types that weakly prefers to choose the risky project and report no tax. That is,

$$\dot{R}-\rho\{(\alpha-k)W+LC_t+AC_t\}=r_f(1-\tau) \tag{3.5}$$

It can be seen that the project choice and the optimal reporting strategy depend on whether p is larger than α. If p is less than or equal to α, it is optimal for the taxpayer to undertake the risky project and to report no tax. Notice that α is determined endogenously. From (3.2) and sequential rationality, α can not be less than or equal to c, the dividing point of the audit partition (P^A). From (3.3) and (3.4), c should be less than b. If the IRS knows that a taxpayer type belongs to the interval, $[c,\alpha)$, it will make a settlement offer, $(\alpha-k)$. Therefore, the taxpayer types with $p\epsilon(\alpha-k, \alpha]$ can always pool with $(\alpha-k)$ because of the imperfect information and the bargaining strategy of the IRS.

Let us now consider the IRS auditing strategy. First, if the IRS does not audit, all types report no tax and the net revenue will be zero. Recall that auditing is a necessary condition for bargaining. That is, the IRS can not make a settlement offer without actually conducting the audit (see Figure 1 for the sequence of moves). From (3.3), we can rule out $\rho=0$. Second, the auditing strategy should be sequentially rational. That is, the expected revenue from an audit, net of audit costs, should be nonnegative. Otherwise, the audit would become an empty threat. Let Π denote the expected net revenue to the IRS when it audits the report of no tax with probability ρ. The optimal auditing decision is determined by the following constrained optimization problem :

$$\max \Pi=(b-\alpha)r_f\tau/(b-a)+\rho[(c-a)ENR\{[a,c)\}+(\alpha-c)ENR\{[c,\alpha]\}-(\alpha-a)AC_s]/(b-a) \tag{3.6}$$

$$\text{s.t.} \quad [(c-a)ENR\{[a,c)\}+(\alpha-c)ENR\{[c,\alpha]\}-(\alpha-a)AC_s] \geq 0 \tag{3.7}$$

where α is given by (3.5)

The first expression in (3.6) is the revenue from the types $(p\geq\alpha)$ who have chosen the safe project, given that the IRS audits with probability ρ. The second term in (3.6) represents expected revenue from the types who have chosen the risky project. Recall that choosing the risky project always results in reporting no tax, since choosing the risky

project and reporting full tax is dominated by investing in the safe project. The inequality (3.7) states that the net expected revenue from an audit should be nonnegative. Letting ρ^* denote the equilibrium audit probability, I characterize an equilibrium of Subgame 1 as follows.

Proposition 3.2.

If (3.2), (3.3), and (3.4) hold, the following sequence of play constitutes an equilibrium and this equilibrium is unique.

1. (a) $p \leq \alpha^*$ => report no tax,

   (b) $p > \alpha^*$ => report $r_f \tau$,

   (c) $c < \alpha^* < b$, where $\alpha^* = [(LC_s - AC_t) + \Phi/\{(AC_t + AC_s) - \sqrt{[AC_t + AC_s]^2 - \Phi}\}]/W$ and

   $\Phi = Wa[2(LC_s + AC_s) - Wa] + 2(LC_t + LC_s)^2 - (LC_s - AC_t)(LC_s + AC_t + 2AC_s)$.

2. The optimal audit strategy is as follows:

   (a) if the taxpayer reports $r_f \tau$ or τR, $\rho^* = 0$,

   (b) if the taxpayer reports no tax,

   (i) $\Phi - 2[R - r_f(1-\tau)](AC_t + AC_s) + [R - r_f(1-\tau)]^2 \geq 0$ => $\rho^* = 1$

   (ii) otherwise, $\rho^* = [R - r_f(1-\tau)]\{(AC_t + AC_s) - \sqrt{[AC_t + AC_s]^2 - \Phi}\}/\Phi$.

3. The IRS makes two settlement offers, $(c-k)W + LC_t$ for the taxpayer types with $p \in [a,c)$, and $(\alpha^* - k)W + LC_t$ for the taxpayer types with $p \in [c, \alpha^*]$. The taxpayer types with $p \in [c-k,c)$ accept the first settlement offer while types with $p \in [a, c-k)$ reject it and go to a trial. The taxpayer types with $p \in [\alpha^* - k, \alpha^*)$ accept the second offer whereas types with $p \in [c, \alpha^* - k)$ reject it.

Proof : For part 1, (a) and (b) follow from the preceding discussion on the taxpayer's reporting decision. Part 2(a) is obvious. Differentiating Π and rearranging terms yield,

$$\frac{d\Pi}{d\rho} = [\rho(W\alpha - LC_s - AC_s - r_f\tau/\rho) \, d\alpha/d\rho]/(b-a) + [(c-a)ENR\{[a,c)\} + (\alpha - c)ENR\{[c,\alpha]\}$$

$-(\alpha-a)AC_S]/(b-a)$

Since $d\alpha/d\rho$ is negative and $W\alpha=\{R-r_f(1-\tau)\}/\rho+LC_S-AC_t$, the first term above is positive. If the second expression in the equation above is positive, then $d\Pi/d\rho$ is positive and $\rho^*=$ max $\{Z\}$, where Z denote the feasible set of ρ which is determined by the constraint (3.7). It should be understood that since ρ is a probability, $0<\rho<1$. If $\Phi-2[R-r_f(1-\tau)](AC_t+AC_S)+[R-r_f(1-\tau)]^2 \geq 0$, the feasible set Z includes 1 and $d\Pi/d\rho$ is positive. This proves part 2(b)(i). One can easily show that if $\Phi-2[R-r_f(1-\tau)](AC_t+AC_S)+[R-r_f(1-\tau)]^2<0$, max $\{Z\}$ must be less than 1 and ρ^* is one of the solutions to the following quadratic equation, $\Phi\rho^2-2[R-r_f(1-\tau)](AC_t+AC_S)\rho+[R-r_f(1-\tau)]^2=0$. It can be shown by tedious computations that $\rho^*=[R-r_f(1-\tau)]\{(AC_t+AC_S)-\sqrt{[AC_t+AC_S]^2-\Phi}\}/\Phi$. The proceeding discussion on the endogenous determination of α is essentially the proof of part 1(c). It follows from (3.2), (3.3), (3.4), (3.5), and sequential rationality of the IRS. Notice that after an audit, the IRS observes the audit partition, P^A ($\{[a,c), [c,b]\}$). Therefore, part 3 follows from Proposition 3.1. Q.E.D.

Remarks: Figure 2 summarizes this equilibrium outcome. Note that there will be nontrivial auditing and litigation in this equilibrium. Also, we can see that some self-selection will occur at the investment and reporting stage. That is, types $p\epsilon(\alpha^*,b)$ self-select into investment in the safe project and report $r_f\tau$.

FIGURE 2   SUBGAME 1 EQUILIBRIUM OUTCOME
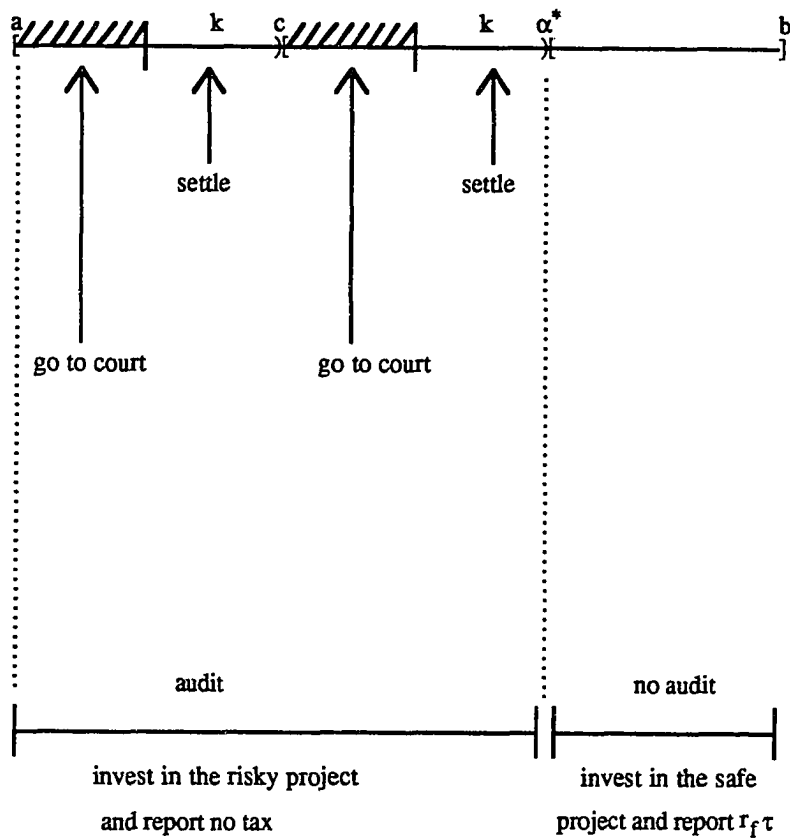
3.4.2. Equilibrium of Subgame 2

Let us look at Subgame 2 in which the ruling process is available. Recall that the ruling process not only enables the IRS to observe $P^I=\{[a,e),[e,b]\}$ but also reduces the audit costs of both the IRS and the requesting taxpayer. The equilibrium configuration of this subgame depends on the individual rulings partition, P^I. For example, if e is so high that $ENR\{[a,e)\}$ is larger than δAC_s, no type will get a ruling of tax exemption. I assume that a<e<c. Given (3.2), this assumption is sufficient to ensure that if the taxpayer with $p\epsilon[a,e)$ requests a ruling, he can get a favorable one (i.e., tax exemption). To find an equilibrium, let us begin with another simple observation.

Observation 3.2.

Suppose it is common knowledge that a taxpayer with $p\epsilon[x,y]$ has requested a ruling. Then the IRS will render the ruling of tax exemption and not audit if and only if $ENR\{[x,y]\} \leq \delta AC_s$. And for the taxpayer with $p\epsilon[a,e)$, it is a dominant strategy to request a ruling.

Proof : The first part is obvious . From (3.2), Observation 3.1, and the assumption that a<e<c, it follows that $ENR\{[a,e]\}\leq ENR\{[a,c]\} \leq \delta AC_s$. Q.E.D.

The optimal reporting and auditing strategy can be found in the same way as in Subgame 1. Let θ be the audit probability and Λ be the expected net revenue to the IRS in Subgame 2. Define β such that $R-\theta\{(\beta-k)W+LC_t+\delta AC_t\}=r_f(1-\tau)$. 　(3.8)

Again, the optimal auditing decision of the IRS is determined by the following constrained optimization problem :

$$\max \Lambda =(b-\beta)r_f\tau/(b-a)+\theta[(c-e)ENR\{[e,c)\}+(\beta-c)ENR\{[c,\beta]\}-(\beta-e)AC_s]/(b-a) \qquad (3.9)$$

$$\text{s.t.} \quad [(c-e)ENR\{[e,c)\}+(\beta-c)ENR\{[c,\beta]\}-(\beta-e)\delta AC_s] \geq 0 \qquad (3.10)$$

where β is given by (3.8).

Letting θ^* be the equilibrium audit probability, I characterize an equilibrium of Subgame 2 as follows.

<u>Proposition 3.3.</u>

Suppose that (3.2), (3.3), and (3.4) hold and assume that $a<e<c$. Then the following sequence of play constitutes an equilibrium.

1.(a) $p \leq \beta^*$ => request a ruling and report no tax,

(b) $p > \beta^*$ => do not request a ruling and report $r_f\tau$,

(c) $c<\beta^*<b$, where $\beta^*=[(LC_s-\delta AC_t)+\Psi/\{\delta(AC_t+AC_s)-\sqrt{\delta^2[AC_t+AC_s]^2-\Psi}\}]/W$

and $\Psi=We[2(LC_s+\delta AC_s)-We]+2(LC_t+LC_s)^2-(LC_s-\delta AC_t)(LC_s+\delta AC_t+2\delta AC_s)$.

2. (a) $p \leq e$ => grant tax exemption

(b) $p > e$ => do not grant tax exemption

3. IRS audit strategy is as follows:

(a) if the taxpayer reports $r_f\tau$ or τR, $\theta^*= 0$,

(b) if the taxpayer reports no tax,

(i) $\Psi-2\delta[R-r_f(1-\tau)](AC_t+AC_s)+[R-r_f(1-\tau)]^2 \geq 0$ => $\theta^*=1$

(ii) otherwise, $\theta^*=[R-r_f(1-\tau)]\{\delta(AC_t+AC_s)-\sqrt{\delta^2[AC_t+AC_s]^2-\Psi}\}/\Psi$,

4. The IRS makes two settlement offers, $(c-k)W+LC_t$ for the taxpayer types with $p\epsilon[e,c)$, and $(\beta^*-k)W+LC_t$ for the taxpayer types with $p\epsilon[c,\alpha^*]$. The taxpayer types with $p\epsilon[c-k,c)$ accept the first settlement offer while types with $p\epsilon[e,c-k)$ reject it and go to a trial. The taxpayer types with $p\epsilon[\beta^*-k,\beta^*)$ accept the second offer whereas types with $p\epsilon[c,\beta^*-k)$ reject it.

Proof : For part 1, (a) and (b) follow from the argument similar to the previous discussion on the taxpayer's reporting decision and (c) follows from (3.2), (3.3), (3.4), (3.8), and sequential rationality of the IRS. Part 2 follows from Observation 3.2. Part 3(a) is obvious. Differentiation of Λ with respect to θ will show that if $[(c-e)ENR\{[e,c)\}+(\beta-c)ENR\{[c,\beta]\}-(\beta-e)\delta AC_s] \geq 0$, then $d\Lambda/d\theta$ is positive. Let Y denote

the feasible set of θ determined by the constraint (3.10). That $\Psi - 2\delta[R-r_f(1-\tau)](AC_t+AC_s)+[R-r_f(1-\tau)]^2 \geq 0$ implies that the feasible set of θ, Y, includes 1 and the constraint (3.10) is satisfied. This proves part 3(b)(i). If $\Psi - 2\delta[R-r_f(1-\tau)](AC_t+AC_s)+[R-r_f(1-\tau)]^2 < 0$, max {Y} must be less than 1. It can be shown by tedious computations that $\theta^* = [R-r_f(1-\tau)]\{\delta(AC_t+AC_s)-\sqrt{\delta^2[AC_t+AC_s]^2-\Psi}\}/\Psi$. Part 4 follows from Observation 3.1.

Remarks : Note that although taxpayer types with $p\epsilon[e,\beta^*]$ know they will get an unfavorable ruling, they still request a ruling to reduce their audit costs. This conclusion appears to be sensitive to the assumption of no costs to make a ruling request. As long as the audit cost reduction is substantial, however, this conclusion does not change. This behavior is consistent with Prebble[1986]'s observation, "one sometimes sees a (tax shelter) prospectus containing an advance ruling with a statement by the promoter explaining why he disagrees with it."[18] Figure 3 summarizes the outcome of this equilibrium.

3.4.3. Equilibrium of the Grand Game

Finding the equilibrium of the whole game is now an easy task. Let Π^* be the equilibrium payoff to the IRS in Subgame 1 and Λ^* in Subgame 2. If $\Pi^* < \Lambda^*$, the IRS will choose Subgame 2 and, therefore, the individual rulings program will be offered. Otherwise, the IRS will weakly prefer Subgame 1. Let us now examine when the IRS will prefer Subgame 1 and want to have "no ruling" areas.

Proposition 3.4.

Suppose $\Psi - 2\delta[R-r_f(1-\tau)](AC_t+AC_s)+[R-r_f(1-\tau)]^2 < 0$. Then the IRS will always prefer to have the ruling process.

FIGURE 3   SUBGAME 2   EQUILIBRIUM OUTCOME

a   k   c   k   β*   b

settle   settle

go to court   go to court

favorable
ruling
(exempt)

unfavorable ruling

no
audit   audit   no audit

request a ruling / invest the risky project   invest in the

and report no tax   safe project and

report $r_f \tau$
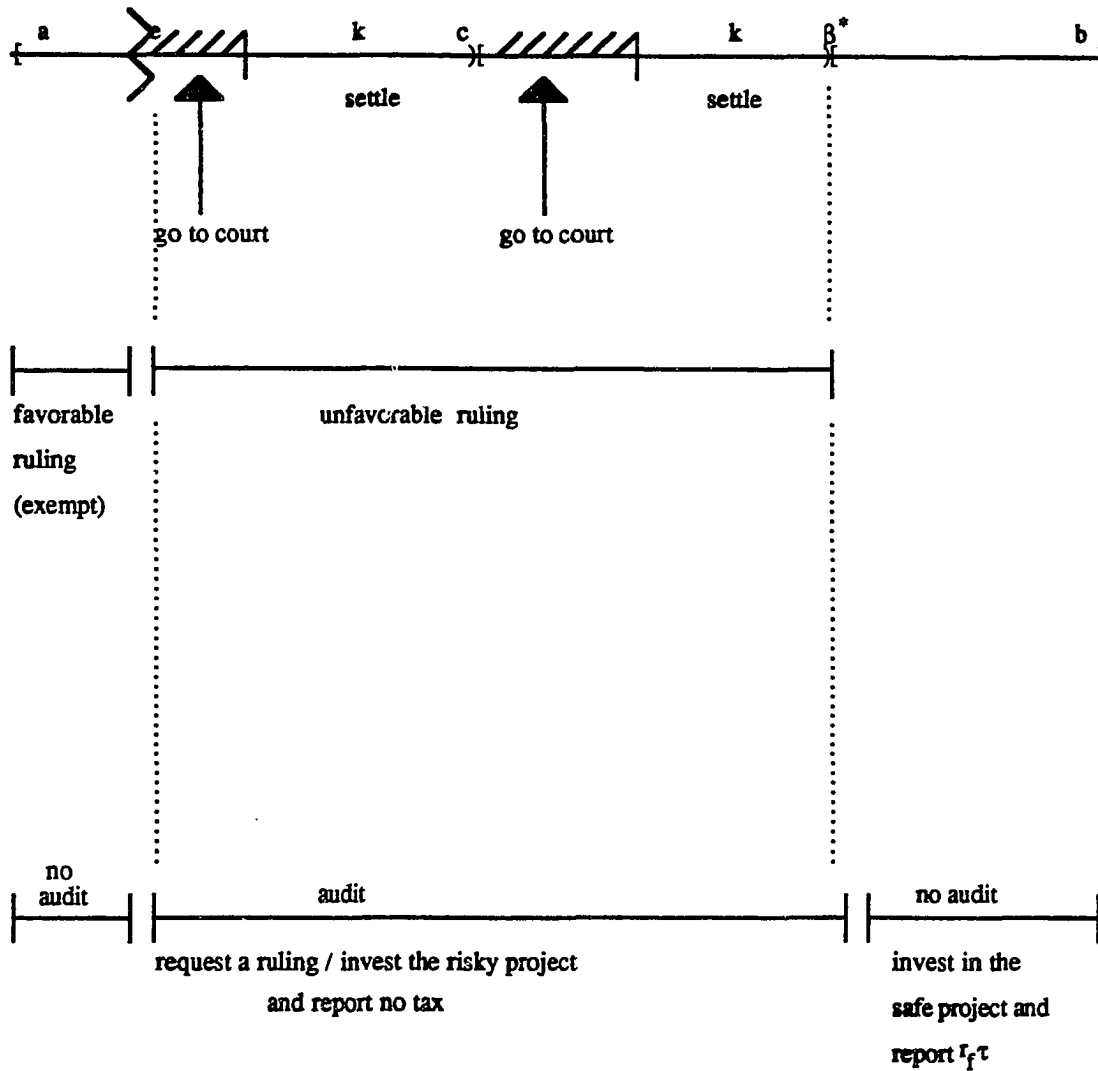
Proof : Since a < e and 0< δ <1, it follows from Observation 3.1 (Monotonicity of the IRS Payoff) and sequential rationality of the IRS that $\rho^* \leq \theta^*$. Since Ψ-2δ[R-r_f(1-τ)](AC$_t$+AC$_s$)+[R-r_f(1-τ)]^2 < 0 implies θ^*<1, both (7) and (10) must be binding. It follows from Observation 3.1 that $\alpha^* > \beta^*$ and this implies that Π^*< Λ^*.

Remarks : The main concern of the IRS in this game is how to induce the "indifferent" types (e.g., pϵ[α-k,α] in Subgame 1) to undertake the safe project and thereby increase the revenues. The ruling process enables the IRS to increase the audit probability by reducing the audit costs, thereby inducing a broader range of types into taking the safe project.

Proposition 3.5.

Suppose Φ-2[R-r_f(1-τ)](AC$_t$+AC$_s$)+[R-r_f(1-τ)]$^2 \geq 0$. Then there exists a grand game equilibrium in which the IRS prefers not to offer the individual rulings program.

Proof: Since Φ-2[R-r_f(1-τ)](AC$_t$+AC$_s$)+[R-r_f(1-τ)]$^2 \geq 0$ implies ρ^*=1, the difference between subgame equilibrium payoffs to the IRS can be written as follows.

(Λ^* - Π^*)=[(e-a){(LC$_s$ +AC$_s$)-W(e+a)/2}]/(b-a)+(β^*-e)(1-δ)AC$_s$/(b-a)

+(β^*-α^*){(β^*+α^*)W/2- (LC$_s$ +AC$_s$)-$r_f\tau$}/(b-a).

The first term is positive and represents the gain by granting tax exemption to the low pϵ[a,e]. The second term is the direct savings in audit costs brought by the ruling process. The last expression represents the revenue loss from allowing the taxpayer with pϵ[α^*,β^*] to switch to the risky project. The first two terms are positive and the last term is negative. Therefore, there will be a nontrivial parameter region in which Π^*> Λ^*. Figure 4 compares Π^* and Λ^*. To prove this proposition, it is sufficient to give an example in which the IRS is better off by not offering the individual rulings program. Assume the following parameter values: a=0.15, e=0.17, c=0.33, b=0.7, δ=0.7,

π=0.25, τ=0.5, r_f=1, R=0.88, LC_t=0.03, LC_s=0.05, AC_t=0.13, AC_s=0.16. Then (Λ^* - Π^*)=0.004. Q.E.D.

By expressing the difference between Π^* and Λ^* in terms of exogenous parameters, we can see more clearly why the IRS prefers to have "no ruling" areas. Making substitutions and rearrangements yield

$$(\Lambda^*-\Pi^*)=\frac{(e-a)}{(b-a)}\{(LC_s+AC_s)-W(e+a)/2\}+(1-\delta)\{(1/1+\pi)+(LC_s/W)-e\}$$

$$-(r_f-R)(1-\delta)[AC_t+(1-t)AC_s]/W - (1-\delta^2)AC_t(AC_t/2+AC_s)/W \qquad (3.11)$$

First, notice that the higher AC_t is, the more likely it is that the IRS will prefer not to have the rulings program. We can infer that in "no ruling" areas, the IRS can impose heavy audit costs by making broad and sweeping information demands. Second, the incentive not to offer the rulings program is increasing in (r_f -R). This is not surprising, given the IRS objective to maximize expected net revenue and that the main concern of the IRS in this game is how to induce the indifferent types to take the safe project. Third, the first term in (3.11) represents the gain by granting tax exemption to the low types pϵ[a,e]. If P^I is such that too few types can be given tax exemption, the gain becomes too small to justify the revenue loss due to the switch of the intermediate type with pϵ[α^*,β^*] from the safe project to the risky project.

The IRS has released formal pronouncements concerning those areas in which advanced rulings will not be issued. Most of the proscribed categories involve questions basically factual in nature or transactions lacking a bona fide business purpose and having as their principal purpose the reduction of federal taxes.

This kind of no-ruling policy is consistent with my model' s prediction. Although the law-fact dichotomy is an imprecise one, one can think of the audit as a fact-finding process. If a transaction has complex tax implications and novel features, it will require extensive

investigation to extricate all relevant facts. This, in turn, results in broad information demands from the IRS, which translates into hefty audit costs to both the taxpayer and the IRS. The rulings program may reduce the audit cost significantly by providing the IRS with a benchmark against which to decide the tax consequences of a transaction. But the problem of the IRS is that since the rulings program enables the taxpayer to save own audit costs too, the risky project becomes more attractive and the taxpayer who otherwise would have chosen the safe project might switch to the risky project. The revenue loss due to this switch from the safe to the risky project may be larger than the saving of audit costs. Recall that although taxpayer types with $p\varepsilon[e,\beta^*]$ know they will get an unfavorable ruling, they still request a ruling to reduce their audit costs. To deter this kind of aggressive behavior reported in Prebble[1986], the IRS does not offer the rulings program. Since this is off-the-equilibrium behavior, one should not expect it to happen frequently and, in fact, it does not.

FIGURE 4   COMPARISON OF THE IRS EQUILIBRIUM PAYOFFS
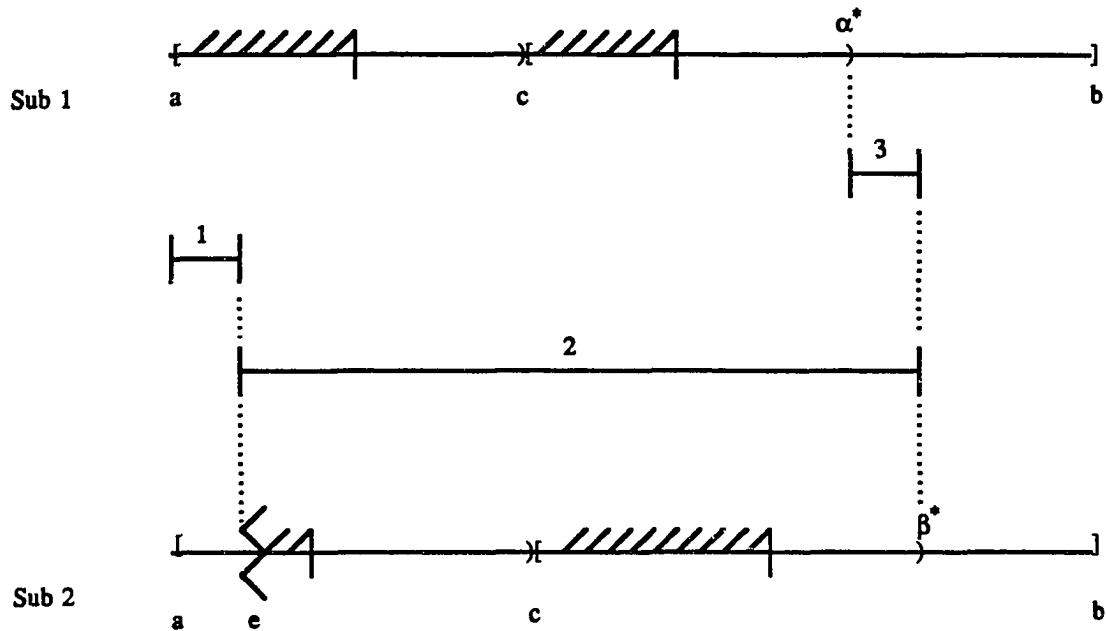
1. $(e-a)\{(LC_s+AC_s)-(e+a)W/2\}/(b-a)$: gain by granting exemption

2. $(\beta^*-e)(1-\delta)AC_s$: direct savings in audit costs

3. $(\beta^*-\alpha^*)\{(\beta^*+\alpha^*)W/2-(LC_s+AC_s)-r_f\tau\}$: revenue loss from the switch to the risky project

3.5. Concluding Remarks

This chapter represents a formal attempt to explain why the IRS may wish to limit the scope of the individual rulings program. Under the assumption that the IRS is a net-revenue maximizer, it is shown that the IRS may not offer the rulings program to discourage the taxpayer from undertaking tax-favored risky projects and that this incentive not to provide the communication opportunity becomes stronger as the implicit tax and audit costs to the taxpayer get larger.

Like all models, this one has limitations. First, I have placed restrictions on potential signalling devices that can be used by taxpayers. For example, having the IRS move first in the bargaining stage and limiting the taxpayer's option to accept/reject choice eliminates the opportunity to use bargaining as a means to reveal taxpayers types. Binary investment choices and binary tax reports precludes separation of the continuous types.

Second, the IRS is an important policy maker in the tax system. Congress in recent years has made the taxpayer increasingly dependent upon administrative implementation of the tax law, but this seems to have been based on the assumption that the administrator would give advance guidance to how the tax law will be implemented. Rev. Proc. 64-22 states that "the function of the Internal Revenue Service is to administer the Internal Revenue Code. Tax policy for raising revenue is determined by Congress." The individual rulings progam may provide an excellent opportunity for the IRS to administer the Internal Revenue Code more effectively. Through the rulings program, the IRS may be able to discourage socially wasteful investment by issuing unfavorable rulings while encouraging socially desirable projects by giving the taxpayer the advance stamp of approval. The IRS officials have emphasized repeatedly that the agency has no pro-revenue bias and is interested in fair and sound tax administration. Although there is evidence that runs counter to this rhetoric from the Service, it is of interest to explore how a social-welfare-maximizing IRS would run the rulings program, a task to which I turn in Chapter Four.[19]

Third, it is assumed that if the taxpayer requests a ruling with a comprehensive description of relevant facts and applicable points of the law, the IRS observes an exogenous partition among taxpayer types. It would be more realistic if the IRS were to grant tax exemptions strategically (i.e., determine endogenously the dividing point of the ruling partition, e).

3.6. Footnotes

1. See Cooper [1985] and Warren [1981] for elaborate discussions of this problem.

2. Another information leakage problem is competitive disadvantage. Individual rulings are now in the public domain. Although identifying details are deleted before publication, it may be relatively easy for a competitor to discover important features of the taxpayer's transaction. This competitive disadvantage issue has been one of the arguments made against the public disclosure of private rulings.

3. According to Uretz [1966], the IRS seeks to dispose of controversies with taxpayers through administrative settlements rather than through litigation.

4. Graetz et al. [1986] and Beck and Jung [1989] also analyze the effects of lump-sum audit costs of the taxpayer.

5. It should be understood that immediate deductibility is not equivalent to tax exemption in all circumstances. For example, if pretax return exceeds the competitive rate, these two tax treatments yield different results. The easiest way to see this is to suppose that the investment cost is zero and the pretax return is positive. For further discussion on this point, see Scholes and Wolfson [1990].

6. The IRS has its own subjective estimate of the winning likelihood. In this model, however, the IRS assumes that because of the taxpayer's private information, the taxpayer's estimate is superior to the IRS'. Therefore, what counts is the taxpayer's estimate.

7. This assumption is adopted for simplicity and is not restrictive at all. I can allow for other reporting and auditing strategeis and suppose a gaming situation. The assumption made here amounts to assuming that the equilibrium of the supposed game is unique.

8. Allowing for more than two partition elements does not change the main results of this paper. An increase in the number of partition elements will just increase the number of settlement offers made by the IRS at the bargaining/litigation stage. This will complicate the computation of equilibrium payoffs to the players without qualitatively affecting the results.

9. The assumed bargaining procedure coupled with the sequential rationality requirement enables the IRS to capture all the gains from settlement. For a discussion on this point, see Section 3.3.

10. There is a substantial literature devoted to the role of time and information in bargaining. For references, see Rubinstein [1985].

11. The main results of this chapter are not sensitive to who garners the gains from the settlement since it depends on the uniqueness of the bargaining outcome and the change in the audit cost structure. Even where the taxpayer gets the gains, the basic conclusion of a "no-ruling" policy in some cases will not be changed as long as the bargaining outcome is unique.

12. Scotchmer [1987] has shown that IRS enforcement policy designed to maximize net revenue results in both vertical and horizontal inequity. The vertical inequity is that expected payments do not rise with income at the legislated rate and the horizontal inequity is that taxpayers in different audit classes with the same true taxable income face different expected payments.

13. The level of social welfare that can be achieved by committing to tax and audit policies that are desirable *ex ante* is higher than the level of social welfare achievable without commitment. The efficiency gain from the delegation is due to the self-interested auditor's ability to restore the credibility of a social-welfare-maximizing government's promise to execute *ex ante* desirable policies.

14. The motivation for this assumption is similar to that for the imperfect auditing. Again, allowing for more than two partition elements does not change the results of this paper.

15. The join is the coarsest common refinement of partitions P^I ({[a,e), [e,b]}) and P^A ({[a,c), [c,b]}). If a<e<c, then the join is {[a,e), [e,c), [c,b]}.

16. The step to convert the game of incomplete information to that of complete but imperfect information is omitted in the game tree depicted in Figure 1. See Harsanyi [1967-1968] for more details on this conversion technique.

17. Since I assume that litigation has a nonnegative expected value for the IRS even if the taxpayer is of the lowest type (i.e., a $(1+\pi)\tau R$-LCs>0), dropping the case after an audit cannot be an equilibrium move. But if we assume $a(1+\pi)\tau R$-LCs<0, the IRS may, in equilibrium, drop the case even after an audit. The assumption that $a(1+\pi)\tau R$-LCs>0 is made for computational ease and does not affect the main result.

18. Cited from Prebble [1986], p.48.

19. Goodman[1964] provides examples that suggest a pro-revenue bias of the IRS. Herzberg[1963] proposed that Congress should establish by law that the IRS could not take positions contradictory to itself to protect the revenue.

CHAPTER FOUR

INDIVIDUAL RULINGS PROGRAM AND SOCIAL WELFARE

4.1. Introduction

"It is tax policy in action, not simply the wording of the statute, that determines how much the taxpayer must pay, and the effects of payment. Knowledge of statute is only a start in knowing a tax system."   Blough[1952] p. 146

It is certainly true that the meaning and equity of tax law depend upon the interpretations made by thousands of IRS employees and upon the judicial determinations made in the various parts of our court system. As tax legislation becomes more complicated and transactions more complex, taxpayers face more uncertainty about how tax laws will be implemented. Since courts are too slow and costly a mechanism to provide the everyday guidance which is needed, taxpayers must rely more on the IRS for the detailed administrative interpretation of Revenue Code provisions and for fleshing out legislative intent.

The starting point of my analysis is the premise that tax rules hammered out by the legislature are designed not only to raise government funds but also to achieve a variety of social goals. Tax preferences given to certain types of transactions are meant to achieve such social purposes as redistribution of wealth, accumulation of capital, and so on.[1] By implementing the tax law as intended by Congress, the IRS is viewed as improving social welfare. The main concern of this chapter is the role of the individual rulings program in sound tax administration that maximizes a measure of social welfare.[2]

One of the distinct advantages of the rulings program is its flexibility and pretransaction review aspect. The courts can interpret the tax ramification of a particular transaction only after it has been carried out. Unlike a trial, the ruling process enables a taxpayer to

communicate potential problems to the IRS before they are committed to a particular transaction. Therefore, the IRS may use this rulings program to influence the taxpayer's action in such a way that the tax law will be implemented as intended by Congress. If the individual ruling indicates that adverse tax consequences would arise, the taxpayer can modify a proposed transaction or abandon it altogether. On the other hand, providing an official blessing by the issuance of a favorable tax ruling encourages certain investment projects that might otherwise not be undertaken. One can think of the individual rulings program as one of the fine-tuning devices employed by the IRS to implement the legislative intent of Congress.

In Chapter 3, the focus was on the ruling policy of a net-revenue-maximizing IRS. It was shown that the IRS may not offer the individual rulings program in order to discourage the taxpayer from undertaking tax-favored projects. Furthermore, this incentive not to issue rulings becomes stronger as the explicit tax savings from tax-favored investments and audit costs to the taxpayer become larger.

From a social welfare viewpoint, this kind of IRS behavior is disturbing for the following reasons. First, a net-revenue-maximizing IRS may discourage transactions that Congress wishes to encourage. Suppose that Congress has enacted an incentive for the purpose of inducing changes in taxpayer behavior such as allowing immediate deduction of tax losses allowed in the case of low-income housing.[3] Market forces would take this tax preference into account so that the after-tax return on these housing projects tend to be equal to the market rate of the return on less tax-favored assets. This means that the pre-tax return on the low-income housing project will be lower than the pre-tax return on other preferred assets. The difference between these pre-tax returns is a form of implicit tax to investors and in this case it is paid, in whole or in part, to the low-income tenants by way of reduced rental rates.[4] Now, if the IRS is motivated to maximize revenue collection, then the agency will try to induce taxpayers to invest in other nonpreferred assets rather than low-income housing projects. This is exactly opposite to what Congress wants to induce.

Second, because of the complexity and ambiguity of the tax law, there are grey areas in taxation where the IRS and the taxpayer may have to expend resources to resolve the differences of opinion on the proper tax treatment. Time and effort spent on auditing and litigation in these grey areas can be thought of as dead-weight losses from an economic efficiency point of view. If the IRS is interested in sound tax administration and improvement in economic efficiency, the agency will try to minimize the dead-weight losses. One way to do this is to open up the individual rulings program and issue rulings to reduce confrontation. But one implication of the preceding work is that a revenue-maximizing IRS may have an incentive not to issue rulings, which becomes stronger as the audit costs to the taxpayer get larger. This behavior can be viewed as an attempt to exploit taxpayers.[5]

As mentioned before, Congress has made taxpayers increasingly dependent upon administrative implementation of the tax law. This appears to have been premised on the assumption that the administrator would give advance guidance as to how the tax law will be implemented. The preceding discussion of the behavior of a net-revenue maximizing IRS suggests that the selective use of a "no-ruling" strategy by a revenue-maximizing IRS could defeat the objective of Congress to have the IRS administer the Internal Revenue Code fairly and effectively. Under such circumstances, one might expect the incentive of the IRS to be designed to achieve goals other than revenue maximization.

The purpose of this chapter is to explore how a social-welfare-maximizing IRS would run the individual rulings program. The rulings program is viewed as a quasi-judicial process in which IRS' delegated rule-making power is exercised. The taxpayer provides evidence pertaining to the proper tax treatment of his transaction. After seeing the evidence, the IRS renders a decision on how to treat that transaction for tax purposes. We will see how the ruling process can contribute to the sound and fair administration of tax laws. Selective use of a "no-ruling" policy by the IRS remains consistent equilibrium behavior, but for reasons that differ significantly from those of a revenue-maximizing IRS.

This chapter is organized as follows. In Section 4.2, I lay out the model, specifying the information structure and sequence of actions. IRS' decision of whether to offer the individual rulings program is distinguished from the decision on what specific rulings to issue. The former is called the IRS' ruling policy and pertains to which subgame to play. The latter is called the ruling decision and relates to a specific tax treatment. Section 4.3 characterizes equilibria of the subgame in which the IRS does not offer the rulings progam. I find two pooling equilibria which have very different characteristics. Section 4.4 analyzes the subgame in which the taxpayer can request a ruling and discuss the ruling decision in addition to the strategic interaction at the reporting and auditing stage. The optimal ruling decision is characterized in terms of a cutoff point which is interpreted as a standard of proof. Section 4.5 computes equilibria of the overall game and analyzes the social welfare effect of the individual rulings program.

4.2. Model

4.2.1. Taxing Process

This section develops a simple game-theoretic model of the taxing process. There are two players in this model, the IRS and the taxpayer. The model treats tax rates and fines as given. Specifically, I assume a proportional tax rate, τ, and a proportional fine, π. I assume that there are two investment projects. One project yields a pre-tax return of r_f and it will be called safe project in that there is no tax treatment uncertainty. The other project is risky in that the tax treatment of this project is uncertain. As in Chapter 3, "safe" and "risky" refer to tax treatment. For simplicity, I assume that the gross return of R is either completely tax-exempt or fully taxable. I call the exempt case a "good type" project and the fully taxable case a "bad type" project. Exemption is intended to apply to good type projects: those that produce public good in addition to their private returns. Full taxation applies to bad type projects: those that masquerade as the good type.

The risky project yields a pre-tax return of R. R is assumed to be less than r_f. This reflects the natural assumption that competitive forces in the market would take the tax preference into account tending to equate after-tax returns of all assets. Let PG denote the social value of the public good provided by the good project and assume that (R+PG) is greater than r_f. To provide an incentive for the taxpayer to undertake the risky but socially desirable (from an economic efficiency viewpoint) project, I assume that after-tax return of the safe project, $r_f(1-\tau)$, is less than R.

The taxpayer chooses which project to undertake. I assume that if the taxpayer chooses the safe project, both the taxpayer and the IRS know the project choice of the taxpayer and the only feasible report is $r_f\tau$.[6] Therefore, the strategic interaction between the players will occur only when the taxpayer undertakes the risky project.

If the taxpayer chooses the risky project, I assume that he knows its type (good or bad), but the IRS cannot distinguish the good type from the bad.[7] Although the IRS does not know the exact type of the risky project chosen by the taxpayer, its prior beliefs are such that the probability of the project being a bad type is ϕ, and of being a good type is $(1-\phi)$, where ϕ is strictly positive. There is information asymmetry since the taxpayer has more information about his project choice than the IRS does. I will refer to the taxpayer as a good type if he chooses a good risky project, and a bad type if he undertakes a bad risky project.

Unlike the model in Chapter 3, IRS auditing is perfect in this model.[8] This means that all factual and legal issues relevant to determining the tax consequences of the risky project become common knowledge after an audit and that there will be no differences of opinion on the appropriate tax treatment. The true taxpayer type will be revealed and the appropriate deficiency, the sum of unpaid tax and fine $((1+\pi)\tau R)$, will be collected. The model neither permits nor requires strategy commitments; it follows the natural temporal sequence of decisions. This eliminates the possibility of empty threats on the part of the IRS. Let AC_t and AC_s denote the audit costs of the taxpayer and the IRS, respectively.

4.2.2. Ruling Process

The individual ruling is a written statement of the IRS position concerning the tax consequences of the taxpayer's proposed transaction. To receive a reliable response from the IRS, the taxpayer must provide a comprehensive statement of facts, the points of law to be covered in the ruling, and documentation of relevant authorities to support the desired ruling.

The individual rulings program is viewed as an administrative proceeding in which the taxpayer can present evidence as to his type. One of the purposes of the ruling process in this model is to screen out the good type and to avoid unnecessary audit costs. That is, if

the IRS is sure that the taxpayer's type is good, there is no reason to waste economic resources to perform an audit. Although the taxpayer is required to provide all relevant information in his ruling request, he will not provide unfavorable information. Since issues such as profit motive are susceptible to colorization of the facts by the taxpayer in his favor, the IRS can not accept the facts stated by the taxpayer at face value. Therefore, I assume that the evidence provided by the taxpayer is an imperfect indicator of the true type either because of misrepresentation of relevant facts or because of intentional withholding of unfavorable information. The strength of the taxpayer's evidence is viewed as a continuous nonnegative random variable. Let X denote the bad type's strength having density and distribution functions, f and F, respectively. Let Y be the good type's strength and g and G denote its density and distribution functions, respectively.

After examining the evidence presented by the taxpayer, the IRS issues a ruling on whether the taxpayer deserves tax exemption. This ruling is binding upon the IRS. It seems reasonable to assume that the good type's evidence will be more convincing than that of the bad type. To reflect the difference in the strength of the evidence, I assume that a monotone likelihood ratio property prevails. That is, if x and y are two realizations of the taxpayer's strength, then $g(x)/f(x)<g(y)/f(y)$, for all x<y.

4.2.3. Behavioral Assumption

A basic assumption throughout my analysis is that both the IRS and the taxpayer behave rationally, meaning that each acts to maximize an appropriately defined objective function. I assume that the taxpayer is risk neutral and maximizes his after-tax net income.

In choosing the IRS's objective function, I first assume that the IRS wishes to achieve economic efficiency. Compared with the investment in the safe project, the bad type's investment in the risky project results in an efficiency loss of (r_f-R) and the good type's investment results in an efficiency gain of $[PG-(r_f-R)]$. To maximize social welfare, the

IRS wants the bad type to choose the safe project and the good type to choose the risky project.

Second, I argue that the objective function of a social-welfare-maximizing IRS should incorporate not only the promotion of economic efficiency but also the notion of fairness or "paying one's just share." Inaccurate tax payments, either because of successful tax evasion or because of IRS enforcement policy, cause gains and losses which ought not have occurred according to law. To the extent that this leads to public dissatisfaction (moral outrage), its elimination is a source of welfare improvement.

To model the social consequences of erroneous tax payment, as in Grossman and Katz [1983], I adopt the construct of "a penalty that fits the crime." I assume that tax plus any applicable penalty due under the law is one's just share and view any deviation of the actual payment from the just share as a social loss. This social loss is called a compliance loss. It can be viewed as a form of moral outrage. Recall that the proportional tax and fine structures are exogenously given. As a result, the just share and the deviation can be readily computed. If there is no tax evasion, the proportional tax represents the just share. If the taxpayer attempts to evade tax, then the sum of the proportional tax and penalty is his just share. For example, if the bad type undertakes the risky project and reports no tax, his just share is $(1+\pi)\tau R$, the sum of proportional tax and fine. The just share depends on both the taxpayer's type and his report.

The social welfare function that the IRS wishes to maximize has three components: gross economic efficiency, direct costs of audit, and the compliance loss. I assume that the society can place a price tag on the compliance loss, so that all three variables are commensurable. Let $V(\cdot)$ denote the compliance loss, a function of the deviation from the just share.[9] I assume that $V((1+\pi)\tau R)$ is greater than the sum of audit costs (AC_t+AC_s) since otherwise it would never pay to audit the bad type. The IRS objective function is defined as follows. First, envision the first-best situation under complete information. That is, the bad type chooses the safe project, the good type undertakes the risky project, each

type pays his just share, and the IRS does not audit. For any outcome different from this first-best solution, I can compute various expected losses as the IRS' expected sacrifice in payoff (I will use the terms "the IRS expected loss" and "the IRS payoff" interchangably from now on). I assume that the IRS wishes to minimize that expected sacrifice.

4.2.4. The Sequence of Moves

To recapitulate, the structure of information and the sequence of actions are as follows (and depicted as a game tree in Figure 5).

1.The IRS announces whether to offer the rulings program. This action will be called the IRS' ruling policy. The tax game without the individual rulings program will be called Subgame 1 and the tax game with the individual rulings program Subgame 2. The IRS' ruling policy determines which subgame will be played. The taxpayer knows his type but the IRS does not. The IRS believes that the probability of the taxpayer being a bad type is ϕ, and being a good type is $1-\phi$.
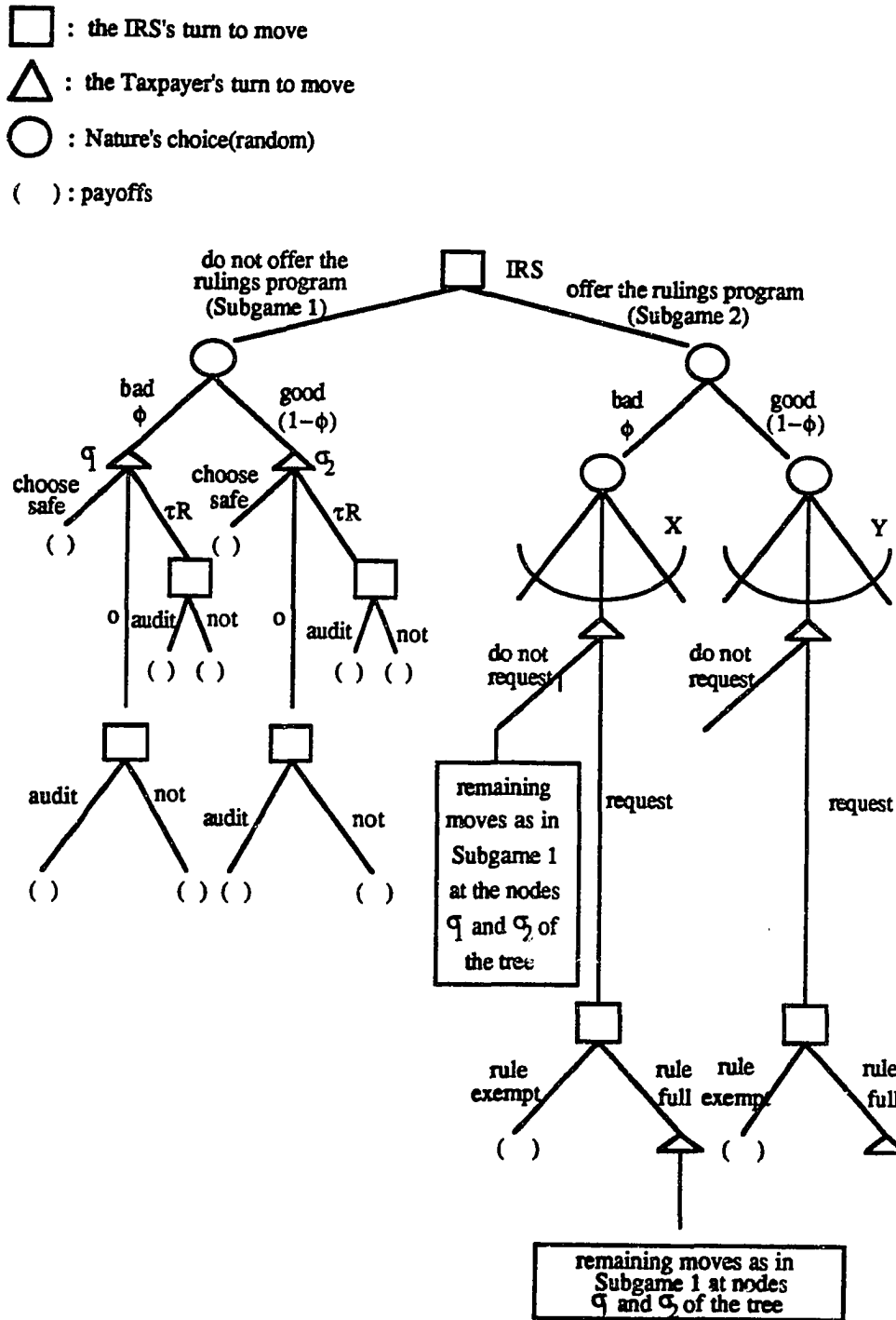
2. Suppose the IRS does not offer the individual rulings program. Since the taxpayer is not allowed to present evidence regarding his type, this subgame consists only of reporting and auditing. The taxpayer first makes the project choice and reports his tax. Then the IRS decides whether to audit, based on the taxpayer's report. If the taxpayer chooses the safe project the only feasible report is $r_f\tau$. The taxpayer has three pure reporting strategies, $\{r_f\tau, 0, \tau R\}$. If the taxpayer chooses the safe project or if the IRS decides not to audit the tax return, the taxpayer pays his tax as reported and the game is over. If the IRS audits the tax return, the taxpayer's type will be identified and the appropriate deficiency (the sum of the underpaid tax and the proportional fine) will be collected.[10]

3. If the IRS offers the rulings program the taxpayer can either request a ruling or just choose one of the projects and report his tax. If the taxpayer requests a ruling, additional information about him is revealed. This additional information can be viewed as another

move by Nature. I model the information structure in Subgame 2 as follows. Nature first chooses the taxpayer type and then makes the second move to determine the strength of each type's evidence. Both moves of Nature are privately observed by the taxpayer. If the taxpayer does not request a ruling, Nature's second move does not have any impact and the sequence of actions will be the same as in Subgame 1 after Nature has determined whether the project is good or bad.

4. If the taxpayer does request a ruling, after Nature's second move, the IRS issues a ruling on whether the gross return, R, is taxable or not. This action will be called the IRS' ruling decision. The ruling issued to the taxpayer is binding upon the IRS. For simplicity, I assume that if the IRS grants tax exemption, the taxpayer reports no tax and game is over.[11] The taxpayer can still report no tax even if he is not granted tax exemption. The sequence of moves after the taxpayer's reporting is the same as in Subgame 1 after Nature has determined whether the project is good or bad. The solution concept employed for this multistage game is sequential equilibrium (Kreps and Wilson[1982]).

FIGURE 5 GAME TREE 2

□ : the IRS's turn to move

△ : the Taxpayer's turn to move

○ : Nature's choice(random)

( ) : payoffs

4.3. Tax Game Without The Individual Rulings Program (Subgame 1)

This section computes equilibria of the subgame in which the IRS does not offer the individual rulings program. Notice that reporting the full tax when the taxpayer undertakes the risky project is dominated by choosing the safe project since R is assumed to be less than r_f.[10] Since nontrivial strategic interaction occurs only when the risky project is undertaken, a strategy for the taxpayer in this subgame is simply a probability of choosing the risky project and reporting no tax. Let α_{1b} and α_{1g} denote these strategies for the bad type and the good type, respectively. By the dominance relation mentioned above, the taxpayer will choose the safe project with a complementary probability.

A strategy for the IRS is a probability of auditing the taxpayer who undertakes the risky project and reports no tax. Let this probability be denoted by β_1. Then this subgame is defined by a triplet $(\alpha_{1b}, \alpha_{1g}, \beta_1) \epsilon [0,1] \times [0,1] \times [0,1]$. Let $N_{1b}(\alpha_{1b}, \alpha_{1g}, \beta_1)$, $N_{1g}(\alpha_{1b}, \alpha_{1g}, \beta_1)$, and $\Pi_1(\alpha_{1b}, \alpha_{1g}, \beta_1)$ denote the payoffs to the bad type, the good type, and the IRS, respectively. To characterize the equilibria of Subgame 1, I begin by establishing the following simple results.

Proposition 4.1.

There does not exist a separating equilibrium.

Proof: There are two cases to consider. First, $\alpha_{1b}=1$ and $\alpha_{1g}=0$ can not be a part of an equilibrium because if the risky project is attractive to the bad type, then it should be even more attractive to the good type. To see that $\alpha_{1b}=0$ and $\alpha_{1g}=1$ also can not be a part of an equilibrium, suppose otherwise. Since only good types undertake the risky project, the IRS has no reason to audit the taxpayer. If the IRS does not audit, the bad type has an incentive to deviate from the purported equilibrium.   Q.E.D.

Remarks: Nonexistence of a separating equilibrium in this kind of setting is a generic result in the literature on auditing. See, for example, Melumad and Thoman [1989].

Observation 4.1.

In equilibrium, $\alpha_{1b} > 0 \Rightarrow \alpha_{1g} = 1$.

Proof: $\alpha_{1b} > 0 \Rightarrow R - \beta_1[(1+\pi)\tau R + AC_t] \geq r_f(1-\tau) \Rightarrow R - \beta_1 AC_t > r_f(1-\tau) \Rightarrow \alpha_{1g} = 1$. Q.E.D.

Observation 4.2.

In equilibrium, $\alpha_{1b} = 0 \Leftrightarrow \alpha_{1g} = 0$.

Proof: The necessity part is obvious since if it is not worthwhile for the good type to undertake the risky project and report no tax, *a fortiori* it will not be worthwhile for the bad type either. The sufficiency part follows from the sequential rationality of the IRS. Suppose that there exists an equilibrium in which only good types undertake the risky project. If only good types undertake the risky project, the IRS has no incentive to audit. If the IRS does not audit, then the bad type has an incentive to deviate from the purported equilibrium and this will eliminate the possibility of $\alpha_{1g} > 0$.   Q.E.D.

These results show that the IRS can not distinguish between the bad type and the good type from the taxpayer's report alone and that if an equilibrium exists, it must be a pooling equilibrium. There are two pooling equilibria in this subgame. In one pooling equilibrium, both types choose the safe project. This equilibrium emerges when the taxpayer expects the IRS to audit with a sufficiently high probability. It is easy to find off-the-equilibrium beliefs that justify such a high audit probability. Notice that in this equilibrium, both types have an incentive to defect to undertaking the risky project since $r_f(1-\tau)$ is less than R. An equilibrium refinement such as the intuitive criterion (Cho and Kreps [1987]) will never eliminate this equilibrium since one cannot impose any restriction on the IRS' beliefs given off-the-equilibrium move (i.e., undertaking the risky project) by the taxpayer.[12]

Let us now explore the other equilibrium in which both types undertake the risky project and report no tax. Since I am looking for the equilibrium where $\alpha_{1b}>0$, by Observation 4.1, the good type's strategy must be such that $\alpha_{1g}=1$. Although the best responses for the bad type taxpayer and the IRS depend on α_{1g}, I will not explicitly consider this dependence and abuse the notation from now on.

For a given probability of audit, β_1, the taxpayer wishes to maximize his expected payoff by choosing a probability that he undertakes the risky project and reports no tax. The payoff to the bad type who reports no tax with probability α_{1b} and is audited with probability β_1 is

$$N_{1b}(\alpha_{1b},1,\beta_1)=\alpha_{1b}\{\beta_1(R-[(1+\pi)\tau R+AC_t])+(1-\beta_1)R\}+(1-\alpha_{1b})r_f(1-\tau).$$

The marginal benefit of choosing the tax-favored project and reporting no tax is

$$\frac{d\,N_{1b}}{d\,\alpha_{1b}}=\beta_1(R-[(1+\pi)\tau R+AC_t])+(1-\beta_1)R-r_f(1-\tau)=R-r_f(1-\tau)-\beta_1[(1+\pi)\tau R+AC_t]. \quad (4.1)$$

This gain decreases with the probability of audit, the size of the fine, and the audit costs. It increases with the difference between the after-tax return of the risky project to the good type and the after-tax return of the safe project under complete information. The bad type will always choose the safe project if the probability of audit, β_1, is such that the marginal benefit expressed in (4.1) is negative and will always undertake the risky project and report no tax if the marginal benefit is positive. Defining $\bar{\beta}_1$ such that (4.1) is equal to zero, I can describe the bad type's best response, $\hat{\alpha}_{1b}(\beta_1)$[13], as follows.

$$\hat{\alpha}_{1b}(\beta_1)\begin{cases} =1 & \text{if } \beta_1<\bar{\beta}_1 \\ \varepsilon\,(0,1] & \text{if } \beta_1=\bar{\beta}_1 \\ =0 & \text{if } \beta_1>\bar{\beta}_1, \end{cases}$$

where $\bar{\beta}_1=[R-r_f(1-\tau)]/[(1+\pi)\tau R+AC_t]$

$\bar{\beta}_1$ is strictly positive since R is assumed to be greater than $rf(1-\tau)$. Although $\bar{\beta}_1$ can be greater than 1, I will ignore this possibility for expositional convenience.

Given that the bad type reports no tax with probability α_{1b}, the expected payoff to the IRS when it observes a report of no tax and audits that report with probability β_1 is

$$\Pi_1(\alpha_{1b},1,\beta_1)=\phi\alpha_{1b}\{(rf-R)+(1-\beta_1)V+\beta_1(AC_t+AC_s)\}+(1-\phi)\beta_1(AC_t+AC_s) \qquad (4.2)$$

The first term in this expession is the social loss due to the bad type's suboptimal investment choice and underreporting. Once the investment choice has been made, the IRS can do nothing to change that choice. Therefore, at the reporting and auditing stage, there will be a sure loss of (rf-R) for bad types that choose the risky project, which occurs with a probability of $\phi\alpha_{1b}$. If the IRS audits with probability β_1, it can detect the underreporting by the bad type, collect the deficiency, and impose the appropriate penalty, but it also suffers the deadweight loss of (AC_t+AC_s). The compliance loss of V will be incurred only when no audit takes place, which occurs with a probability of $(1-\beta_1)$. The second term is the deadweight loss of auditing the good type taxpayer.

For any given α_{1b} (and implicitly α_{1g}), the IRS wants to choose its audit probability to minimize its expected sacrifice in payoff relative to first best. The marginal change in social loss by auditing the taxpayer who reports no tax is

$$\frac{d\,\Pi_1}{d\,\beta_1}=[\phi\alpha_{1b}+(1-\phi)](AC_t+AC_s)-\phi\alpha_{1b}V \qquad (4.3)$$

The marginal cost of auditing the taxpayer (the first term in (4.3)) is the sum of audit costs times the proportion of taxpayers who undertake the risky project and report no tax. The marginal benefit (the second term in (4.3)) is the reduction of the compliance loss. If (4.3) is positive it always pays to audit and if it is negative then it never pays to audit. Let us define $\bar{\alpha}_{1b}$ such that (4.3) is equal to zero. Then the IRS' best response, $\hat{\beta}_1(\alpha_{1b})$, can be calculated as follows.

$$\hat{\beta}_1(\alpha_{1b}) \begin{cases} =1 & \text{if } \alpha_{1b}>\bar{\alpha}_{1b} \\ \varepsilon \ [0,1] & \text{if } \alpha_{1b}=\bar{\alpha}_{1b} \\ =0 & \text{if } \alpha_{1b}<\bar{\alpha}_{1b} \end{cases}$$

where $\bar{\alpha}_{1b}=(1-\phi)(AC_t+ AC_s)/\phi[V-(AC_t+AC_s)]$

Here $\bar{\alpha}_{1b}$ is strictly positive since V is finite and is assumed to be greater than the sum of audit costs. The IRS' best response is to audit if and only if the probability that the bad type reports no tax exceeds some trigger value $\bar{\alpha}_{1b}$ and randomize if $\alpha_{1b}=\bar{\alpha}_{1b}$. Although $\bar{\alpha}_{1b}$ can be greater than or equal to 1, I will assume away this possibility for expositional ease.

Given the best response functions of both players, I am ready to describe the equilibrium configuration. Let a starred triplet $(\alpha_{1b}{}^*, \alpha_{1g}{}^*, \beta_1{}^*)$ be the equilibrium strategies of this subgame. The preceding discussion on the best responses is in essence the proof of the following proposition.

Proposition 4.2.

1. $(\alpha_{1b}{}^*, \alpha_{1g}{}^*, \beta_1{}^*)=(0, 0, \beta_1\varepsilon(\underline{\beta}_1,1])$, where $\underline{\beta}_1=[R-r_f(1-\tau)]/AC_t$

2. $(\alpha 1b^*, \alpha 1g^*, \beta 1^*)=(\bar{\alpha}1b,1, \underline{\beta}1)$

$\underline{\beta}_1$ is the probability of audit that will keep the bad type taxpayer indifferent between the safe project and the risky project. The IRS trades off the deadweight loss of auditing the taxpayer against the reduction of the compliance loss. In this equilibrium configuration, the good type is hurt by the bad type's mimicking behavior. To deter the bad type's noncompliance, the IRS makes the good type suffer because of an unnecessary audit. In equilibrium, the loss due to the unnecessary audit is equated to the compliance gain net of audit costs. $\bar{\alpha}_{1b}$ is the probability of the bad type's underreporting which will make the

IRS indifferent between auditing and not auditing the taxpayer. For future use, let Π_{11}^* be $\Pi_1(0,0,\beta_1\epsilon(\underline{\beta}_1,1])$ and Π_{12}^* denote $\Pi_1(\overline{\alpha}_{1b},1,\overline{\beta}_1)$.

4.4.Tax Game With The Individual Rulings Program (Subgame 2)

This section analyzes the equilibria of the subgame in which the IRS does offer the individual rulings program. If the taxpayer does not request a ruling, the equilibria of this subgame will be exactly the same as in the previous section. Since I am interested in the informational effect of the individual rulings program, I will look at the equilibria when the taxpayer does request a ruling. I first calculate equilibrium configurations of the reporting and auditing stage given an arbitrary ruling decision of the IRS and then describe the optimal ruling decision in terms of a cutoff point.

4.4.1. Equilibrium Profile of Reporting and Auditing Stage

Suppose that a ruling request is made to determine whether the risky project is indeed tax-exempt. Let $\delta(x)$ denote the IRS ruling decision based on the taxpayer's evidence x and let the value of δ be either d_E(tax-exempt) or d_T(fully taxable). For any δ, let X_E and X_T be the subsets of $\mathbf{R}_+$ which are defined as follows:

$$X_E=\{x:\delta(x)=d_E\}, \quad X_T=X_E{}^c=\{x:\delta(x)=d_T\}$$

In words, X_E is the set of taxpayer types that are given tax exemption and X_T the set of taxpayer types that are not. If the ruling decision of the IRS is $\delta(x)$, the taxpayer with $x\epsilon X_E$ will request a ruling and be given tax exemption because requesting a ruling costs nothing and a favorable ruling provides complete insurance.The taxpayer with $x\epsilon X_T$ will be indifferent between requesting a ruling and just entering into the reporting and auditing subgame since although the taxpayer does not request a ruling the IRS knows that his type belong to X_T.

Recall that the ruling decision is binding upon the IRS. If the taxpayer reports no tax with the individual ruling to that effect, the IRS has no reason to audit. Therefore, nontrivial strategic interaction at this stage of Subgame 2 will be between the IRS and the

taxpayer types whose evidence x belong to X_T and who report no tax. Notice that the IRS cannot distinguish good types from bad types beyond the information reflected in evidence x. Let P_b denote the probability that the taxpayer's evidence x belong to X_T. Define P_g similarly. That is, $P_b = \int_{X_T} f(x)dx$ and $P_g = \int_{X_T} g(x)dx$.

A strategy for the taxpayer at this stage in this subgame is again a probability of undertaking the risky project and reporting no tax. Let α_{2b} and α_{2g} denote these strategies for the bad type and the good type, respectively. A strategy for the IRS is a probability of auditing the taxpayer who reports no tax. Let this probability be denoted by β_2. Then a triplet $(\alpha_{2b}, \alpha_{2g}, \beta_2) \in [0,1] \times [0,1] \times [0,1]$ defines this reporting and auditing subgame of Subgame 2. Since the game structure of this reporting and auditing stage is the same as in the previous section except for the fact that the proportions of types are different, I get similar results and state these without proof.

Proposition 4.3.

There does not exist a seperating equilibrium.

Observation 4.3.

In equilibrium, $\alpha_{2b} > 0 \implies \alpha_{2g} = 1$.

Observation 4.4.

In equilibrium, $\alpha_{2b} = 0 \iff \alpha_{2g} = 0$.

As in Section 3, there exist two pooling equilibria at the reporting and auditing stage of this subgame. Since the case in which both types choose the safe project is simple enough, I will concentrate on the equilibrium in which there is nontrivial strategic interaction between the players. Let $\Pi_2(\alpha_{2b}, \alpha_{2g}, \beta_2; \delta(x))$ denote the payoff to the IRS when the ruling decision is $\delta(x)$ and the reporting and auditing stage is played by $(\alpha_{2b}, \alpha_{2g}, \beta_2)$. Since I want to analyze the case where α_{2b} is positive in equilibrium, by Observation 4.3, I can again fix the good type strategy at $\alpha_{2g} = 1$. Then

$$\Pi_2(\alpha_{2b}, \alpha_{2g}, \beta_2; \delta(x)) = \phi(1-P_b)\{(r_f-R)+V\}+\phi P_b\alpha_{2b}\{(r_f-R)+(1-\beta_2)V\}$$
$$+\beta_2[\phi P_b\alpha_{2b}+(1-\phi)P_g](AC_t+AC_s). \tag{4.4}$$

The first term in this expression is the social loss from granting tax exemption to the bad type, based on the evidence presented in the ruling request. There is both an efficiency loss of (r_f-R) and a compliance loss of V. $\phi P_b\alpha_{2b}$ in the second term is the probability that the bad type who is denied tax exemption undertakes the risky project and reports no tax. At this stage of Subgame 2, the investment choice is irreversible and there will be a efficiency loss of (r_f-R) with probability 1 and a compliance loss in the absence of audit, which occurs with probability $(1-\beta_2)$. The third term represents the expected audit costs, the product of the proportion of taxpayers audited with probability β_2 and the sum of each player's audit costs. Differentiating Π_2 with respect to β_2 and rearranging terms gives

$$\frac{d\,\Pi_2}{d\,\beta_2}=(\phi P_b\alpha_{2b}+(1-\phi)P_g)(AC_t+AC_s)-\phi P_b\alpha_{2b}V. \tag{4.5}$$

As in the previous section, defining $\bar\alpha_{2b}$ such that (4.5) is equal to zero, I can determine the best response for the IRS.

As far as the taxpayer is concerned, the situation here is much the same as in section 3. The payoff to the bad type who reports no tax with α_{2b} given the probability of audit β_2 is

$$N_{2b}(\alpha_{2b},1,\beta_2)=\alpha_{2b}\{\beta_2(R-[(1+\pi)\tau R+AC_t])+(1-\beta_2)R\}+(1-\alpha_{2b})r_f(1-\tau).$$

Differentiating N_{2b} with respect to α_{2b}, I get

$$\frac{d\,N_{2b}}{d\,\alpha_{2b}}=\beta_2(R-[(1+\pi)\tau R+AC_t])+(1-\beta_2)R-r_f(1-\tau). \tag{4.6}$$

Defining $\bar\beta_2$ such that (4.6) is equal to zero, I describe the best response for the taxpayer as in Section 4.3. Letting $(\alpha_{2b}{}^*, \alpha_{2g}{}^*, \beta_2{}^*)$ be the equilibrium profile of this reporting and auditing stage in Subgame 2, I summarize the discussion on the pooling equilibria in the following proposition.

<u>Proposition 4.4.</u>

1. $(\alpha_{2b}{}^*, \alpha_{2g}{}^*, \beta_2{}^*)=(0,0,\beta_2 \ \varepsilon \ (\underline{\beta}_2,1])^{14}$

2. $(\alpha_{2b}{}^*,\alpha_{2g}{}^*,\beta_2{}^*)=(\bar{\alpha}_{2b},1, \bar{\beta}_2)$

   where $\bar{\alpha}_{2b}=(1-\phi)P_g(AC_t+AC_s)/\phi P_b[V-(AC_t+AC_s)]$,

   $\bar{\beta}_2=[R-r_f(1-t)]/[(1+\pi)tR+AC_t]$, and $\underline{\beta}_2=[R-r_f(1-t)]/AC_t$

Depending on the magnitude of P_g/P_b that is determined by IRS' ruling decision, $\bar{\alpha}_{2b}$ can be smaller or larger than $\bar{\alpha}_{1b}$. $\bar{\beta}_2$ is the same as $\bar{\beta}_1$ since the bad type faces the same tradeoff and the same level of auditing will keep the taxpayer indifferent between the safe project and the risky project. For future use, let $\Pi_{21}{}^*(\delta)$ be Π_2 $(0,0, \beta_2\varepsilon(\underline{\beta}_2,1];\delta(x))$ and $\Pi_{22}{}^*(\delta)$ denote Π_2 $(\bar{\alpha}_{2b},1, \bar{\beta}_2;\delta(x))$.

4.4.2. Optimal Ruling Decision

In the previous subsection, the ruling decision of the IRS, $\delta(x)$, was arbitrary. As mentioned in Section 4.2, this chapter views the individual rulings program as an administrative proceeding in which the IRS improves its information about the taxpayer type. Conceptually, one can think of the ruling decision as a problem of statistical inference. The IRS deduces something about an unknown parameter (the taxpayer type) from observable data (evidence x). The purpose of this subsection is to characterize the optimal ruling decision.

Given $\delta(x)$, the payoff to the IRS is either $\Pi_{21}{}^*(\delta)$ or $\Pi_{22}{}^*(\delta)$, depending on how the reporting and auditing stage of Subgame 2 is played. Let us first consider the simple case where both types with $x\varepsilon X_T$ choose the ordinary project and report $r_f t$ at the reprting and auditing stage. Suppressing the argument δ, I get

$\Pi_{21}{}^{*}=\phi(1-P_b)\{(r_f-R)+V\}+(1-\phi)P_g(R+PG-r_f).$

P_g and $(1-P_b)$ are the probabilities that δ will lead to the wrong decision. If the IRS grants tax exemption to the bad type, there will be both an efficiency loss, (r_f-R), and a compliance loss of V. If the good type taxpayer chooses the safe project since he has received an unfavorable ruling, there will be an efficiency loss of $(R+PG-r_f)$. One can think of the IRS' ruling decision as a Bayesian statistical problem. That is, the optimal ruling decision must minimize a linear combination of the form, aP_1+bP_2, where $a=\phi\{(r_f-R)+V\}$, $b=(1-\phi)(R+PG-r_f)$, $P_1=(1-P_b)$, $P_2=P_g$. Recall that $P_b=\int_{X_T} f(x)dx$ where $f(x)$ is the density function given that the taxpayer is the good type.

Lemma 4.1.(Neyman-Pearson)

For any constants $a>0$ and $b>0$, let δ^{*} be a decision function such that $\delta^{*}(x)=d_T$ (fully taxable) if $af(x)>bg(x)$ and $\delta^{*}(x)=d_E$ (tax-exempt) if $af(x)<bg(x)$. The value of $\delta^{*}(x)$ may be either d_T or d_E if $af(x)=bg(x)$. Then, for any other decision function δ,

$aP_1(\delta^{*})+bP_2(\delta^{*}) \le aP_1(\delta)+bP_2(\delta).$

Proof: See DeGroot[1970] pp.146-147. For completeness, an entire proof is given in Appendix 1.

Lemma 4.1 says that the optimal ruling decision depends in a very simple way on the likelihood ratio $g(x)/f(x)$ and that the IRS may be viewed as performing a statistical test with the critical region $X_E=\{x:g(x)/f(x) > a/b\}$. The ruling process can be characterized by a likelihood-ratio test in which the IRS seeks to establish an appropriate critical region X_E and grants tax exemption if and only if the taxpayer's evidence x belongs to the critical region.

Proposition 4.5.

The critical region X_E is an interval of the form (x_{c1},∞).

Proof: By definition of the monotone likelihood ratio property, $g(x)/f(x)$ is increasing in x. Let x_{c1} be such that $g(x_{c1})/f(x_{c1})=\phi\{(r_f-R)+V\}/(1-\phi)(R+PG-r_f)$. Then, for all $x>x_{c1}$, $g(x)/f(x)>\phi\{(r_f-R)+V\}/(1-\phi)(R+PG-r_f)$. From Lemma 4.1, the critical region is the interval, (x_{c1},∞). Q.E.D.

<u>Corollary 4.1.</u> The cutoff point x_{c1} is

1. increasing in ϕ, the prior probability that the taxpayer is a bad type,

2. increasing in (r_f-R), the efficiency loss due to the bad type's suboptimal investment,

3. increasing in V, the compliance loss, and

4. decreasing in PG, the magnitute of public good produced by the good type's investment in the risky project.

Proof: Follows immediately from Proposition 4.5.   Q.E.D.

One can think of the cutoff point as a standard of proof. The higher the standard of proof is, the less likely the bad type is to be given tax exemption and *vice versa*. High ϕ means that the taxpayer is *a priori* more likely to be a bad type. As a result, the IRS will be more conservative and the standard of proof should be higher, *ceteris paribus*. The greater the efficiency and compliance losses are, the more careful the IRS should be about issuing a favorable ruling, and the higher the standard of proof will be. The greater is the social value of the public good, the more incentive the IRS has to encourage the good type to invest in the risky project, and the lower the standard of proof will be.

Let us now consider the case where both types undertake the risky project and report no tax (i.e., $\alpha_{2b}^*>0$ and $\alpha_{2g}^*=1$). Substituting the appropriate equilibrium values for α_{2b}, α_{2g}, and β_2 in expression (4.4) and rearranging terms yield,

$$\Pi_{22}^*(\delta)=\Pi_2(\bar{\alpha}_{2b},1,\bar{\beta}_2;\delta)=\phi(1-P_b)\{(r_f-R)+V\}+\phi P_b\bar{\alpha}_{2b}\{(r_f-R)+V\}+\bar{\beta}_2\{[\phi P_b\bar{\alpha}_{2b}+$$
$$(1-\phi)P_g](AC_t+AC_s)-\phi P_b\bar{\alpha}_{2b}V\} \qquad (4.7)$$

The optimal ruling decision should minimize this social loss. Notice that this is not a srtaightforward statistical problem since $\bar{\alpha}_{2b}$ and $\bar{\beta}_2$ are endogenously determined through the strategic interaction between the taxpayer and the IRS at the reporting and auditing stage of Subgame 2. Using the equilibrium relationship, however, I can transform Π_{22}^* into the form of aP_1+bP_2 as follows. First, recall that $\bar{\alpha}_{2b}$ is such that the marginal benefit of auditing the taxpayer is equal to zero. The bracketed expression of the third term in (4.7) is that marginal benefit of auditing the taxpayer. Second, substituting the exogenous terms for $\bar{\alpha}_{2b}$, I rewrite (4.7) as

$$\Pi_{22}^*(\delta)=\{(r_f\text{-}R)+V\}\{\phi(1\text{--}P_b)+(1\text{-}\phi)P_g(AC_t+AC_s)/[V\text{-}(AC_t+AC_s)]\}.$$

This payoff is of the form, aP_1+bP_2, where $a = \phi\{(r_f\text{-}R)+V\}$, $b = (1\text{-}\phi)\{(r_f\text{-}R)+V\}(AC_t+AC_s)/[V\text{-}(AC_t+AC_s)]$, $P_1=(1\text{-}P_b)$, and $P_2=P_g$. Letting x_{c2} denote the cutoff point in this case, I obtain the result similar to Proposition 4.5.

Proposition 4.6.

The critical region is an interval (x_{c2},∞), where x_{c2} is such that

$$g(x_{c2})/f(x_{c2})=\phi[V\text{-}(AC_t+AC_s)]/(1\text{-}\phi)(AC_t+AC_s).$$

Proof: Follows from Lemma 4.1 and the monotone likelihood ratio property. Q.E.D.

Corollary 4.2.

The cutoff point x_{c2} is

1. increasing in ϕ,

2. increasing in V, and

3. decreasing in (AC_t+AC_s), the sum of audit costs.

Proof: Follows from Proposition 4.6.

These results show that the cutoff points and critical regions are different, depending on how the reporting and auditing stage is played. For example, the efficiency loss, $(r_f\text{-}R)$, has no bearing on the determination of x_{c2} whereas the sum of audit costs, (AC_t+AC_s), has nothing to do with x_{c1}. The reason is as follows. In the first subgame configuration, $(0, 0, \beta_2\epsilon(\beta_2,1])$, compliance is not an issue, by assumption, at the reporting and auditing stage and, therefore, audit costs do not influence the choice of x_{c1}. The major concern of the IRS lies with how to encourage the good type's investment in the socially desirable risky project. $(r_f\text{-}R)$ is a cost for encouraging the good type's risky project. In the second equilibrium configuration, $(\bar{\alpha}_{2b},1,\bar{\beta}_2)$, however, the IRS does not have to encourage good types' investment in the risky investment since they will undertake that project anyway with probability 1. The primary objective of the agency in this case is to reduce the bad type's noncompliance at the reporting and auditing stage and, therefore, audit costs should have an impact on the determination of x_{c2}. The more costly an audit is, the less incentive the IRS has to perform the audit and to deter noncompliance, the less costly it is to issue a favorable ruling, and the more liberal the ruling decision becomes. As a result, the standard of proof in the second subgame configuration is decreasing in the sum of audit costs, *ceteris paribus*.

It is shown that different major concerns of the IRS reflected in different equilibrium configurations of the reporting and auditing stage of Subgame 2 result in different cutoff points representing different standards of proof. One can think of higher x_{cj}, $j=1,2$, as more conservative ruling decisions. At this juncture, it is interesting to compare x_{c1} with x_{c2} to see when the IRS makes more conservative or liberal ruling decisions. Using the relative magnitude of public good, I show the relationship between x_{c1} and x_{c2}. Let γ equal to $PG\text{-}[(r_f\text{-}R)+(AC_t+AC_s)]V/[V-(AC_t+AC_s)]$.

Proposition 4.7.

If γ is larger (smaller) than zero, the cutoff point that determines the IRS ruling decision in the first equilibrium configuration of Subgame 2 (x_{c1}) is smaller (larger) than the cutoff point in the second (x_{c2}). If γ is equal to zero, then the two cutoff points are the same.

Proof : See Appendix 1.

Large γ means relatively large PG and *vice versa*. From an economic efficiency point of view, the larger PG is, the more encouraged the good type's risky project should be, *ceteris paribus*. When compliance is not much of a problem as in the first equilibrium configuration, the IRS will be more conservative (liberal) if PG is relatively small (large). In the second case where the IRS has to worry about the effect of its ruling decision on the bad type's noncompliance, the agency has to compromise the efficiency aspect to control the bad type's underreporting. In a sense, x_{c1} can be viewed as more receptive than x_{c2} to the change in the relative magnitute of PG. For future use, let $\delta_1^*(x)$ and $\delta_2^*(x)$ be the ruling decisions characterized by x_{c1} and x_{c2}, respectively, and let Λ_{21}^* denote $\Pi_{21}^*(\delta_1^*)=\Pi_2(0,0,\beta_2\varepsilon(\underline{\beta}_2,1];\delta_1^*)$ and Λ_{22}^* be $\Pi_{22}^*(\delta_2^*)=\Pi_2(\bar{\alpha}_{2b},1,\bar{\beta}_2;\delta_2^*)$.

4.5. Ruling Policy and Social Welfare

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In this section, the effect of the individual rulings program on social welfare will be determined. Recall that the payoff to the IRS is defined as the loss due to suboptimal decision and that Π_{1i}^*, i=1,2, and Λ_{2j}^*, j=1,2, are the subgame equilibrium outcomes. The orderings of these equilibrium payoffs to the IRS determine grand-game equilibria. If the equilibrium payoff to the IRS in Subgame 1 is larger than that in Subgame 2, the rulings program will be offered and such a ruling policy can be thought as increasing social welfare and *vice versa*. For the IRS always to prefer to offer the rulings program, $\Pi_{1i}^* > \Lambda_{2j}^*$, for all i=1, 2, and j=1, 2.

There are multiple subgame equilibria, two for each subgame. Since the players may settle into different subgame equilibrium configurations in different subgames, I have four pairs of subgame equilibrium outcomes to compare to compute grand-game equilibria. Depending on which subgame equilibrium obtains in each subgame, I find different grand-game equilibria and arrive at different conclusions about the social welfare effect of the IRS' ruling policy.

Since the ordering of each pair of subgame equilibrium payoffs depends on the values of exogenous parameters of the model there are many grand-game equilibria. To gain insight into the social welfare effect of the IRS' ruling policy, I proceed in the following way. First, I begin by identifying the cases where I can make an unequivocal statement about the social welfare effect of the individual rulings program. I obtain the orderings that hold under any circumstances. These orderings result in grand-game equilibria where the IRS always prefer to play the tax game with the individual rulings program (i.e., Subgame 2). The analysis of these equilibria gives us an idea when the IRS may refuse to rule. Then we show two sufficient conditions for the two orderings of subgame equilibrium expected

losses that make the IRS refuse to rule, formally proving the argument that the individual rulings program is not always beneficial.

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<u>Proposition 4.8.</u>

The IRS' expected loss in the first (second) equilibrium configuration of Subgame 1 is greater than the IRS' expected loss in the first (second) equilibrium configuration of Subgame 2. That is, $\Pi_{11}^*>\Lambda_{21}^*$ and $\Pi_{12}^*>\Lambda_{22}^*$.

Proof: See Appendix 1.

Remarks: In the first case of the above proposition, both good and bad taxpayer types are better off by the individual rulings program. It is easy to see that the rulings program in this case is both *ex ante* and interim Pareto efficient. As will be seen later, however, the rulings progam hurts the bad type in the second case. As a result, the rulings program is both *ex ante* and interim inefficient.

The intuitive reason for these two inequalities to hold is as follows. Let $\Lambda_{21}(x\infty)$ denote the IRS expected loss in Subgame 2 when the cutoff point is infinity (i.e., no taxpayer gets tax exemption) and the reporing and auditing stage is played by $(\alpha_{2b}^*, \alpha_{2g}^*, \beta_2^*)=(0,0, \beta_2\epsilon(\beta_2, 1])$. Define $\Lambda_{22}(x\infty)$ similarly with $(\alpha_{2b}^*, \alpha_{2g}^*, \beta_2^*)=(\bar{\alpha}_{2b},1,\bar{\beta}_2)$ as the outcome of the reporting and auditing stage. Then it is clear that $\Lambda_{21}^*\leq\Lambda_{21}(x\infty)$ and $\Lambda_{22}^*\leq\Lambda_{22}(x\infty)$ since infinity is not the optimal cutoff point in either case. Notice that $\Pi_{11}^*=\Lambda_{21}(x\infty)$ and $\Pi_{22}^*=\Lambda_{22}(x\infty)$, though strategy profiles that yield the payoffs, Π_{1i}^* and $\Lambda_{2j}^*(x\infty)$, are different.[15]

Since Π_{11}^* is larger than Λ_{21}^*, the first grand game equilibrium configuration is as follows. The IRS offers the rulings program with the cutoff point x_{c1}. The taxpayer with x greater than or equal to x_{c1} requests a ruling and is given tax exemption. The taxpayer with

x less than x_{c1} chooses the safe project and reports the full tax at the reporting and auditing stage. The IRS encourages the good type with $x \epsilon X_E$ to invest in the risky project by granting tax exemption, thereby achieving the efficiency gain of $(R+PG-r_f)$ and reduction of unnecessary audit costs. These benefits outweigh the efficiency and compliance losses due to suboptimal investment and underpayment of tax by the bad type $x \epsilon X_E$.

In the second equilibrium configuration where $\Pi_{12}^* > \Lambda_{22}^*$, the IRS offers the rulings program with the cutoff point x_{c2}. The taxpayer with $x \geq x_{c2}$ requests a ruling and receives a favorable response. The taxpayer with $x < x_{c2}$ does not request a ruling and the good type undertakes the risky project with probability 1, while the bad type chooses the risky project with probability $\bar{\alpha}_{2b}$. The costs and benefits associated with the ruling process with the cutoff point x_{c2} are as follows. First, unnecessary costs to audit the good type with $x \epsilon X_E$ can be saved. Second, the pre-screening through the ruling process discourages the bad type from investing in the risky project, thereby resulting in both efficiency and compliance gains. Since the rulings program screens out good types, the proportion of the bad type at the reporting and auditing stage will be increased. This increase in the proportion of the bad type will increase compliance. That is, $\bar{\alpha}_{2b}$ is smaller than $\bar{\alpha}_{1b}$ since it follows from the first order stochastic dominance implied by the monotone likelihood ratio property that $G(x_{c2})/F(x_{c2})$ is less than 1. The reason for this decrease in the probability of the bad type's reporting no tax is that after the screening through the ruling process, the probability that a random taxpayer is the bad type increases. In such a case, a given taxpayer who reports no tax will be more likely to be the bad type, so that the IRS will have the greater incentive to audit. To keep the IRS indifferent, therefore, the bad type must decrease his probability of reporting no tax. Third, since the screening through the ruling process is imperfect, some bad types who appear to be good will be granted tax exemption and get away with inefficient investment and underpayment, causing the efficiency loss of (r_f-R) and compliance loss of V. Since the loss of auditing the good type is equated to net compliance gain by auditing the bad type at the reporting and auditing

stage in each subgame, the payoff comparison in this second case boils down to which subgame equilibrium results in a higher probability of noncompliance and inefficient investment. In Subgame 1, this probability of noncompliance is $\phi\bar{\alpha}_{1b}$ and in Subgame 2, $\{\phi[1-F(x_{c2})]+\phi F(x_{c2})\bar{\alpha}_{2b}\}$. Proposition 4.8 establishes that the former is greater than the latter.

It is shown that if the equilibrium characteristics of the reporting and auditing stage in each subgame are not qualitatively different, the IRS will always prefer to offer the individual rulings program. Notice that if the equilibrium reporting and auditing strategies are similar, then the major concern of the IRS does not differ for each subgame. In the first grand game equilibrium above, the issue is how to encourage the good type's investment in the risky project, whereas in the second case the concern is how to deter the bad type's inefficient investment and underreporting. For the IRS to refuse to rule, therefore, it is necessary that the players settle into qualitatively different subgame equilibria. Let us now consider grand-game equilibria in which the IRS refuses to rule.

Proposition 4.9.

1. $G(x_{c1})f(x_{c1})/g(x_{c1}) > f(x_{c2})/g(x_{c2}) => \Pi_{12}{}^{*} < \Lambda_{21}{}^{*}$

2. $G(x_{c2})f(x_{c2})/g(x_{c2}) > f(x_{c1})/g(x_{c1}) => \Pi_{11}{}^{*} < \Lambda_{22}{}^{*}$

Proof: See Appendix 1.

Remarks: These orderings result in the grand-game equilibria in which the rulings program is both *ex ante* and interim inefficient.

These orderings are the bases for grand game equilibria in which the IRS prefers to play the tax game without the individual rulings program (i.e., Subgame 1). The sufficient condition for $\Pi_{12}{}^{*} < \Lambda_{21}{}^{*}$ will be satisfied when the relative magnitude of

public good produced by the risky project, γ, is very large. To gain insight into why the IRS does not wish to offer the rulings program, let us consider subgame equilibria that yield these two outcomes. The IRS gets $\Pi_{12}{}^*$ if $(\bar{\alpha}_{1b},1,\bar{\beta}_1)$ is played in Subgame 1 and $\Lambda_{21}{}^*$ if $(0,0,\beta_2 \, \varepsilon(\bar{\beta}_2,1])$ is played at the reporting and auditing stage of Subgame 2. Let us take the equilibrium of Subgame 1 as status quo. Then, in this equilibrium configuration, one can think of the ruling process as changing the taxpayer's behavior. When γ is very large, the main issue would be how to encourage the good type to undertake the risky project . Since the good type undertakes the risky project with probability 1 at status quo, the IRS should not cause the change in the taxpayer's behavior by offering the rulings program.

The second sufficient condition in Proposition 4.9 will be met if γ is very small. The situation is now reversed and the major concern is how to discourage the risky project by the bad type. The IRS gets $\Pi_{11}{}^*$ when $(0,0,\beta_1\varepsilon(\bar{\beta}_1,1])$ is played in Subgame 1 and has no incentive to provide an opportunity for the bad type to get away with the inefficient investment and underpayment of tax. In this equilibrium configuration, the incentive for the IRS not to rule may be viewed as increasing in the efficiency loss of $(r_f - R)$ since γ is decreasing in that loss. This IRS behavior is similar to that of a revenue maximizing IRS, although the motivations differ. In Chapter 3, it was shown that IRS refusal to rule may force the taxpayer to switch from the risky project to the safe project, thereby increasing tax revenues. The IRS in this model prefers not to rule to minimize the social deadweight loss.

4.6. Dynamic Implications

The IRS may refuse to rule if the rulings program has the effect of changing the taxpayer's behavior. From a dynamic perspective, a tax expert made the following observation on the IRS' ruling policy:

> The fact that each company must file for its own ruling enables the IRS to get a sense of how many taxpayers are considering a certain type of transaction. When it perceives that a number of corporations are jumping on a particular bandwagen, it often stops rulings in that area.[16]

Although the model in this chapter is a single period one, a simple extension to a multiperiod model would yield the prediction consistent with this tax expert's view on the IRS' ruling policy. Suppose that the tax game modeled here is played independently in each period except for the fact that the taxpayer's investment choice has a cumulative effect (i.e., capital stock for private return and/or public good is accumulated each period according to the investment choice). Assume that the marginal rate of return on investment is decreasing. Assume also that the initial tax game without the rulings program is played by $(0,0,\beta_1\epsilon(\underline{\beta}_1,1])$ and that the relative magnitude of the public good's social value, γ, is quite large so that $G(x_{c1})f(x_{c1})/g(x_{c1}) > f(x_{c2})/g(x_{c2})$ holds. This inequality implies $\Pi_{12}^* < \Lambda_{21}^*$ and, in turn, $\Pi_{11}^* > \Lambda_{21}^* > \Lambda_{22}^*$. Since no taxpayer undertakes the socially desirable risky project, the IRS offers the rulings program to encourage that project. Note that the IRS is strictly better off by opening up the ruling process. Now suppose that the rulings program successfully changes the taxpayer's behavior and that the players settle into an equilibrium in which the reporting and auditing stage is played by $(\bar{\alpha}_{2b}, 1,\bar{\beta}_2)$ and the cutoff point of the ruling decision is x_{c2}. Notice that the payoff to the IRS in this new equilibrium is Λ_{22}^*. As more and more investments are made in the risky project and as a result, more and more

capital stock for producing public good is accumulated, the marginal public return per project will decrease. As a result, γ becomes so small that $G(x_{c2})f(x_{c2})/g(x_{c2}) > f(x_{c1})/g(x_{c1})$ holds. This implies the reversed inequality $\Pi_{11}^* < \Lambda_{22}^*$ that makes the IRS stop issuing rulings.

4.7. Concluding Remarks and Direction for Future Research

In this chapter, I represent the taxing process as a noncooporative game with incomplete information. The individual rulings program is viewed as a quasi-judicial process in which the taxpayer, who is perfectly informed about his tax liability, can present evidence as to his type. Since the ruling process involves pretransaction review, my concern has been with the possibility that the IRS may use the rulings program to influence the taxpayer's behavior such that the tax law will be implemented as intended by Congress.

It is shown that a social-welfare-maximizing IRS may refuse to rule to discourage socially undesirable investment projects. This result is based on the multiplicity of subgame equilibria and is reminiscent of the role of indices in the signaling model characterized by Spence[1973]. In the educational signaling model, he considered the informational impact of observable but unalterable indices such as sex and race. Even though these indices were not correlated with the ability or productivity of an employee, they might have informational impact since there existed multiple signaling equilibria in each of the indexed markets.[17] In my model, the presence or absence of the individual rulings program plays a similar role.

There are a couple of directions to expand this research. First, the IRS in this model does not have its own private information. In general, the tax liability can be thought of as a function of both facts of a case and relevant tax rules. One would argue that the taxpayer has better information about the facts and the IRS has superior information about the law. If that is the case, the rulings program can be thought of as a two-way communication channel between the IRS and the taxpayer. More often than not, the unclear position of the IRS adds annoying uncertainty to the tax system. One main objective of the individual rulings program is to introduce a greater degree of certainty into the administration of the tax system. If I allowed for the taxpayer's risk aversion and the IRS's private information, I could

investigate the role of the individual rulings program as an insurance and information pooling mechanism.

As described in Chapter 2, individual rulings provide guidance for nonrequesting taxpayers in similar transactions. It would be interesting to see to what extent models in this thesis generalize to the case in which the IRS faces multiple taxpayers with comparable problems. A related issue is the public disclosure of individual rulings. Prior to 1976, the IRS policy was like selective disclosure. Published rulings were selectively and voluntarily provided by the IRS. The unpublished rulings constituted the private information which the IRS might have preferred to withhold from the taxpayers. But this policy was successfully challenged by taxpayers who argued that it violated the Freedom of Information Act. Owing to this litigation, the Tax Reform Act of 1976 required public disclosure of IRS written determinations. The required public disclosure of individual rulings has a remarkable resemblance to financial disclosure regulation by the Securities Act of 1933 and 1934. Although the settings are different, similar economic issues are present and similar arguments for or against public diclosure can be applied. An extension to a multiperson game could offer a well-structured evaluation of the public disclosure problem.

4.8. Appendices

Appendix 1: Proofs

Proof of Lemma 4.1. (Neyman-Pearson)

$$aP_1(\delta) + bP_2(\delta) = a\int_{X_E} f(x)dx + b\int_{X_T} g(x)dx = a + \int_{X_T} [bg(x) - af(x)]dx$$

Since any decision function δ can be characterized by the set X_T on which it specifies

that decision d_T should be chosen, it follows that finding a decision function δ which

minimizes the linear combination $aP_1(\delta) + bP_2(\delta)$ is equivalent to finding a set x_T for which

the final integral in the equation above is minimized. This integral will be minimized if the

set X_T includes every point $x \epsilon R_+$ for which the integrand is negative and excludes every

point $x \epsilon R_+$ for which the integrand is positive. It is irrelevant whether the set X_T includes

or excludes any point $x \epsilon R_+$ for which the integrand vanishes. This is exactly what δ^*

does. Q.E.D.

Proof of Proposition 4.7.

$$g(x_{c1})/f(x_{c1}) - g(x_{c2})/f(x_{c2}) = \phi\{[(r_f-R)+V]/(R+PG-r_f) - [V-(AC_t+AC_s)]/(AC_t+AC_s)\}/(1-\phi)$$

Let $PG=[(r_f-R)+(AC_t+AC_s)]V/[V-(AC_t+AC_s)] + \omega$. Then,

$$g(x_{c1})/f(x_{c1}) - g(x_{c2})/f(x_{c2}) = \phi\{[V-(AC_t+AC_s)]/[(AC_t+AC_s)+\omega]\}/(1-\phi)$$

$$-\phi\{[V-(AC_t+AC_s)]/(AC_t+AC_s)\}/(1-\phi)$$

$\gamma > 0 \Rightarrow \omega > 0 \Rightarrow g(x_{c1})/f(x_{c1}) < g(x_{c2})/f(x_{c2}) \Rightarrow x_{c1} < x_{c2}$

$\gamma = 0 \Rightarrow \omega = 0 \Rightarrow g(x_{c1})/f(x_{c1}) = g(x_{c2})/f(x_{c2}) \Rightarrow x_{c1} = x_{c2}$

$\gamma < 0 \Rightarrow \omega < 0 \Rightarrow g(x_{c1})/f(x_{c1}) > g(x_{c2})/f(x_{c2}) \Rightarrow x_{c1} > x_{c2}$. Q.E.D.

Proof of Proposition 4.8.

To prove this proposition, I begin by establishing a technical result.

Lemma 4.2.

Let X and Y denote continuous nonnegative random variables having densities f and

g and hazard-rate functions λ_x and λ_y, respectively. If $g(x)/f(x)>g(t)/f(t)$, for all

$x>t$, then $\lambda_x(t)>\lambda_y(t)$, for all $t\geq0$.

Proof: $\lambda_x(t)=f(t)/1-F(t)=f(t)/\int_t^\infty f(x)dx>f(t)/\int_t^\infty[g(x)f(t)/g(t)]dx=g(t)/\int_t^\infty g(x)$

$$=g(t)/1-G(t) = \lambda_y(t) \quad Q.E.D.$$

To prove part 1 of the proposition,

$\Pi_{11}{}^*-\Lambda_{21}{}^*=(1-\phi)(R+PG-r_f)-\{(1-\phi)G(x_{c1})(R+PG-r_f)+\phi[1-F(x_{c1})][(r_f-R)+V]\}$

$$=(1-\phi)[1-G(x_{c1})](R+PG-r_f)-\phi[1-F(x_{c1})][(r_f-R)+V]$$

$$=\phi(1-F)[(r_f-R)+V]\{(1-\phi)(1-G)(R+PG-r_f)/\phi(1-F)[(r_f-R)+V] - 1\}$$

From Proposition 4.5, $g(x_{c1})/f(x_{c1})=\phi(1-F)[(r_f-R)+V]/(1-\phi)(R+PG-r_f)$

$$\Pi_{11}{}^* > \Lambda_{21}{}^* <=> (1-G)f/(1-F)g >1 <=> f/(1-F) > g/(1-G)$$

The last inequality follows from Lemma 4.2.

To prove part 2,

$\Pi_{12}{}^*-\Lambda_{22}{}^*= \phi\bar\alpha_{1b}\{(r_f-R)+(1-\bar\beta_1)V+\bar\beta_1(AC_t+AC_s)\}+(1-\phi)\bar\beta_1(AC_t+AC_s)$

$$-\phi[1-F(x_{c2})]\{(r_f-R)+V\}+\phi F(x_{c2})\bar\alpha_{2b}\{(r_f-R)+(1-\bar\beta_2)V\}$$

$$+\bar\beta_2[\phi F(x_{c2})\bar\alpha_{2b}+(1-\phi)G(x_{c2})](AC_t+AC_s)$$

$$= \{\phi\bar\alpha_{1b}- \phi[1-F(x_{c2})]-\phi F(x_{c2})\bar\alpha_{2b}\}\{(r_f-R)+V\}$$

Substituting for $\bar\alpha_{1b}$ and $\bar\alpha_{2b}$ gives us,

$\Pi_{12}{}^*-\Lambda_{22}{}^*=\{(1-\phi)(1-G)(AC_t+AC_s)/[V-(AC_t+AC_s)]-\phi(1-F)\}\{(r_f-R)+V\}$

$$=\phi(1-F)\{(r_f-R)+V\}\{(1-\phi)(1-G)(AC_t+AC_s)/\phi(1-F)[V-(AC_t+AC_s)] -1\}$$

From Proposition 4.5, $g(x_{c2})/f(x_{c2}) = \phi[V-AC_t+AC_s)]/(1-\phi)(AC_t+AC_s)$

$$\Pi_{12}{}^*>\Lambda_{22}{}^*<=> (1-G)f/(1-F)g > 1 <=> f/(1-F) > g/(1-G)$$

Again the last inequality follows from Lemma 4.2. Q.E.D.

Proof of Proposition 4.9.

$\Pi_{12}{}^*-\Lambda_{21}{}^*=(1-\phi)[1-G(x_{c1})](R+PG-r_f)-\phi[1-F(x_{c1})][(r_f-R)+V]-(1-\phi)\gamma$

$$=\phi[1-F(x_{c1})][(r_f-R)+V]\{f(x_{c1})[1-G(x_{c1})]/g(x_{c1})[1-F(x_{c1})]-1\}$$

$$-\phi[(r_f\text{-}R)+V]\{f(x_{c1})/g(x_{c1}) \text{-} f(x_{c2})/g(x_{c2})\}$$

$$=\phi[(r_f\text{-}R)+V]\{f(x_{c2})/g(x_{c2}) - G(x_{c1})f(x_{c1})/g(x_{c1})\}\text{-}\phi[1\text{-}F(x_{c1})][(r_f\text{-}R)+V]$$

Therefore, $f(x_{c2})/g(x_{c2}) < G(x_{c1})f(x_{c1})/g(x_{c1}) =>\Pi_{12}{}^* < \Lambda_{21}{}^*$. Similarly,

$$\Pi_{11}{}^*\text{-}\Lambda_{22}{}^*=\phi[1\text{-}F(x_{c2})][(r_f\text{-}R)+V]\{f(x_{c2})[1\text{-}G(x_{c2})]/g(x_{c2})[1\text{-}F(x_{c2})]\text{-}1\}$$

$$+\phi[(r_f\text{-}R)+V]\{f(x_{c1})/g(x_{c1}) \text{-} f(x_{c2})/g(x_{c2})\}$$

$$=\phi[(r_f\text{-}R)+V]\{f(x_{c1})/g(x_{c1}) - G(x_{c2})f(x_{c2})/g(x_{c2})\}\text{-}\phi[1\text{-}F(x_{c2})][(r_f\text{-}R)+V]$$

and $f(x_{c1})/g(x_{c1}) < G(x_{c2})f(x_{c2})/g(x_{c2}) =>\Pi_{11}{}^* < \Lambda_{22}{}^*$.   Q.E.D.

Appendix 2: Footnotes

1. As opposed to the "public interest" perspective adopted here, Stigler [1971] advanced the "capture theory" of regulation by examining the supply and demand for regulation. He argued that industries which commanded sufficiently large political power and cohesiveness will endeaver to utilize the powers of the state to increase the industry's profitability. Although this theory explains why and how the specific regulations come into being, it seems to lack predictive power since virtually any observations on regulation can be reconciled with it.

2. What I mean by social welfare will be elaborated on in Subsection 2.3.

3. A case in point is discussed in Revenue Ruling 79-300. Section 183 of the Code disallows deductions for activities not engaged in for profit. In Revenue Ruling 79-300, the IRS declined to apply Section 183 to the construction and operation of low and moderate income housing under the National Housing Act because that Act assumed that the deduction of tax losses would be allowed to encourage investment in such projects. To require a pre-tax profit as proof of business purposes under these circumstances would interfere with the incentive intended by Congress, assuming that the transactions were what they were purported to be.

4. For the definition of implicit tax and related issues, see Scholes and Wolfson [1990] and Wolfson [1985].

5. Melumad and Mookherjee [1989] pointed out the possibility of IRS exploitation in grey areas of the law when the agency is provided with incentives to maximize revenue.

6. This assumption is just for simplicity. We can allow for a gaming situation but this will not change the result as long as the equilibrium of the game is unique.

7. I assume that the taxpayer's superior information about tax liability is perfect. I entertain this extreme assumption to concentrate on the role of the rulings program as a quasi-judicial process.

8.Given perfect audit, one could get rid of the bad type projects if the fine, π, were sufficiently large. But there are institutional constraints on the level of punishments and detection (see Graetz and Wilde [1985] on this point). The assumption of the perfect audit is made for simplicity and does not affect qualititatively the main results of this chapter.

9.The presumption in this study is that taxes are collected to finance government activities producing public goods that would otherwise not be produced. If taxes collected are less than the just share defined by tax laws because of successful underpayment of some taxpayers, desired public goods will not be delivered and social loss will be incurred. This loss may be thought of as being reflected in V.

10. For expositional convenience, we rule out a refund of overpayment, when the taxpayer is found, after an audit, to report more than his just share. If the objective of the IRS includes the minimization of social loss due to the difference between the taxpayer's actual payment and his just share, the Service will want to refund the overpayment. Ruling out this possibility is for simplicity and does not affect the major results.

11. Although the evidence presented in the ruling request is subject to taxpayers' manipulation, some of the good types should be able to present convincing evidence as to their claim with a positive probability, if there is an inherent difference between the two types. This assumption simply reflects the observation that if the IRS is convinced that a taxpayer is a good type, then it is optimal to grant tax exemption.

12. The intuition behind the Cho-Kreps criterion is as follows. Suppose that the taxpayer makes an off-the-equilibrium move (undertaking the risky project and reporting no tax). Then the IRS will interpret this move as a defection by a taxpayer type and consequently, consider only taxpayer types that have incentives to defect in updating its beliefs as to the taxpayer type. To illustrate, suppose that only the good type has an incentive to deviate and undertake the risky project in this pooling equilibrium. Then the intuitive criterion requires that the IRS' updated beliefs given this defection assign zero probability to the bad type

and 1 to the good type. If both types have (or no type has) the incentive to defect, the criterion does not impose any restriction.

13. As mentioned before, I am abusing the notation, suppressing an argument of the best response function, α_{1g}. The correct notation would be $\alpha_{1b}(1, \beta_1)$.

14. It is easy to find off-the-equilibrium beliefs that justify this IRS action. For example, if the IRS believes, given the off-the-equilibrium move of the taxpayer, that the probability of the risky project being a bad type is greater than or equal to $\bar{\alpha}_{2b}$, then it is optimal to audit with a probability $\beta_2\epsilon(\beta_2,1]$.

15. Notice that this intuitive proof does not establish the strict inequalities of Proposition 4.8.

16. Belluck [1985], quoting Langdon, L.

17. For concreteness, Spence[1973] used sex as the example. Assume that within each group of men or women the distribution of productive capabilities are the same. Then sex by itself could not tell anything about productivity since sex and productivity are uncorrelated. Assume that men and women of equal productivity have the same signaling (educational) costs. Then it would appear that their opportunity sets are the same. Under these two assumptions, we appear to be driven to the conclusion that sex can have no informational impact. But this conclusion is wrong since there exist multiple signaling equilibria in the men's market and in the women's market. They may settle into signaling equilibrium configurations independently of each other and stay there. We have the possibility of arbitrary differences in the equilibrium configurations of two distinct groups (e.g., women may be at a disadvantage relative to men).

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