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Boon or Bane? Advance Tax Rulings as a Measure to Mitigate Tax Uncertainty and Foster Investment

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ABSTRACT:

Politicians and tax practitioners often claim that tax uncertainty negatively affects investment. In many countries, firms can request fee-based Advance Tax Rulings (ATRs) to mitigate tax uncertainty. We analyze theoretically the circumstances under which investors request ATRs, how tax authorities should price them and how they can affect investment. We assume that tax authorities integrate investors' reasoning into their decisions. We determine the optimal fee tax authorities should charge. We find that in special cases this fee is prohibitively high, thus firms will refrain from requesting ATRs. However, we find that revenue-maximizing tax authorities offer ATRs if the ruling enables them either to significantly reduce their tax audit costs or to increase the probability of detecting ambiguous tax issues. Under certain circumstances, ATRs may effectively foster investment and potentially benefit both the tax authorities and taxpayers. Our results provide new explanations for why taxpayers that face high levels of tax uncertainty often do not request ATRs, even when the fee is rather low. Our results also hold when the tax authority maximizes social wealth instead of its revenues. Regulatory changes in ATR requirements might serve as a natural quasi-experiment for an empirical study of our predictions regarding investment decisions.

Keywords: *Advance Tax Rulings, Fee Design, Investment Effects, Tax Uncertainty*

JEL Classification: *H21, H25, M41, M42, M48*

I. Introduction

Tax practitioners, politicians and lobbyists often claim that tax uncertainty negatively affects investment.

> *'There must be certainty about tax provisions designed to encourage investment, or the investment won't take place.' (Tom Giovanetti, president of the Institute for Policy Innovation, IPI 2015)*

In addition, practitioners are concerned about the potential impact of tax risk and tax changes for economic decisions (Deloitte, 2014). A recent survey of 830 tax and finance executives found as follows:

> *'85% of US-headquartered companies report that they are experiencing more risk or uncertainty around tax legislation or regulation than they were two years ago.'* (EY, 2014, p. 3).

Obviously, tax risk is growing in scope and relevance and is expected to have considerable economic effects.

Tax uncertainty arises from the difficulty in applying ambiguous tax laws and anticipating the consequences of a future tax audit (Mills, Robinson, and Sansing, 2010; Lisowsky, Robinson, and Schmidt, 2013). Prior to making an investment decision, investors must forecast the prospective tax burden, as it can be a significant cost factor. It is frequently claimed that this tax uncertainty is harmful for investment (for empirical evidence see, e.g., Edmiston, 2004). Even a detailed examination of underlying legal norms sometimes cannot prevent a tax issue from being interpreted in myriad ways. No matter how detailed the tax code may seem to be, it still contains rules that are far too general to clearly indicate how a particular transaction is to be taxed (Scholes, Wolfson, Erickson, Hanlon, Maydew, and Shevlin, 2015, p. 17). Consequently, investors are expected to seek shelter from the risk of an unfavorable interpretation of a tax issue by tax authorities.

Advance tax rulings (ATRs) are instruments that offer legal certainty on a specific tax issue associated with a future business activity, such as an investment. However, ATRs typically are not free of charge. To obtain a binding ex ante ruling, a taxpayer typically must pay a pre-determined fee. Against this background, we determine under what circumstances taxpayers request ATRs, and when tax authorities will offer such instruments. In addition, it is not obvious how much tax authorities should charge even when they anticipate taxpayers' behavior correctly. We answer these questions in the following investigation by developing a model of how tax uncertainty can impact real investment decisions and exploring under what circumstances taxpayers and tax authorities enter into ATRs. Our model suggests that taxpayers are more likely to seek ATRs for investment with rather modestly sized cash flows than when there is high potential tax damage from high tax uncertainty. Furthermore, tax authorities are more likely to provide ATRs when they can reduce audit costs, increase detection, or increase tax revenues by encouraging investment.

In many countries, tax authorities are required by law to issue ATRs. According to the OECD's Comparative Information Series (OECD, 2015, p. 289), which provides an overview of the tax administrations in OECD and selected non-OECD countries, ATRs are a popular and widely available instrument across the globe. Of the 34 OECD countries, 33 allow taxpayers to request an ATR. China, Colombia and Indonesia are the only countries among the 22 non-OECD countries under review that do not offer this option. In 31 OECD countries and 16 non-OECD countries, the rulings are binding on the tax administrations. Bulgaria, Hungary, India, Japan, and Malta offer non-binding rulings. Many tax authorities charge a fee in return for offering taxpayers ATR certainty. According to the OECD's Comparative Information Series, 15 (out of 34) OECD and six (out of 22) non-OECD countries charge a fee for providing ATRs (OECD, 2015, p. 289).

From practical experience we know that ATR fees vary considerably across countries. For example, the fees range between 625 USD and 11,500 USD in the U.S., there is an upper bound of approximately 10,000 USD in South Africa, Canada charges 84 to 130 USD plus tax per hour, and the fee is 423 USD plus 106 USD per hour in Singapore.[1] In Germany, the fees range from a minimum of 35 € to a maximum of 109,736 € or 50 € per hour if the tax authority cannot determine the amount in dispute.[2] Austria charges fees ranging from 1,500 € to 20,000 € and Luxembourg charges between 3,000 € and 10,000 €.[3]

Recently, rulings have received a substantial amount of attention and have been controversially discussed as instruments for aggressive tax strategies and undesirable tax avoidance in the major international daily newspapers and by the tax administrations in the OECD countries (OECD, 2013, esp. Action 5; ICIJ, 2014). Some countries offer rulings designed to attract multinational groups, guaranteeing them ex ante that their tax structure (such as hybrid financing) will be accepted. The International Consortium of Investigative Journalists (ICIJ) has assembled the so-called Luxembourg Leaks database, which is based on a confidential cache of secret tax agreements approved by Luxembourg authorities that provide tax-relief for more than 350 companies across various industries around the world, including, e.g., ABS-CBN Broadcasting Corporation, Amazon, Apple, Eon Group, FedEx Corp, Guardian Media Group, Ikea, Procter & Gamble, Sinopec, Skype, The Walt Disney Company, Vodafone, and the Volkswagen Group. These 350 companies mainly take advantage of cross-border financing structures that enjoy substantial tax privileges in Luxembourg.[4] Luxembourg Leaks (ICIJ, 2014) has taught us that this type of ruling is enormously popular and is used frequently. What are the basic characteristics of the underlying investments? First, without a ruling, such international tax planning activities and the underlying investments are characterized by a high degree of tax uncertainty. Second, except for the chosen tax (avoidance) structure there is typically no additional economic benefit for the investor that is to be derived from investing in the destination country, which means that potential tax damage might render the investment highly unfavorable. Our general model will prove that these features are a necessary component of the demand for ATRs.

In contrast to these publicly debated rulings in cross-border situations we primarily address a more general type of uncertain tax position. It is possible that the investment is associated with cash outflows that are expected to be tax-deductible but that might be considered as non-tax deductible by the tax authority in a tax audit. For example, this is the case for R&D investments when it is not clear whether the costs at issue must be capitalized; this might be the case with real estate investments if it cannot be determined in advance what part of the investment costs are attributed to non-depreciable land. In such cases, only when there is a favorable interpretation by the tax authority does the outflow reduce taxes. Alternatively, a firm requesting an ATR can condition its investment decision on the ATR's outcome. Otherwise, if no ATR has been requested, such conditionality is not possible.

In our first step, we determine the maximal fee that investors are willing to pay for the ATR based on the investment's characteristics. Moreover, we show how the possibility of requesting an ATR influences investment decisions. Based on the determination of the taxpayers' maximal fee, we determine the optimal fee that the tax authorities should charge for ATRs. Assuming that the tax authority determines the fee, we then identify a basic scenario in which the optimal fee is prohibitively high. In other words, the fee exceeds the investor's willingness to pay. By contrast, if we extend the model framework, we show that the tax authorities' ATR offer meets the investor's demand when the tax authorities can either significantly increase their detection probability of ambiguous tax issues or decrease their tax audit costs, which is possible as a consequence of the extra documents that the taxpayer submits with the ATR application. Our results hold whether the tax authority maximizes either revenues[5] or social wealth.

The remainder of the paper is organized as follows. In the next section, we review the prior literature. In section III, we introduce our framework, while in section IV, we introduce our model to analyze the taxpayer's investment decision. In section V, we integrate the tax authorities' perspective into the model. Based on the results of the previous section, we determine the optimal fee that the tax authority should charge for ATRs in various settings. Finally, we summarize and draw conclusions in section VI.

II. PRIOR LITERATURE

Although there are several jurisprudential contributions regarding the legal conception and practical issues involving ATRs, few scholarly contributions examine the economic reasoning behind such rulings. One such contribution that does make such an examination is Givati (2009). By analyzing taxpayers' strategic considerations regarding whether to request an ATR, Givati explains the infrequent use of such rulings in the US. The author shows that the strategic disadvantages of requesting ATRs (such as increased inspection, detection and expertise of tax examiners) outweigh the benefits (such as avoidance of penalties).

De Simone, Sansing, and Seidman (2013) study the attractiveness of ‘enhanced relationship tax compliance programs’, in which taxpayers may disclose significant uncertain tax positions to the tax authority prior to filing a tax return. In exchange, the tax authority provides a timely resolution of these positions and does not challenge the position within the review of a filed tax return. Using a game theoretic framework, these authors identify settings in which these programs are mutually beneficial to taxpayers and tax authorities by virtue of lower combined government audit and taxpayer compliance costs.

We contribute to this stream of literature by analyzing the advantages of ATRs from both the taxpayer’s and tax authority’s perspectives. Whereas enhanced relationship tax compliance programs address the resolution of uncertain tax positions, ATRs provide legal certainty to the taxpayer before the underlying business decisions are made. Therefore, in contrast to De Simone et al. (2013), we analyze the costs and benefits of the uncertainty shield that ATRs generate in a taxpayer’s decision-making process regarding a potential investment. Based on a taxpayer’s maximum fee, we identify the salient factors that drive the decisions of tax authorities to offer ATRs. In so doing, we can identify those scenarios in which offering ATRs is beneficial for tax authorities that anticipate taxpayer behavior.

As an instrument that covers a broad range of transactions, ATRs must be distinguished from Advance Pricing Agreements (APAs), i.e., international ex ante bilateral or multilateral agreements between taxpayers and tax authorities on transfer pricing problems arising from cross-border transactions (De Waegenaere, Sansing, and Wielhouwer, 2007; Becker, Davies, and Jakobs, 2014; for an overview see Vollert, Eikel, and Sureth, 2013). Our model also covers APAs when they are modeled in very abstract, almost naïve ways that neglect the peculiarities of the APA process. De Waegenaere et al. (2007) reflect these special features of APAs in their seminal paper, which focuses on the decision arising from a game involving three parties (the tax authorities of the two countries and the requesting firm) instead of on the reduction of an investment´s uncertainty. De Waegenaere et al. (2007) assume a tax planning situation, i.e., they aim to discover how income is allocated across the two countries and under what circumstances an APA will be feasible. Therefore, the decision situation in their setting is quite different from the one we model in this paper. In contrast to our study, De Waegenaere et al. (2007) do not address whether taxpayers should engage in an investment in the presence of tax uncertainty and how APAs affect investment. Further, De Waegenaere et al. (2007) assume, contrary to our model, that the firm knows the 'true' values of the transfer prices whereas the tax authorities must conduct an audit to obtain sufficient information to determine 'true' transfer prices. Their analysis therefore more closely resembles a tax evasion model (e.g., Reinganum and Wilde, 1986); Erard and Feinstein, 1994). Therefore, the parties play a reporting game when not applying for an APA. By contrast, we address the reverse case. The taxpayers are uncertain about the true treatment of the tax case and thus apply for an ATR.

Alternatively, taxpayers can hire tax professionals to help them prepare the tax assessment and reduce tax uncertainty, or in some countries, they can ask the tax authority to provide a real-time audit (Beck and Lisowsky, 2014) or even purchase insurance against tax risk (e.g., Logue, 2005). In contrast to our study on ATRs, Beck and Lisowsky (2014) find that firms with moderate-sized FIN 48 reserves and moderate exposure to tax uncertainty are more likely to participate in the 'Compliance Assurance Process' audit program offered by the U. S. Internal Revenue Service (IRS) on a voluntary basis. While those authors focus on compliance behavior, we are interested in the effect of an upfront tax uncertainty shield on investments. We also contribute to the literature that investigates the effects of additional information on tax compliance. Sansing (1993) investigates tax authorities' information acquisition that helps to improve audit decisions in a tax compliance game. Among other findings, Sansing shows that such information acquisition frequently will have no effect on the expected level of the tax authorities' revenues. Moreover, using a game-theoretic approach, Beck, Davis, and Jung (2000) investigate the effects of a penalty exemption for taxpayers who voluntarily disclose questionable positions to the government. These authors find that information disclosure may positively or negatively impact collection costs and tax revenues and that the penalty exemption often is not an effective tool to increase revenues. The results of both studies are consistent with our finding that the tax authorities often are not likely to be in an improved position when offering a tax uncertainty shield to taxpayers. Nevertheless, Sansing (1993) and Beck et al. (2000) do not provide insight into the taxpayers' possibility of eliminate tax uncertainty prior to the investment. Instead, they investigate the possibility of tax authorities' acquiring information to improve audit decisions and a voluntary disclosure of uncertain positions, as well as a compliance decision. Additionally, Mills et al. (2010) choose a game-theoretic approach to investigate the effects of FIN 48 on strategic interactions between publicly traded corporate taxpayers and the government. They find that FIN 48 does not necessarily harm taxpayers, who are mandatorily required to disclose liabilities for uncertain tax benefits in their financial statements. Furthermore, they show that taxpayers overstate or understate such liabilities relative to their expected cash payments. As is common in the tax compliance and tax aggressiveness literature, Mills et al. (2010) consider a post-investment mandatory disclosure of uncertain tax benefits, whereas we investigate an instrument that enables taxpayers to eliminate tax uncertainty before making the investment decision. Nevertheless, as support for their findings, we also identify the ambiguous effects of information that the taxpayer provides in the ATR process. Reducing tax uncertainty and simultaneously increasing information availability do not necessarily appear to be beneficial for the parties involved.

Therefore, our paper also extends the previous literature on the demand for (tax) information or advice. As with our investigation of ATRs, Shavell (1988) studies contemplated acts and finds (in a non-tax context) that individuals will engage in contemplated acts when the benefits outweigh the expected sanctions. They seek legal advice if the expected value of such advice, which is determined by the likelihood that the individual's decision to commit the act will change, multiplied by the benefit of committing the act, exceeds the cost. Beck and Jung (1989) show that the demand for tax advice to reduce tax uncertainty depends on audit probability, the penalty rate and the tax rate. Furthermore, Beck, Davis, and Jung (1996) find that taxpayers with the highest degree of uncertainty acquire information from tax advisers more frequently. Frischmann and Frees (1999) empirically demonstrate that taxpayers purchase tax advice to save time and protect against uncertainty. In line with these studies, we also find high willingness to pay for information (ATR) to mitigate high volatility of after-tax returns.

All these studies indicate that gathering information from experts regarding uncertain tax issues leads to reduced legal uncertainty. However, prior studies that investigate the impact of tax uncertainty on investment behavior have provided only mixed results. Thus, Beck and Jung (1989) analytically demonstrate that greater tax liability uncertainty may either increase or decrease reported income. Furthermore, Edmiston (2004) provides empirical evidence for the negative impact that tax uncertainty has on investments. Among those studies that focus on the impact of tax uncertainty on investment decisions in a real option setting, Agliardi (2001), Niemann (2011) and Niemann and Sureth-Sloane (2016) identify the ambiguous effects of tax uncertainty on investment decisions. Whereas all three analyses find that uncertainty about tax policy delays investment, Niemann (2011) also shows that if profit tax uncertainty is small compared to cash flow uncertainty – and if both stochastic processes are positively correlated – increased tax uncertainty may also accelerate investment. Niemann and Sureth-Sloane (2016) find an increase in tax risk may accelerate investments if the level of capital tax risk is low.

Against this background, our study attempts to highlight whether and under what conditions ATR demand and supply will meet and whether ATRs help to improve the investment environment.

III. FRAMEWORK

Two parties are involved in the overall investment decision – an investor and the tax authority. The investment decision is risky. By assumption, the only risk involved is the tax risk. We abstract from pre-tax cash flow uncertainty to isolate tax uncertainty from project uncertainty. However, the underlying projects themselves (such as R&D) often may be inherently uncertain. It is worthwhile to extend our model regarding multi-fold uncertainty in the future.

The tax authority's role is to provide an ATR that offers the opportunity to resolve tax uncertainty and that sets a price $\bar{F}$ for the ATR. Here, $\bar{F}$ is the fee that investors must pay for the ATR. During the ATR application process, the tax authority audits the documents that the applicant provides before conducting the underlying investment (the ATR audit). If, at the end of the ATR audit, the tax authority interprets the tax consequences that the ATR covers in line with the investor's previous expectations, the investor does not have to adjust her initial tax expectations. If the tax authority's interpretation differs from the interpretation that investor has expected, she accordingly corrects the expected after-tax net cash flow prior to the decision-making process. This ATR audit anticipates the outcome of the regular ex post tax audit (ex post audit), which otherwise most likely would have occurred after the investor completed the investment. Figure 1 illustrates this sequence of decision, events, and payoffs.

[INSERT FIGURE 1 ABOUT HERE]

We restrict our model to tax adjustments that lead to an increase in the tax burden, contrary to the investor's initial expectations. In the following, the monetary consequences of this adjustment are denoted by Δ. Based on the price $\bar{F}$, the investor decides whether to request the ATR to resolve future tax uncertainty. Finally, the investor makes the investment decision, which she can make based on the outcome of the ATR. Further, the tax authority anticipates the investor's decision when setting the fee.

IV. MODEL: INVESTOR´S DECISION

As the first step, we abstract from the tax authority's decision and begin with the investor's decisions stepwise, in line with Table *1*. We focus on a taxpayer who must decide whether to engage in an investment project. If the expected after-tax net cash flow from the investment is positive, the investor will undertake the investment. Nevertheless, there is uncertainty regarding the tax issues associated with the investment. We assume that the taxpayer, i.e., the investor, cannot anticipate the eventual tax consequences of the project perfectly. Although she has the opportunity to request an ATR, the ATR fee may outweigh its benefit. Thus, the investor first decides whether to request the ATR, and then makes the investment decision in the second step. To examine this situation more closely, we use a binomial model.

In particular, the underlying investment is characterized by an exogenously given initial outlay I and an exogenously given cash flow CF, and both occur in period t. The return on investment is subject to tax at rate τ. The taxpayer will engage in the investment, if the after-tax net cash flow is positive. The investor faces a simple cash flow tax, which in our one-period setting is equivalent to a tax on profits with an immediate write-off. Thus, the tax base is equal to the pre-tax net cash flow. Against this background, the intended investment earns an after-tax net cash flow that is denoted by $C = (1 - \tau)(CF - I)$.[6]

During the ATR procedure, the tax authority scrutinizes the underlying tax issues (the ATR audit). We assume that, with probability $(1 - d)$, when $0 \leq d \leq 1$, the tax authority interprets the tax consequences in line with the investor's expectations after having audited the tax case on the basis of the documents accompanying the ATR application. The same probability is valid for the ex post tax audit. Identical probabilities of a tax deficiency arising from a tax audit and from an unfavorable ATR serve as the base scenario for our analysis and enable us to identify the forces at work. Later, we relax this limiting assumption, extend our model and assume that an ATR assessment results in higher detection risk and higher deficiencies than a regular tax audit.

We analyze the model illustrated in Table *1* by backward induction.

[INSERT TABLE 1 ABOUT HERE]

One possible outcome after an ATR routine is Δ, the (negative) impact of a deviating fiscal treatment on the project's after-tax net cash flow C. Alternatively, the tax authority confirms the investor's expected tax burden. We denote the potentially higher tax burden by $\widetilde{\Delta}$, where $\widetilde{\Delta}$ is a binary random variable with $\widetilde{\Delta} \in \{0; \Delta\}$ and $\Delta > 0$.[7] Consequently, we obtain the post-audit after-tax net cash flow, $\widetilde{C^{\Delta}} = C - \widetilde{\Delta}$. If the tax authority accepts the favorable interpretation of the tax consequences, $\widetilde{\Delta}$ collapses to zero.

By contrast, the tax authority interprets the tax consequences of the tax case differently with probability d. For example, the tax authority may decide to treat only a fraction of the investment outlay I as tax-deductible. In this case, the tax burden increases by Δ.[8] If the tax authority interprets the consequences of the project differently, the project's pre-audit after-tax net cash flow C, referred to as pre-audit net cash flow below, will be reduced by Δ to the post-audit after-tax net cash flow $\widetilde{C^{\Delta}}$, which is referred to as post-audit net cash flow.

Therefore,

$$\tilde{\Delta} = \begin{cases} \Delta & \text{with probability } d \\ 0 & \text{with probability } 1-d. \end{cases} \tag{1}$$

We obtain

$$\widetilde{C^{\Delta}} = \begin{cases} (C-\Delta) & \text{with probability } d \\ C & \text{with probability } 1-d. \end{cases} \tag{2}$$

Figure *2* illustrates the random variable $\widetilde{C^{\Delta}}$:

[INSERT FIGURE 2 ABOUT HERE]

The taxpayer is risk neutral (see, e.g., Beck et al. 2000, p. 247); in other words, she strives for the maximum expected post-audit net cash flow of her investment $\mathrm{E}\left[\widetilde{C^{\Delta}}\right]$ and will therefore engage in the project only if its expected post-audit net cash flow is positive. Thus, without considering an ATR, the objective function ϕ of the taxpayer is given by

$$\phi = Max\left\{\mathrm{E}\left[\widetilde{C^{\Delta}}\right]; 0\right\} \tag{3}$$

With

$$\mathrm{E}\left[\widetilde{C^{\Delta}}\right] = (1-d)C + d(C-\Delta) = C - d\Delta. \tag{4}$$

Then, we obtain

$$\phi = Max\{C - d\Delta; 0\} = \begin{cases} C - d\Delta & \text{for } C > d\Delta \\ 0 & \text{otherwise.} \end{cases} \tag{5}$$

In line with the maximum calculus, the investor undertakes the investment as long as $C > d\Delta$ (first case of eq. (5)). She will refrain from investing if the expected value of the post-audit net cash flow from the investment is not positive, i.e., if $C \leq d\Delta$ (second case of eq. (5)). As tax damages are typically a function of gross values, such as operating expenses or accruals (for example, depreciation allowances), we assume that the tax damage Δ is independent of C.[9]

To reduce uncertainty, the taxpayer may request an ATR before deciding upon the investment. If the ruling turns out to induce a higher tax burden and be disadvantageous for the investor, she will be able to refrain from the planned investment. The investor will not engage in the investment if it generates a negative post-tax audit net cash flow. However, although we assume a so-called neutral cash flow tax, a tax-induced distortion may arise from the underlying tax uncertainties and even make a pre-tax beneficial investment an unattractive investment post-tax.

If the investor has requested an ATR she knows the fiscal interpretation of the tax issue. Therefore, she can make the investment decision based on the outcome of the tax ruling. In the decision-making process, the investor anticipates both a favorable and an unfavorable outcome of the ATR, and thus accounts for an unattractive tax treatment and the possibility that she will not undertake the investment. Thus far, we have abstracted from an ATR fee. However, if the taxpayer must pay a fee $\bar{F}$ for the ATR, she must include this fee in her decision-making process.[10]

Assuming that the investor requests an ATR,[11] the objective function ϕ of the taxpayer (eq. (5)) becomes ϕ_{ATR} with

$$\phi_{ATR} = (1-d)C + d * Max\{(C-\Delta); 0\} - \bar{F} \tag{6}$$

$$= \begin{cases} C - d\Delta - \bar{F} & \text{for } C > \Delta \\ (1-d)C - \bar{F} & \text{otherwise.} \end{cases}$$

Figure 3 depicts the objective functions with and without an ATR depending on pre-audit net cash flow C for $d \coloneqq 0.4$, $\bar{F} \coloneqq 0$ and $\Delta \coloneqq 10$.

[INSERT FIGURE 3 ABOUT HERE]

The graphs illustrate that the option to apply for an ATR becomes attractive when the post-audit net cash flow $\widetilde{C^{\Delta}}$ becomes negative ($C \leq \Delta$, here: $C \leq 10$) because of the tax authorities' divergent interpretation of the fiscal consequences.

Anticipating the optimal investment decisions from above, the investor requests the ATR if and only if $\phi_{ATR} \geq \phi$. Equating the objective functions with and without an ATR allows us to determine the maximum fee F^{max} the taxpayer is willing to pay. We obtain from setting

$$\phi_{ATR} = \phi. \tag{7}$$

and inserting the eqs. (5) and (6) for ϕ_{ATR} and ϕ, and finally

$$\begin{aligned} F^{max}(C) &= C - dC + d * Max\{(C - \Delta); 0\} \\ &\quad - Max\{(C - d\Delta); 0\} \\ &= \begin{cases} C(1-d) & \text{for } d\Delta \geq C \\ d(\Delta - C) & \text{for } \Delta \geq C > d\Delta \\ 0 & \text{otherwise.} \end{cases} \end{aligned} \tag{8}$$

Figure 4 depicts the fee F^{max} as a function of the pre-audit net cash flow C for $\Delta := 10$ and $d := 0.4$.

[INSERT FIGURE 4 ABOUT HERE]

To interpret our results and examine whether the investor is willing to pay for an ATR, we distinguish two scenarios. In the first scenario, the pre-audit net cash flow C exceeds the value of the impact of a different fiscal treatment Δ (the third case in eq. (8)), whereas in the second scenario, C is less than or equal to Δ (first and second case in eq. (8)).

If $C > \Delta$, the authority's divergent interpretation of the tax consequences leads to a reduction in the expected post-audit net cash flow $\mathrm{E}\big[\widetilde{C^{\Delta}}\big]$, but investors remain willing to undertake the investment upfront because in both states, it provides a positive post-audit net cash flow. Therefore, the ATR is not decision-relevant in such circumstances. An example of a non-decision-relevant ATR would be the decision to invest in a factory without knowing whether the tax authority allows the taxpayer to use linear or declining-balance depreciation. Given that the investment is favorable regardless of the depreciation method to be applied, even if one of these depreciation options is more worthwhile to the taxpayer than the other, the taxpayer will not be willing to pay for legal certainty on the depreciation pattern. Thus, an ATR here would not offer decision-relevant certainty.

By contrast, the option to apply for an ATR becomes decision-relevant if $\widetilde{C^{\Delta}}$ becomes negative $(C \leq \Delta)$ as a consequence of the tax authorities' divergent interpretation of the fiscal consequences. Then, the ATR serves as an effective shield against possible tax damage. When we determine the maximum payable fee, we again distinguish between the two cases. In the first case, the pre-audit net cash flow C ranges between Δ and $d\Delta$, that is, $d\Delta< C \leq \Delta$, whereas in the second case, C is less than or equal to $d\Delta,$ i.e., $0 \leq C \leq d\Delta$. Here, $d\Delta$ can be interpreted as a threshold that indicates whether the investor would realize the investment in the laissez faire case (i.e., without an ATR).

We first consider the case of $0 \leq C \leq d\Delta$ (first case of eq. (8)) in which the taxpayer will abandon the investment project without an ATR. She therefore will be willing to pay a fee for the ATR of up to the opportunity costs of not carrying out the investment, i.e., $C(1-d)$. Considering the second case with $d\Delta< C \leq \Delta$ (the second case of eq. (8)), the maximum fee corresponds to the disadvantage that the taxpayer suffers due to the negative post-audit net cash flow caused by the divergent interpretation of the tax consequences weighted against the probability of the negative interpretation. The maximum fee is $F^{max} = d(\Delta - C)$. Thus, the fee accounts for the expected loss that the taxpayer would experience from the investment if the tax authority were to interpret the tax issue disadvantageously.

The maximum of the function F^{max}, i.e., the highest fee a taxpayer is willing to pay for a given investment, is depicted by the peak of the triangle in Figure 4. This maximum, $Max[F^{max}]$, is determined by $C = d\Delta$ and amounts to

$$Max[F^{max}] = (1-d)d\Delta. \tag{9}$$

If we compare this maximum with the variance of the post-audit net cash flow, from the investment given by

$$Var(\widetilde{C^{\Delta}}) = (1-d)\big(C-(C-d\Delta)\big)^2 + d\big((C-\Delta)-(C-d\Delta)\big)^2 = (1-d)d\Delta^2 \tag{10}$$

it is clear that the two expressions are similar. Both the variance and the maximum of the maximum fee are functions of d. Both have their maximum exactly at $d = 0.5$. A high (tax-) uncertainty, that is, the variance, induces a high willingness to pay for an ATR and therefore — for a given fee — also a high demand for rulings. In this context, the degree of ambiguity in a tax issue is reflected in the variance.[12] The variance is at its maximum for $d = 0.5$; in other words, the investor has no clue how the tax issue is being interpreted by the tax authorities. If the uncertain interpretation is more likely to be interpreted favorably or unfavorably, that is, $d \neq 0.5$, the variance (ambiguity) decreases, as does the willingness to pay.

The willingness to pay a fee to gain tax certainty depends on the probability d and on net cash flow C. If we compare the maximum fee that an investor is willing to pay (eq. (8)) with a given fee $\bar{F}$ and solve for the probability d, then we obtain combinations of d and C for which an investor is indifferent (indifference curve).

$$F^{max}(C) = C - dC + d * Max\{(C - \Delta); 0\} - Max\{(C - d\Delta); 0\} \geq \bar{F} \tag{11}$$

$$\Rightarrow \quad \frac{\bar{F}}{-C+\Delta} < d < 1 - \frac{\bar{F}}{C} \tag{12}$$

Figure 5 depicts this inequation for a given fee, $\bar{F} \coloneqq 2$ and $\Delta \coloneqq 10$. The area in the ellipse describes d-C-combinations that lead to advantageous ATRs.

[INSERT FIGURE 5 ABOUT HERE]

Clearly, only taxpayers who face a high degree of tax uncertainty ($0.4 < d < 0.6$) and a medium net cash flow (compared to the potential tax damage) will apply for an ATR given a specific fee $\bar{F}$. The intuitive economic interpretation of this result is that, for relatively high pre-audit net cash flows (compared to Δ), the taxpayer will refrain from paying for legal tax certainty even when the tax position is quite uncertain, as she will carry out the investment anyway. These analytical findings can also serve to deduce hypotheses to be tested in future empirical analyses. Tax consulting firms typically archive requested ATRs and also the information regarding the fees paid and the involved legal norm. However, if the fees paid are intended to serve as a proxy for the ambiguity of the corresponding legal norm, one must be careful: low fees, for example, do not necessarily indicate that the underlying legal norm is clear; these low fees can also be the result of relatively high net cash flows. An inference from the fee on the lack of clarity of the legal norm (i.e., legal uncertainty) can only be drawn if the functional relationship between the investment´s net cash flow, the risk and the potential tax damage is known.

V. MODEL: TAX AUTHORITIES´ DECISION

We extend our model, accounting for the tax authority's perspective. We aim to determine the optimal fee that tax authorities should demand for ATRs, considering the investor's reaction. We assume that the tax authority wants to maximize total revenue,[13] which is the sum of the expected taxes and the expected revenues from the fee, net of costs (see, e.g., Graetz, Reinganum, and Wilde, 1986; Reinganum and Wilde, 1986; Beck and Jung, 1989; Sansing, 1993; Rhoades, 1999). With respect to ATRs, Givati (2009) also confirms that revenue maximization plays an important role for the tax authorities. First, we determine the ex-ante optimal fee for the standard model, which abstracts from complications, such as tax audit cost effects and selective ATR patterns that will be examined in the subsequent subsections.

V.1. Optimal Fee in the Standard Model

We determine the optimal fee $\bar{F}^*$. We assume that investments are distributed uniformly in the interval $[0, f]$ in the economy, where f is the exogenously given upper boundary of the interval of cash flows. I.e., the tax authority is able to forecast its revenues, although the investors' decision remains characterized by tax uncertainty, which is consistent with Mills et al. (2010). To keep things simple, we consider the case $f \leq d\Delta$.[14] In the following, we can determine the equilibrium fee by backward induction, after considering the previously derived taxpayers' decisions.

Given our assumption ($f \leq d\Delta$), it follows from the previous section that the expected tax revenues $\mathrm{E}^f[\tilde{R}]$ equal:

$$\mathrm{E}^f[\tilde{R}] = \int_{\frac{\bar{F}}{1-d}}^{f} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right) \frac{1}{f}\, dC \tag{13}$$

and 0 if $f \leq \frac{\bar{F}}{1-d}$. This result can be explained as follows. It follows from the first case of eq. (8) that investors request the ATR if $C \geq \frac{\bar{F}}{1-d}$. We can focus on this boundary because $f \leq d\Delta$. Therefore, between $\frac{\bar{F}}{1-d}$ and f the investors pay the fee $\bar{F}$. In addition, since the ATR is requested in this region, the investors conduct the investment in a good state (favorable interpretation of the tax issue). This case occurs with a probability of $1-d$. As the net cash flow C is an after-tax value, we transform it to obtain the pre-tax net cash flow CF by dividing by $(1-\tau)$.[15]

Since the integral term for $\mathrm{E}^f[\tilde{R}]$ is strictly positive, the values of $\bar{F}$ with $f < \frac{\bar{F}}{1-d}$ cannot be optimal. Taking the derivative of $\mathrm{E}^f[\tilde{R}]$ yields the optimal fee

$$\bar{F}_f^* = \frac{(1-d)f(1-\tau)}{2-\tau}. \tag{14}$$

Because the optimal fee in the above formula satisfies the previous assumption $\left(\frac{\bar{F}}{1-d} < f \le d\Delta\right)$, $\bar{F}_f^*$ represents the optimal fee for all $f \le d\Delta$.

Theorem 1: *Assume that the investment projects' cash flows are uniformly distributed over the interval* $[0, f]$ with $f \le d\Delta$. *Then, the optimal fee equals* $\bar{F}_f^* = \frac{(1-d)f(1-\tau)}{2-\tau}$.

It would be interesting to see what occurs for the values of f with $d\Delta < f \le \Delta$. Note that Δ is a natural upper bound because for all $C \ge \Delta$, the ATR has no value since the investment will be undertaken independent of the outcome of the ATR. Again, it follows from the previous section that the investors ask for the ATR for values of C with $\frac{\bar{F}}{1-d} \le C \le \frac{d\Delta-\bar{F}}{d}$. If $f \le \frac{d\Delta-\bar{F}}{d}$ the expected tax revenues are still given by eq. (13), and therefore the optimal fee coincides with that in Theorem 1. However, if $f > \frac{d\Delta-\bar{F}}{d}$, the expected tax revenues are

$$\mathrm{E}^f[\tilde{R}] = \int_{\frac{\bar{F}}{1-d}}^{\frac{d\Delta-\bar{F}}{d}} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC + \int_{\frac{d\Delta-\bar{F}}{d}}^{f} \left(d\Delta + \frac{C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC. \tag{15}$$

Optimizing this function yields the optimal fee $\bar{F}^* = (1-d)d\Delta$. It remains to discover which of the two local optima is the global optimum. In the Appendix, we show that there is a value $\hat{f}$ such that the optimal fee is $\bar{F}_f^* = \frac{(1-d)f(1-\tau)}{2-\tau}$ for $f \leq \hat{f}$ and $\bar{F}^* = (1-d)d\Delta$ for $f > \hat{f}$. The optimal fee $\bar{F}^* = (1-d)d\Delta$ corresponds to the maximum willingness to pay. Thus, it becomes obvious that tax authorities de facto choose a fee that is higher than taxpayers' willingness to pay for an ATR. Only a taxpayer who earns exactly a pre-audit after-tax net cash flow of $C = d\Delta$ would be indifferent between choosing an ATR and not doing so.

The last result holds for $f = \Delta$. This case is especially interesting because it covers all uniform distributions of net cash flows that range at least over an interval of [0, Δ]. Therefore, it clarifies that our results are generalizable. The following theorem highlights the case for $f = \Delta$.

Theorem 2: *Assume that the pre-audit net cash flows are distributed uniformly in the interval* $[0, \Delta]$. *Then, the optimal fee for an advance tax ruling is given by*

$$\bar{F}^* = (1-d)d\Delta.$$

No taxpayer strictly prefers to request an advance tax ruling at this optimal fee.

However, when the tax authorities offer advance tax rulings at this optimal fee, taxpayers whose investment projects earn exactly a pre-audit net cash flow of $C = d\Delta$ are willing to request an advance tax ruling. Thus, the number of taxpayers that are likely to request an advance tax ruling is marginal. Note that these taxpayers will only be indifferent toward the ruling and would not be able to increase their return in the expected post-audit net cash flow terms via an advance tax ruling.

To gain more intuition, we take a second slightly different approach to determine the optimal fee. To keep things simple, we concentrate on the case of $f = \Delta$. We see that the following tradeoff arises. The lower the fee $\bar{F}$, the more taxpayers demand ATRs. The revenue effect of a lower fee is ambiguous. On the one hand, revenues may increase as taxpayers undertake investment projects, which would not have been profitable in expected value terms without the ruling. On the other hand, a lower fee may also reduce the fee revenues and, furthermore, decrease tax revenues due to projects that will not be carried out in the event of an unfavorable ruling.

Two effects are important for why tax authorities are not able to take advantage of offering, i.e., the so-called *real investment-revenue effect* and the so-called *advance tax ruling-revenue effect (ATR-revenue effect)*. To analyze these two effects, we take a graphical approach.

[INSERT FIGURE 6 ABOUT HERE]

In Figure 6, we compare the maximum fee, F^{max}, and the tax authority's fee, $\bar{F}$, depending on the pre-audit net cash flow C for $\Delta \coloneqq 10,\ \mathrm{d} \coloneqq 0.4$ and $\bar{F} \coloneqq 1$. We use the abbreviations $\hat{C}_1 = \frac{\bar{F}}{1-d}$ and $\hat{C}_2 = \frac{\mathrm{d}\Delta-\bar{F}}{d}$. In addition, Figure 6 shows the intervals $A = \left[\hat{C}_1; \hat{C}_2\right]$, $A_1 = [\hat{C}_1; \mathrm{d}\Delta]$ and $A_2 = \left[\mathrm{d}\Delta; \hat{C}_2\right]$. We will take the following approach. We analyze how the tax authority's revenues change if the investors can request an ATR for a fixed fee $\bar{F}$. We will show that the possibility for investors to request an ATR in expected value terms reduces the tax authority's tax revenues. Therefore, the tax authority will choose a fee that is prohibitively high.

For illustrative purposes, it is helpful to determine the lengths of the intervals A, A_1 and A_2.

$$Length\ A = \left(\frac{d\Delta - \bar{F}}{d} - \frac{\bar{F}}{1-d}\right) = \frac{d\Delta(1-d) - \bar{F}}{d(1-d)}. \tag{16}$$

$$Length\ A_1 = \left(d\Delta - \frac{\bar{F}}{1-d}\right) = \frac{d\Delta(1-d) - \bar{F}}{1-d}. \tag{17}$$

$$Length\ A_2 = \left(\frac{d\Delta - \bar{F}}{d} - d\Delta\right) = \frac{d\Delta(1-d) - \bar{F}}{d}. \tag{18}$$

Next, we analyze the so-called *real investment-revenue effect* and *advance tax ruling-revenue effect.*

V.1.1. Real Investment-Revenue Effect

The real investment-revenue effect refers to the tax associated with the pre-audit net cash flows $\frac{\tau}{1-\tau}\,C$. If the tax authority offers ATRs, it earns additional revenues in area A_1 from those investment projects that are realized with the probability $(1-d)$. However, in area A_2, the tax authority loses revenues with the probability d from those investment projects that the taxpayer would have realized based on the expected post-audit net cash flows, $\mathrm{E}\left[\widetilde{C^{\Delta}}\right]$. The probability p_{A_1} for the pre-audit net cash flows is additionally invested in area A_1 is

$$p_{A_1} = (1-d)\,\frac{1}{\Delta}\,\frac{d\Delta(1-d)-\bar{F}}{1-d} = \frac{d\Delta(1-d)-\bar{F}}{\Delta}, \tag{19}$$

and the probability p_{A_2} of the pre-audit net cash flows that are not realized anymore in area A_2 is

$$p_{A_2} = d\,\frac{1}{\Delta}\,\frac{d\Delta(1-d)-\bar{F}}{d} = \frac{d\Delta(1-d)-\bar{F}}{\Delta}. \tag{20}$$

When considering the probabilities in both areas, it becomes clear that the tax authority loses as many investment projects in area A_2 as it gains in area A_1. Nevertheless, these effects do not cancel one another because the after-tax net cash flows from the additional investment projects in area A_1 are smaller than the lost after-tax net cash flows in area A_2, as are the expected tax revenues. The following theorem summarizes the result.

Theorem 2a: *Assume that the pre-audit net cash flows are distributed uniformly in the interval* $[0, \Delta]$. *Then, tax revenues associated with the pre-audit cash flow* C *decrease when the tax authorities offer advance tax rulings because expected revenues from additionally realized investment projects are smaller than those from projects that are cancelled as a result of an unfavorable ruling.*

Obviously, for small values of C, ATRs stimulate extra investment projects whenever the ruling is favorable for the investor. By contrast, investors will not undertake investments for high after-tax net cash flows when the ATR's outcome is unfavorable.[16]

V.1.2. Advance Tax Ruling-Revenue Effect

In addition to the tax revenues that the tax authority receives from the realized investment projects, they earn expected revenues from the fee $\mathrm{E}[\tilde{R}_A^F]$ for ATRs. By offering ATRs, they also lose — in addition to the revenue loss addressed in eq. (20) — tax revenues amounting to Δ in area A_2 because taxpayers cancel investments with disadvantageous tax consequences.

Whenever taxpayers request an ATR, the tax authority receives expected revenues from fees $\mathrm{E}[\tilde{R}_A^F]$ in area A with

$$\mathrm{E}[\tilde{R}_A^F] = \frac{1}{\Delta}\,\bar{F}\,\frac{d\Delta(1-d)-\bar{F}}{d(1-d)}. \tag{21}$$

Simultaneously, in the case of ATRs, the tax authority loses tax revenues of Δ for each investment that is no longer carried out in area A_2 with the probability d. The expected value of losing these tax revenues is

$$\mathrm{E}\left[\tilde{R}_{A_2}^{\Delta}\right] = d\Delta\;\frac{d\Delta(1-d)-\bar{F}}{d\Delta} = d\Delta(1-d)-\bar{F}. \tag{22}$$

Note that the highest possible fee is $\bar{F}^* = (1-d)d\Delta$. At higher fees, no taxpayer will request ATRs. Therefore, we can focus on fees, $\bar{F}$, with $\bar{F}\ \leq (1-d)d\Delta$. We obtain the following:

$$\begin{aligned}\mathrm{E}[\tilde{R}_A^F] = \frac{1}{\Delta}\,\bar{F}\,\frac{d\Delta(1-d)-\bar{F}}{d(1-d)} &\leq d(1-d)\,\frac{d\Delta(1-d)-\bar{F}}{d(1-d)}\\ &= d\Delta(1-d)-\bar{F} = \mathrm{E}[\tilde{R}_{A_2}^{\Delta}].\end{aligned} \tag{23}$$

Therefore, it becomes clear that the expected revenues from the fee $\mathrm{E}[\tilde{R}_A^F]$ are generally smaller than expected reductions of tax revenues that are associated with Δ, i.e., $\mathrm{E}\left[\tilde{R}_{A_2}^{\Delta}\right]$. The following theorem summarizes this result.

Theorem 2b: *When offering advance tax rulings to all interested taxpayers, tax authorities are in expected value terms not able to generate more revenues from charging a fee than they lose due to the advance tax ruling-induced lost tax revenues* Δ.

The total effect from offering ATRs can be decomposed into two separate effects: those described in Theorem 2a and those in Theorem 2b. Because both effects are negative, it follows that by offering ATRs, the tax authorities cannot be better off than by not offering the ruling.

Theorem 2c*: Assume that the pre-audit net cash flows are distributed uniformly in the interval* $[0,\Delta]$. *Then, there is no fee* $\bar{F}$ *such that the tax authorities strictly benefit from offering advance tax rulings.*

The above theorem recaptures Theorem 2. The optimal value in Theorem 2 is such that no taxpayer requests ATRs. This is equivalent to not offering ATRs at all.

Nevertheless, we can observe ATRs in reality. Against the background of this observation, Theorem 2c is unsatisfactory. Therefore, in the following, we integrate further details leading to lower fees even when the pre-audit net cash flows are distributed in the interval $[0, \Delta]$.

V.2. Optimal Fee for Model Extensions

V.2.1 Ex Post Tax Audit Cost

Until now, we have abstracted from ex-post tax audit costs that the tax authorities face when evaluating a tax case. In the following, we integrate audit costs and assume that these costs are reduced when investors use an ATR (similar to Beck et al. 2000, pp. 248-249). This reduction of tax audit costs can be motivated as follows. To request ATRs, taxpayers must precisely explain the tax issue and provide detailed descriptions of the situation and possible legal issues that are subject to the ruling. In contrast to an ordinary tax audit in a ruling-free setting, the tax authorities receive more information regarding the tax issues. Therefore, they can assess and evaluate the case more rapidly, which may lead to reduced tax audit costs.

We assume that the tax authority audits all tax issues and evaluates them correctly in cases without ATRs. Abstracting from tax evasion, the tax authority can reduce its tax audit costs whenever the investor receives an ATR. Therefore, in area A, the tax authority is able to save tax audit costs. We denote the amount of the reduced audit costs by P.

To determine the expected audit cost savings, we must distinguish between the areas A_1 and A_2. In area A_2, audit cost reduction P resulting from requesting an ATR works as an additional fee because the investment must be audited with or without the ruling. However, the additional investment projects that taxpayers undertake due to a positive outcome of the ATR in area A_1 lead to additional audit costs, K. These additional costs K would not have occurred without the ruling and are of course also diminished by P, which is attributable to the ATR. Table 2 illustrates the effects of the ruling on the audit costs.

[INSERT TABLE 2 ABOUT HERE]

Thus, the expected fee revenues can be modified to

$$\mathrm{E}^{audit}[\tilde{R}_A^F] = \frac{1}{\Delta}\left(\bar{F} - (K - P)\right)\left(d\Delta - \frac{\bar{F}}{1-d}\right) \qquad (24)$$

$$+\frac{1}{\Delta}(\bar{F} + P)\left(\frac{d\Delta - \bar{F}}{d} - d\Delta\right).$$

As above, we can determine the optimal fee $\bar{F}_{audit}^{*}$ from the respective first-order condition:

$$\bar{F}_{audit}^{*} = (1-d)d\Delta + (dK - P)\left(1 - \frac{1}{2-\tau}\right). \qquad (25)$$

Clearly, this fee is smaller than the that found in Theorem 2, given $P > d\,K$; thus, the saved audit costs P are greater than the additional audit costs multiplied by the probability, d. In this case, the tax authority offers a fee that at least some investors will accept. Thus, we describe a setting in which it is rational for both investors and the tax authority to participate in ATRs. The following theorem summarizes these results.

Theorem 3: *Assume that tax authorities' audit costs are reduced by $P > d\,K$ when investors ask for advance tax rulings. Then, the optimal fee is given by*

$$\bar{F}_{audit}^{*} = (1-d)d\Delta + (d\;K - P)\left(1 - \tfrac{1}{2-\tau}\right) \quad \textit{with} \quad \bar{F}_{audit}^{*} < \bar{F}^{*}.$$

In summary, a reduction of tax audit costs increases the attractiveness of ATRs. Therefore, the tax authorities reduce the fee such that more investors request ATRs. We also want to emphasize that the reduction of the audit costs only affects the tax authorities' view and not the investors' view. Therefore, it is not a zero-sum game.

V.2.2. Increased Attention to Ambiguous Tax Issues

In the case of an ATR, intensive documentation of all possibly ambiguous tax issues is required. Hence, close inspection (often performed by a specialist with the tax authority) will occur, which by assumption certainly leads to the detection of unfavorable consequences (if any). By contrast, in the no-ruling case, the tax case is not necessarily audited ex post because the tax authorities regularly only draw samples of tax issues to be audited in detail or the audit is performed by a non-specialist, who is most likely not aware of the inherent tax ambiguity. Therefore, the tax authorities may want to incentivize taxpayers to request an ATR by setting a low fee and thus ensuring that all tax issues are assessed accurately and any inconsistencies are detected upfront during the ATR audit. As a consequence, in the case of an ATR, the tax authorities will always be aware of a tax problem (as in the previous subsections) that they possibly would not have detected otherwise.

This subsection thus addresses two issues that have been described as 'strategic disadvantages of applying for an advance tax ruling' by Givati (2009), namely increased inspection and detection risk for ATR applicants. Given a probability of an inspection by the tax authority of the taxpayer´s tax return of less than 1%, 'by applying for an advance tax ruling the taxpayer increases the probability of inspection by the service from less than 1% to 100%' (increased inspection risk, Givati, 2009). Even if the inspection risk is almost 100% for large corporations, 'ex post auditors' may overlook the ambiguous tax issue unless an ATR 'red flags' it (increased detection risk, Givati, 2009).

To integrate this issue into our model, the probability that the tax issue in the no-ruling case is not audited – or that the ambiguous tax issue is overlooked – is a. The following Table 3 summarizes the altered assumptions:

[INSERT TABLE 3 ABOUT HERE]

The expected post-audit net value without an ATR is

$$\mathrm{E}\left[\widetilde{C_a^{\Delta}}\right] = a\,C + (1-a)\big((1-d)C + d(C-\Delta)\big). \tag{26}$$

With probability $a,$ the tax authorities are not aware of the ambiguous tax issue, and the post-audit net cash flow is C. Otherwise, the expected post-audit net cash flow from eq. (4) will emerge with probability $(1-a)$. The expected post-audit net cash flow in the case of an ATR is identical to that described in previous subsections, as tax ambiguity, will always be disclosed.

Again, after equating the objective functions and solving for the maximum fee, F_a^{max}, we obtain

$$F_a^{max} = \begin{cases} C(1-d) & \text{for } d\Delta(1-a) \geq C \\ d\,(\Delta\,(1-a) - C) & \text{for } \Delta \geq C > d\Delta(1-a) \\ -ad\Delta & \text{otherwise.} \end{cases} \quad (27)$$

Clearly, the maximum fee has changed in comparison with our standard model. Figure 7 compares the maximum fee in the standard model with the model with inspection risk for $d \coloneqq 0.6, a \coloneqq 0.4$ and $\Delta \coloneqq 10$.

[INSERT FIGURE 7 ABOUT HERE]

Thus, for small net cash flows, the maximum fee function remains unchanged after having integrated the inspection risk into the no-ruling scenario because these investments would not have been undertaken if there had been no ATR. Therefore, these investments are not exposed to the benefits from more negligent tax inspections, i.e., they are not able to benefit from probability a. The maximum fee is affected by the inspection risk only for higher net cash flows. Compared with investments for an advance ruling, the laissez faire-alternative is more attractive due to the possibility of not being audited in detail; therefore, the maximum fee for high net cash flows is lower and even takes negative values.

For the extended model, with inspection risk for sufficiently large a, i.e., $a > 1 - d$, ATRs are only requested for $C \in [0;\ d\,\Delta)$, i.e., in the area in which no investment would have been carried out in the laissez-faire scenario. Thus, there is no negative revenue effect, in contrast to the setting described above. No investment projects are lost when offering ATRs. Taking these remarks into account, we can determine the optimal fee as above:

$$\bar{F}_a^* = (1-d)d\Delta(1-a)\frac{d-\tau}{2d-\tau}. \quad (28)$$

This fee is always lower than the maximum fee, $F_a^{max} = (1-d)d\Delta(1-a)$, a taxpayer is willing to pay in this setting. To ensure positive fees, we must postulate $\tau \leq d$. Otherwise, for higher tax rates ($\tau > d$), it is efficient for the tax authorities to set an optimal fee of zero because of the real investment effect, which outbalances the fee revenues for high tax rates.

Basically, the result that ATRs are offered also holds for the case in which the 'new' maximum fee function has positive values for $C > d\Delta$ and thus for $a < (1-d)$. Because no additional insights will be gained, we will not elaborate upon this matter in detail.

Theorem 4: *Assume that there is a probability that indicates the possibility of not being audited in detail (or by experts), which exists only if no advance tax ruling is requested. In this case, the optimal fee for advance tax rulings is given by*

$$\bar{F}_a^* = (1-d)d\Delta(1-a)\frac{d-\tau}{2d-\tau}, \quad \text{where} \quad \bar{F}_a^* < \bar{F}^* \text{ for } a > (1-d).$$

Hence, the fee $\bar{F}_a^*$ is not cost-prohibitive such that the advance tax ruling will be requested by taxpayers and can even become zero.

To summarize, the tax authorities' capability of increasing the detection probability as a consequence of an ATR increases the attractiveness of such rulings for the authorities. Therefore, under specific circumstances, the tax authorities reduce the fee to incentivize more investors request ATRs.

V.2.3 Different Distribution of Net Cash Flows

In this subsection, we consider a different distribution of the net cash flows from the investment across all projects in the economy. We assume that low cash flows are more likely than high cash flows. Concretely, we assume the density function, $g(C) = (1 - C/\Delta)/\left(\frac{d\Delta}{2}\right)$. In this case, the expected revenues are given by

$$\mathrm{E}^g[\tilde{R}] = \int_{\frac{\bar{F}}{1-d}}^{\frac{d\Delta-\bar{F}}{d}} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right)\frac{1-C/\Delta}{\left(\frac{d\Delta}{2}\right)}\,dC + \int_{\frac{d\Delta-\bar{F}}{d}}^{\Delta} \left(\frac{C\,\tau}{1-\tau} + d\Delta\right)\frac{1-C/\Delta}{\left(\frac{d\Delta}{2}\right)}\,dC. \tag{29}$$

The first order condition now yields two optimal fees (critical values). One of which is

$$\bar{F}_g^* = (1-d)\, d\Delta \tag{30}$$

and the other

$$\bar{F}_g^* = \frac{-d\Delta + d^2\Delta + d\Delta\tau - d^2\Delta\tau}{(-1+2d)(-3+\tau)}. \tag{31}$$

The following numerical example illustrates that in this case, lower fees than $\bar{F} = (1-d)\, d\Delta$ can occur ($d \coloneqq 0.8$; $\Delta \coloneqq 1$; $\tau \coloneqq 0.5$) (Figure 8).[17] The intuition behind this result is quite similar to above. Based on our assumption that low cash flows are more likely than high cash flows, offering an ATR increases the tax authority's revenues for investments with low cash flows, whereas it decreases revenues for investments with high cash flows. In contrast to our standard model, the tax authority now offers ATRs at a lower fee that will be accepted by some investors, since low cash flows are more likely.

[INSTERT FIGURE 8 ABOUT HERE]

V.2.4 Welfare-maximizing Tax Authority

Until now we have assumed that the tax authority wants to maximize tax and fee revenues. Now, we extend the objective function of the tax authority and assume social welfare maximization. We assume a stylized social welfare function W that additionally captures welfare gains from redistributing extra revenues as social benefits.

$$W(\beta, \bar{F}) = \mathrm{E}_{ATR}[\tilde{R}] + \beta * \mathrm{E}_{ATR}[\tilde{P}], \tag{32}$$

where $\mathrm{E}_{ATR}[\tilde{R}]$ denotes the tax authority's expected revenues, $\mathrm{E}_{ATR}[\tilde{P}]$ denotes the investors' expected after-tax-after-fee profits in the presence of the ATR, aggregated over all investments in the economy, and β is a constant that denotes how much the tax authority values investors' wealth relative to the one of the receivers of social benefits. This approach enables us to gain first impressions on the effects at the aggregate level. Of course, the results are limited by the underlying set of assumptions, which should be elaborated in future research.

In detail, social welfare is determined by

$$\mathrm{E}_{ATR}[\tilde{R}] = \int_{\frac{\bar{F}}{1-d}}^{\frac{d\Delta-\bar{F}}{d}} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right)\frac{1}{\Delta}dC + \int_{\frac{d\Delta-\bar{F}}{d}}^{\Delta}\left(\frac{C\,\tau}{1-\tau} + d\Delta\right)\frac{1}{\Delta}dC \tag{33}$$

and

$$\mathrm{E}_{ATR}[\tilde{P}] = \int_{\frac{\bar{F}}{1-d}}^{\frac{d\Delta-\bar{F}}{d}} (-\bar{F} + (1-d)C)\frac{1}{\Delta}dC + \int_{\frac{d\Delta-\bar{F}}{d}}^{\Delta}(C - d\Delta)\frac{1}{\Delta}dC. \tag{34}$$

As a benchmark, we consider the case $\beta = 1$. In this case, the tax authority weights the wealth of receivers of social benefits and investors equally. Tax revenues and tax liabilities are cancelled out and we obtain the maximization of the expected net cash flows from investments:

$$W(1,\bar{F}) = \int_{\frac{F}{1-d}}^{\frac{d\Delta-F}{d}} \left((1-d)\frac{C}{1-\tau}\right)\frac{1}{\Delta}dC + \int_{\frac{d\Delta-F}{d}}^{\Delta}\left(\frac{C}{1-\tau}\right)\frac{1}{\Delta}dC \tag{35}$$

The following theorem describes this benchmark result:

Theorem 5: *Assume that the tax authority equally weights on the wealth of receivers of social benefits and investors. Then, the optimal fee for ATRs is given by* $\bar{F}^* = (1-d)d\Delta$. *As above, no investor will request an ATR.*

At first sight, the above result might seem surprising. But in fact, it is not because the tax authority weights investors' wealth equal to that of receivers of social benefits taxes and the fee does not matter (in fact, in sum they cancel out). Therefore, the tax authority wants to maximize the expected net cash flows. As we have shown before, whenever an ATR is offered and accepted, the investors substitute investments with high cash flows for ones with low cash flows (because after taxes, projects with low cash flows are more profitable). To prevent this outcome, the tax authority offers a fee that will not be accepted.

Next, we consider the general case. Using eqs. (33) and (34) we can directly compute

$$W(\beta,\bar{F}) = \frac{-(-1+d)^2 d\Delta^2(\beta(-1+\tau)-\tau) - 2(-1+d)d\bar{F}\Delta(2+\beta(-1+\tau)-\tau) + \bar{F}^2(-2+\beta+\tau-\beta\tau)}{2(-1+d)d\Delta(-1+\tau)} \tag{36}$$

Interestingly, the first order condition again yields $\bar{F}^* = (1-d)d\Delta$. The function $W(\beta,\bar{F})$ is quadratic in $\bar{F}$. Hence, the second derivative determines whether $(1-d)d\Delta$ leads to a maximum or minimum. The second derivative of the objective function is proportional in

$$-2+\beta+\tau-\beta\tau.$$

Therefore, for $\beta \geq \frac{2-\tau}{1-\tau}$ the objective function is decreasing between 0 and $(1-d)d\Delta$. Hence, it is optimal to offer the ATR for free. For $\beta < \frac{2-\tau}{1-\tau}$ a fee of $\bar{F}^* = (1-d)d\Delta$ is optimal. The following theorem summarizes the result.

Theorem 6: *Assume that the tax authority maximizes social welfare. It will thus offer the ATR for free if and only if the weight put on investors satisfies $\beta \geq \frac{2-\tau}{1-\tau}$. If this is not the case, the tax authority offers ATRs at a fee of $\bar{F}^* = (1-d)d\Delta$ that no investor will accept.*

Our result has a straightforward interpretation. If the ATR is offered at a lower fee (for free) the investors will be better off because they get the option to condition their investment on the state of the world at a lower price. Therefore, if the tax authority (or the social planner) cares sufficiently about investors, as indicated by $\beta \geq \frac{2-\tau}{1-\tau}$, it wants to provide them the option for free. Note that a necessary condition for $\beta \geq \frac{2-\tau}{1-\tau}$ to be fulfilled is that β must necessarily exceed 2. This is the case for $\tau = 0$. For other values of τ the parameter β must even be greater than 2 and if τ approaches 1 the right side of the inequality $\beta \geq \frac{2-\tau}{1-\tau}$ converges to infinity.

VI. CONCLUSION

In this paper, we investigate under which circumstances investors have an incentive to request ATRs and which fee that tax authorities should charge for offering ATRs. In the first step, we determine the maximal fee investors are willing to pay for ATRs. This fee is a function of the investment's cash flow. For rather moderate cash flows, the ATR fee is increasing in the cash flow up to a specific peak, and then it decreases again. We are able to show how ATRs affect investment decisions. For low cash flows, it stimulates investments whereas it rather hinders or even prevents investments with higher cash flows. In the second step, the tax authority determines the fee by anticipating these investors' reactions. In our standard model, we assume that the tax authority determines the fee to maximize its revenues. We determine the optimal fee tax authorities should charge for ATRs. In general, this fee is such that firms facing investments with medium-sized cash flows will request ATRs. However, we also identify special settings for which the tax authorities will choose a fee that is prohibitively high. In other words, firms will refrain from requesting ATRs.

By contrast, extending the standard model, we identify settings that are likely to ensure not only positive revenues but also a benefit for the taxpayer. For example, if tax authorities benefit from the information provided in documents submitted jointly with the ATR application and are capable of significantly decreasing audit costs or increasing the detection probability of ambiguous tax issues and set the ATR fee accordingly, then the demand of investors and the supply of tax authorities for ATRs will meet. Our results provide a first impression of the magnitude of the opportunity costs that countries that offer free rulings to tax-aggressive multinational groups must accept. Notably, our model as a partial analytical approach does not have the power to draw conclusions on the aggregate level, including labor market and other effects. However, using a stylized welfare model we obtain a first impression of the effects on aggregate level. We then identify conditions under which a welfare maximizing tax authority will offer ATRs for free.

Our results are limited to settings with a tax-risky investment project and risk-neutral investors. It would be interesting to extend our analysis into risk-averse firms. Such investors are likely to be willing to pay higher fees than risk-neutral investors. As a consequence, offering ATRs can be more attractive to tax authorities. Future research should also model the taxpayers' cost of preparing an ATR application and the cost of giving up valuable information, too, should be integrated into the model. Moreover, the model should be extended with respect to timing costs.

We believe our model also provides testable empirical implications. One such implication is that ATRs are offered and requested more frequently when the tax authorities are able to effectively exploit the extra information provided by taxpayers during the ATR process to either reduce costs or increase revenues directly. Regulatory changes in ATR requirements, e.g., in documentation requirements might serve as a natural quasi-experiment for an empirical study of ATRs' effects on investment decisions. Moreover, our findings indicate that ATR fees may become an important component of a new measure for tax uncertainty in future empirical tests. Such a measure might be interpreted as a signal for the value-added from this tax uncertainty shield and may thus serve as a new proxy.

APPENDIX: Proof of the cutoff-level $\hat{f}$

We denote

$$\mathrm{A}(\bar{F}) = \int_{\frac{\bar{F}}{1-d}}^{f} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC \tag{A1}$$

and

$$B(\bar{F}) = \int_{\frac{\bar{F}}{1-d}}^{\frac{d\Delta-\bar{F}}{d}} \left(\bar{F} + \frac{(1-d)C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC + \int_{\frac{d\Delta-\bar{F}}{d}}^{\mathrm{f}} \left(d\Delta + \frac{C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC. \tag{A2}$$

The tax authority's objective function is $\mathrm{A}(\bar{F})$ for $f \le \frac{d\Delta-\bar{F}}{d}$ and $\mathrm{B}(\bar{F})$ for $f \ge \frac{d\Delta-\bar{F}}{d}$. For $f = \frac{d\Delta-\bar{F}}{d}$, the functions $\mathrm{A}(\bar{F})$ and $\mathrm{B}(\bar{F})$ coincide. The functions $\mathrm{A}(\bar{F})$ and $\mathrm{B}(\bar{F})$ are concave and single-peaked, and the optimum of the tax authority's objective function is therefore either the local optimum of $\mathrm{A}(\bar{F})$ or the one of $\mathrm{B}(\bar{F})$. Let us consider as a benchmark the case in which the investor cannot ask for an ATR. In this case, the expected revenues are

$$\mathrm{E}^{f,no\ ATR}[\tilde{R}] = \int_{d\Delta}^{\mathrm{f}} \left(d\Delta + \frac{C\,\tau}{1-\tau}\right)\frac{1}{f}\,dC. \tag{A3}$$

This value is exactly the optimal value of $\mathrm{B}(\bar{F})$ (that is attained at $\bar{F}^* = (1-d)d\Delta$). We want to argue that the difference between eq. (A3) and $\mathrm{A}(\bar{F})$ is decreasing in f for each $\bar{F}$, if $f \ge d\Delta$. In particular, this implies that the local maximum of $\mathrm{A}(\bar{F})$ decreases relative to the one of $\mathrm{B}(\bar{F})$ (which is given by eq. (A3)). This in turn implies the cutoff-level $\hat{f}$.

For fixed values of $C \ge d\Delta$, the difference of the integrands of $\mathrm{A}(\bar{F})$ in eq. (A1) and eq. (A3) is

$$\bar{F} + \frac{(1-d)C\,\tau}{1-\tau} - d\Delta - \frac{C\,\tau}{1-\tau} = \bar{F} - d\Delta - d\frac{C\,\tau}{1-\tau} < 0. \tag{A4}$$

The last inequality holds because $\bar{F} \leq d\Delta$, which in turn follows from $f \leq \frac{d\Delta - \bar{F}}{d}$. In addition, eq. (A4) is decreasing in C. If f increases more, such values of C occur. Therefore, the difference between the value of eq. (A3) and $\mathrm{A}(\bar{F})$ is decreasing in f for each $\bar{F}$, if $f \geq d\Delta$.

NOTES

[1] See Starkman (2010), p. 21, Inland Revenue Authority of Singapore (2013), South African Revenue Service (2013), Canadian Revenue Agency (2014), p. 4.

[2] See § 89 Abgabenordnung (German General Tax Code) and § 34 Gerichtskostengesetz (German Court Fees Act).

[3] See § 189 Bundesabgabenordnung (Austrian General Tax Code), KPMG (2014).

[4] ICIJ's (2014) documentation includes 548 tax rulings that have been approved by Luxembourg officials with a stamped and signed confirmation letter. ICIJ further outline, 'In addition, ICIJ is publishing 16 other documents such as corporate tax returns related to companies in Luxembourg. On December 9, 2014, ICIJ released on this database a small new batch of Luxembourg tax rulings. ICIJ received the documents after the publication of the first installment of stories on Nov. 5. The new documents are Luxembourg tax rulings sought by a variety of accountancy firms on behalf of corporate clients from around the world. The files cover the period from 2003 to 2011. ICIJ is only publishing the rulings that were reported on by ICIJ and its media partners and that bear evidence that they were approved by Luxembourg authorities.'

[5] See the critical considerations on revenue maximization by Slemrod and Yitzhaki (2002).

[6] Our model offers several possible interpretations. In the first interpretation, the best alternative investment has a net cash flow of zero. In our second interpretation, the best alternative investment has a positive net cash flow. Then we interpret C as the additional after-tax net cash flow generated by the underlying investment. More explicitly, let C_1 denote the after-tax cash flow of the investment and C_2 one of the alternative investments, then $C = C_1 - C_2$. For example, the alternative investment might be a financial investment that is subject to a tax that is non-stochastic, i.e, certain. In the third interpretation, the investor has the possibility either to invest in the domestic country or in a tax haven, i.e., in a country with a very low tax rate. The after-tax net cash flow in the domestic country is $(1-\tau_D)(CF-I)$, while it is $(1-\tau_H)(CF-I)$ in the tax haven. We then interpret C as the difference $(1-\tau_H)(CF-I)-(1-\tau_D)(CF-I)=(\tau_D-\tau_H)(CF-I)=(1-\tau)(CF-I)$, with $\tau = 1-(\tau_D-\tau_H)$. In other words, the investor must decide whether to invest in the tax haven. Cash flow C denotes the saved taxes due to the tax differential. With these three possible interpretations of our model and this explanation, we emphasize that in the third case, i.e., in settings in which the benefit of the investment is generated exclusively by the tax treatment, it is likely that an unfavorable tax treatment might render the investment disadvantageous. The unfavorable treatment, for example, might be due to the non-deductibility of outflows or double taxation.

[7] Similar to Mills et al. (2010) p. 1726, who also gives an example for the discrete nature of tax disputes.

[8] The parameter Δ can be interpreted as follows. The tax authority might treat part of the expenditures I as non-deductible for tax purposes. Explicitly, let $I = I_1 + I_2$, where I_2 is non-deductible. Then, the after-tax cash flow changes to $C_b = (CF-I) - \tau(CF-I_1)$. We define $\Delta = C - C_b = \tau\, I_2$. Then, in case of a favorable interpretation of the tax case, the investor receives C, and if I_2 is non-deductible, $C - \Delta$.

[9] While C results from offsetting earnings against expenses and accruals, tax disputes typically focus on operating expenses or accruals (e.g., depreciation allowances), such that, e.g., for $C = 0$, a huge tax liability may arise. Obviously, Δ is typically not a function of C.

[10] Although the fee for an ATR in most countries is or will be tax-deductible, it is not necessary to model this deductibility explicitly. The fee $\bar{F}$ can be interpreted as a net fee for the taxpayer (gross fee net of tax savings resulting from tax deductibility) and net revenues for the tax authorities (net of lost revenues due to the deductibility of the fee).

[11] Implicitly, we assume that the probability of a negative outcome of the ATR is the same as the probability of a negative interpretation of the tax code in a setting with no ATRs.

[12] This tax ambiguity can be operationalized, e.g., by FIN 48 reserves. Cf., e.g., Lisowsky et al. (2013). For an overview of potential additional operationalizations of tax risk, cf. Neuman, Omer, and Schmidt (2015).

[13] Slemrod and Yitzhaki (2002) note that revenue maximization is a common assumption in the literature (see, e.g., p. 1452) but suggest that revenue maximization is suboptimal from a normative standpoint under social utility maximization. We abstract from these long-term effects and concentrate on ATR settings that are potentially able to increase public revenues.

[14] For simplicity, we only consider the case of an upper border f that is smaller than $d\Delta$.

[15] In the case of our third interpretation, the formulas would slightly change. However, the main insights remain valid.

[16] The ex-ante probability of losing cash flows due to fewer investments equals the probability of additional cash flows due to more investment. This result depends critically on the assumption that C is uniformly distributed.

[17] An interior solution, as in the above example, cannot always be derived. Thus, for the parameters $d \coloneqq 0.6$; $\Delta \coloneqq 1$; $\tau \coloneqq 0.5$ we obtain $F^* = (1-d)d\Delta$.

REFERENCES

Agliardi, E. (2001). Taxation and Investment Decisions: A Real Options Approach. *Australian Economic Papers, 40*, 44-55. doi:10.1111/1467-8454.00112

Beck, P. J., Davis, J. S., & Jung, W. (1996). Tax Advice and Reporting under Uncertainty: Theory and Experimental Evidence. *Contemporary Accounting Research, 13*, 49-80. doi:10.1111/j.1911-3846.1996.tb00491.x

Beck, P. J., Davis, J. S., & Jung, W. (2000). Taxpayer Disclosure and Penalty Law. *Journal of Public Economic Theory*, *2*, 243-272. doi:10.1111/1097-3923.00038

Beck, P. J., & Jung, W. (1989). Taxpayer Compliance under Uncertainty. *Journal of Accounting and Public Policy*, *8*, 1-27. doi:10.1016/0278-4254(89)90009-4

Beck, P. J., & Lisowsky, P. (2014). Tax Uncertainty and Voluntary Real-Time Tax Audits. *The Accounting Review*, *89*, 867-901. doi:10.2308/accr-50677

Becker, J., Davies, R. B., & Jakobs, G. (2014). *The Economics of Advance Pricing Agreements*, (CESifo Working Paper No. 5079). Retrieved from http://ssrn.com/abstract=2532898

Canadian Revenue Service. (2014). *Advance Income Tax Rulings and Technical Interpretations. Income Tax Information Circular IC 70-6R6*. Retrieved from http://www.cra-arc.gc.ca/E/pub/tp/ic70-6r6/README.html

De Simone, L., Sansing, R. C., & Seidman, J. K. (2013). When are Enhanced Relationship Tax Compliance Programs Mutually Beneficial? *The Accounting Review, 88*, 1971-1991. doi:10.2308/accr-50525

De Waegenaere, A., Sansing, R. C., & Wielhouwer, J. (2007). Using Bilateral Agreements to Resolve Tax Transfer Pricing Disputes. *National Tax Journal*, *60*, 173-191. Retrieved from http://www.jstor.org/stable/41790383

Deloitte. (2014). *The impact of Tax Risk: Five Questions to Consider* [Interview with Alan Macpherson, Global Governance, Risk and Compliance tax leader, Deloitte Touche Tohmatsu Limited (DTTL)]. Retrieved from http://deloitte.wsj.com/riskandcompliance/2014/02/06/the-impact-of-tax-risk-five-questions-to-consider/

Edmiston, K. D. (2004). Tax Uncertainty and Investment: A Cross-Country Empirical Examination. *Economic Inquiry*, *42*, 425-440. doi:10.1093/ei/cbh071

Erard, B., & Feinstein, J.S. (1994). Honesty and evasion in the tax compliance game. *RAND Journal of Economics*, *25*, 1-19. Retrieved from http://www.jstor.org/stable/2555850

EY. (2014). *Bridging the divide. Highlights from the 2014 Tax risk and controversy survey*. EYMG Limited. Retrieved from http://www.ey.com/Publication/vwLUAssets/EY-2014-tax-risk-and-controversy-survey-highlights/$FILE/EY-2014-tax-risk-and-controversy-survey-highlights.pdf

Frischmann, P. J., & Frees, E. W. (1999). Demand for Services: Determinants of Tax Preparation Fees. *The Journal of the American Taxation Association*, *21*(Suppl. 1999), 1-23. doi:10.2308/jata.1999.21.s-1.1

Givati, Y. (2009). Resolving Legal Uncertainty: The Unfulfilled Promise of Advance Tax Rulings. *Virginia Tax Review*, *29*, 137-175. Retrieved from: http://papers.ssrn.com/abstract =1433473

Graetz, M. J., Reinganum, J. F., & Wilde, L. L. (1986). The tax compliance game: Toward an interactive theory of law enforcement. *Journal of Law, Economics, and Organization*, *2*, 1-32. Retrieved from http://www.jstor.org/stable/764914

ICIJ (The International Consortium of Investigative Journalist). (2014). *Explore the Documents: Luxembourg Leaks Database*. Retrieved from http://www.icij.org/project/luxembourg-leaks/explore-documents-luxembourg-leaks-database.

Inland Revenue Authority of Singapore. (2013). *Advance Ruling System*. Retrieved from http://www.iras.gov.sg/irashome/uploadedfiles/e-Tax_Guide/etaxguides_IIT_Advance%20Ruling%20System_2012-12-23.pdf.

IPI (Institute for Policy Innovation). (2015). How Tax Uncertainty Harms Economic Growth, *IPI Ideas*, No 64, March 2015. http://www.ipi.org/docLib/20150319_HowTaxUncertaintyHarmsEconomicGrowth.pdf.

KPMG. (2014). Luxembourg 2015 Budget voted. *Luxembourg Tax News*, 2014-29. Luxembourg. Retrieved from https://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/taxnewsflash/Documents/luxembourg-dec22-2014.pdf

Lisowsky, P., Robinson, L. A., & Schmidt, A. (2013). Do Publicly Disclosed Tax Reserves Tell Us About Privately Disclosed Tax Shelter Activity? *Journal of Accounting Research*, *51*, 583-629. doi:10.1111/joar.12003

Logue, K. D. (2005). The Problem of Tax Law Uncertainty and the Role of Tax Insurance. *Virginia Tax Review*, *25*, 339-414. Retrieved from: http://papers.ssrn.com/abstract =780345

Mills, L., Robinson, L. A., & Sansing, R. (2010). FIN 48 and Tax Compliance. *The Accounting Review, 85*, 1721-1742. doi:10.2308/accr.2010.85.5.1721

Niemann, R. (2011). The impact of tax uncertainty on irreversible investment. *Review of Managerial Science, 5*, 1-17. doi:10.1007/s11846-010-0042-5

Niemann, R., & Sureth-Sloane, C. (2016). *Does Capital Tax Risk Delay Irreversible Risky Investment?* Unpublished Manuscript.

Neuman, S. S., Omer, T. C., & Schmidt, A. (2015). *Assessing Tax Risk: Practitioner Perspectives.* Retrieved from SSRN: http://ssrn.com/abstract=2579354.

OECD. (2013). *Action Plan on Base Erosion and Profit Shifting*, OECD Publishing. http://dx.doi.org/10.1787/9789264202719-en

OECD. (2015). *Tax Administration 2015: Comparative Information on OECD and Other Advanced and Emerging Economies*. OECD Publishing. doi:http://dx.doi.org/10.1787/tax_admin-2015-en

Reinganum, J. F., & Wilde, L. L. (1986). Equilibrium verification and reporting policies in a model of tax compliance. *International Economic Review, 27*, 739-760. Retrieved from http://www.jstor.org/stable/2526692

Rhoades, S. C. (1999). The Impact of Multiple Component Reporting on Tax Compliance and Audit Strategies. *The Accounting Review*, *74*, 63-85. doi:10.2308/accr.1999.74.1.63

Sansing, R. C. (1993). Information Acquisition in a Tax Compliance Game. *The Accounting Review*, *68*, 874-844. Retrieved from http://www.jstor.org/stable/248510

Scholes, M. S., Wolfson, M. A., Erickson, M., Hanlon, M. L., Maydew, E. L., & Shevlin, T. (2015). *Taxes and Business Strategy: A Planning Approach*. Upper Saddle River, NJ: Pearson Prentice Hall.

Shavell, S. (1988). Legal Advice about Contemplated Acts: The Decision to Obtain Advice, Its Social Desirability, and Protection of Confidentiality. *Journal of Legal Studies*, *17*, 123-150. Retrieved from http://www.jstor.org/stable/3085598

Slemrod, J., & Yitzhaki, S. (2002). Tax Avoidance, Evasion, and Administration. In A. J. Auerbach & M. Feldstein (Eds), *Handbook of Public Economics* (Vol. 3, pp. 1423-1470). Amsterdam: Elsevier.

South African Revenue Service. (2013). *Comprehensive Guide to Advance Tax Ruling*. Retrieved from http://www.sars.gov.za/AllDocs/OpsDocs/Guides/LAPD-TAdm-G02%20-%20Comprehensive%20Guide%20to%20Advance%20Tax%20Rulings%20-%20External%20Guide.pdf.

Starkman, J. (2010). Applying for a Private Letter Ruling. *Journal of Accountancy, 209*, 21. Retrieved from http://www.journalofaccountancy.com/issues/2010/jan/20092143.html

Vollert, P., Eikel, C., & Sureth, C. (2013). Advance Pricing Agreements (APAs) als Instrument zur Vermeidung von Verrechnungspreiskonflikten – eine kritische Betrachtung [Title in English: Advance Pricing Agreements (APAs) as a Measure to Alleviate Transfer Pricing Conflicts – A Critical Perspective], *Steuer und Wirtschaft*, 90, 367-379.

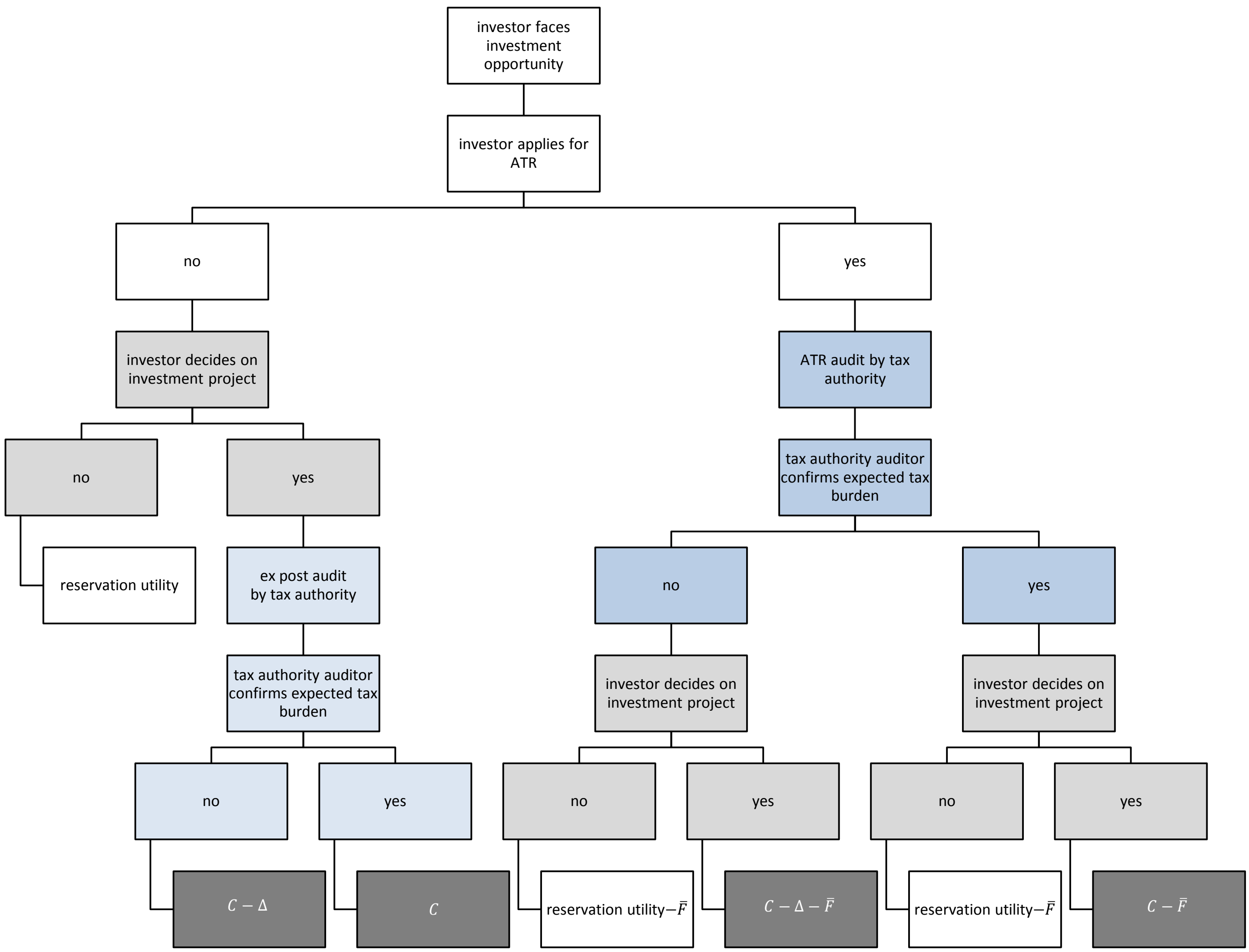

Figure 1. Sequence of Events and Decisions

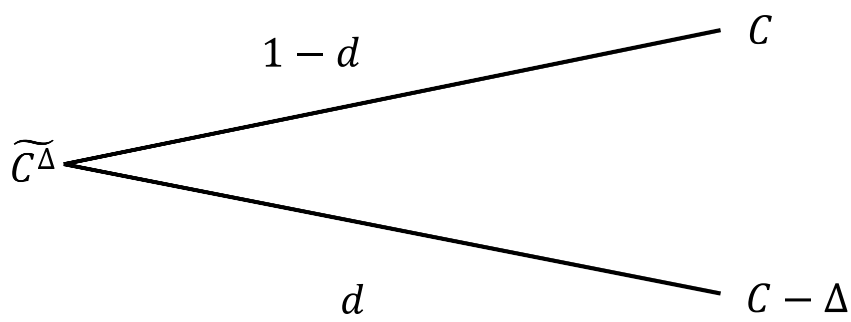

Figure 2. Random variable $\widetilde{C^{\Delta}}$

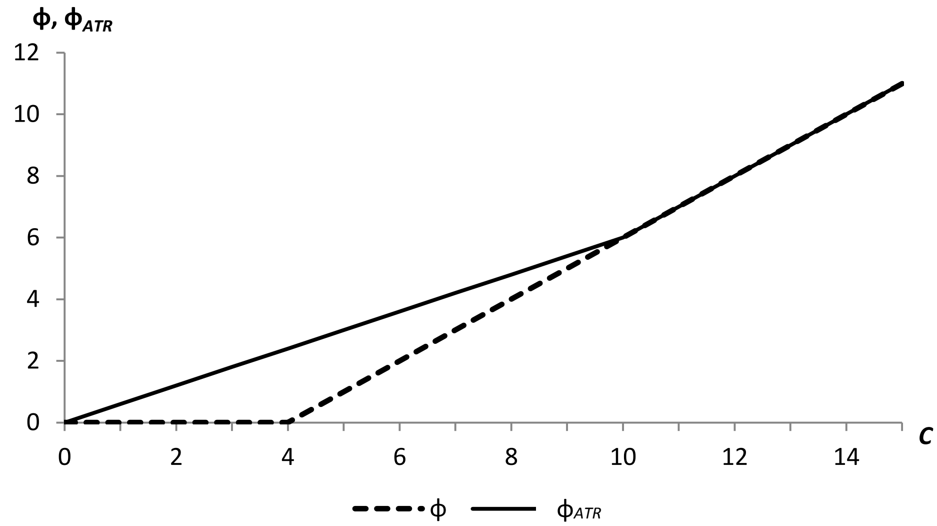

Figure 3. Objective functions with (ϕ_{ATR}) and without an ATR (ϕ), depending on pre-audit net cash flow C

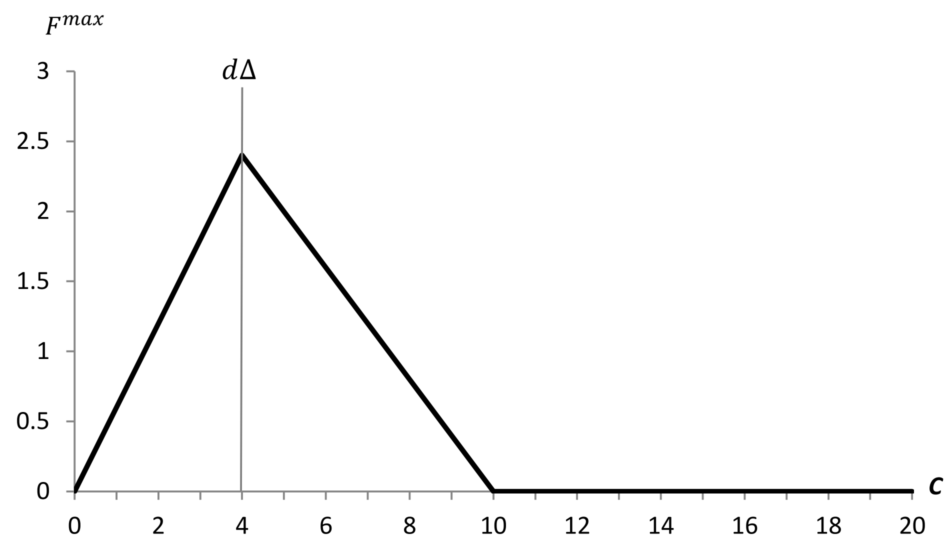

Figure 4. Maximum fee F^{max} for an ATR as a function of pre-audit net cash flow C

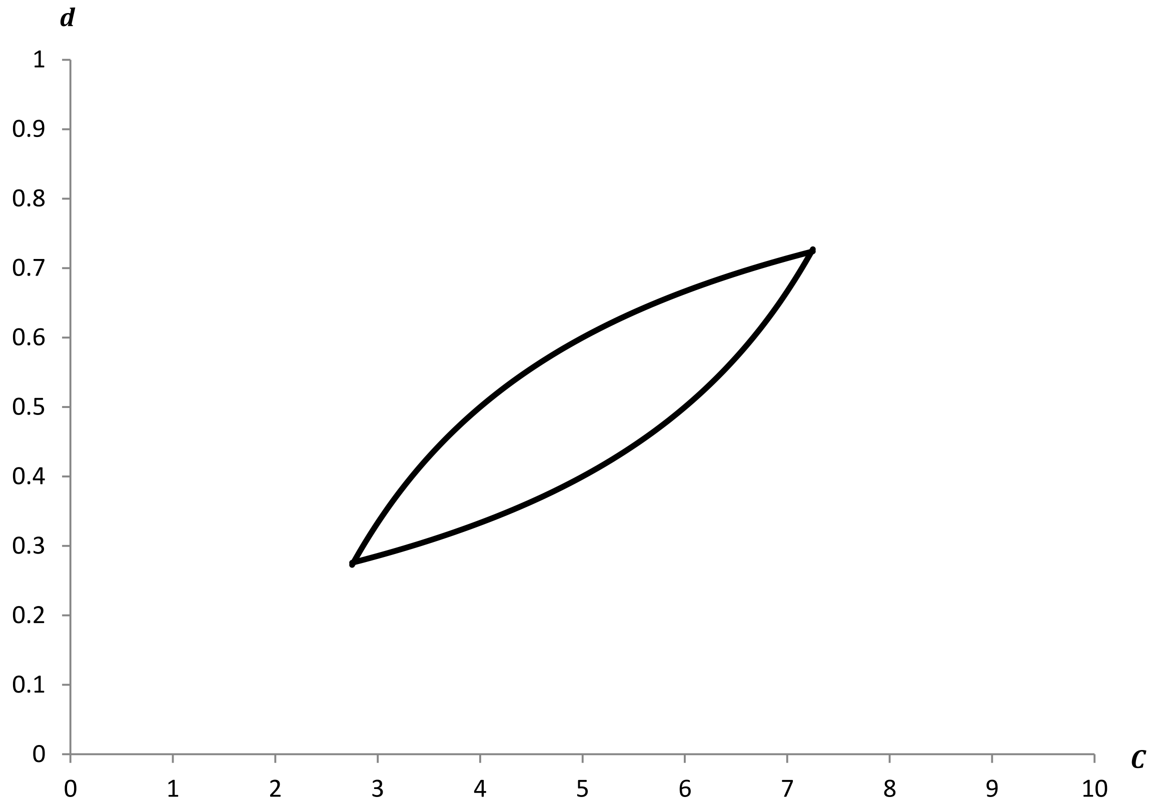

Figure 5. d-C-combinations for a given fee $\bar{F} = 2$ and $\Delta = 10$ that induce indifference toward requesting an ATR (taxpayer's perspective)

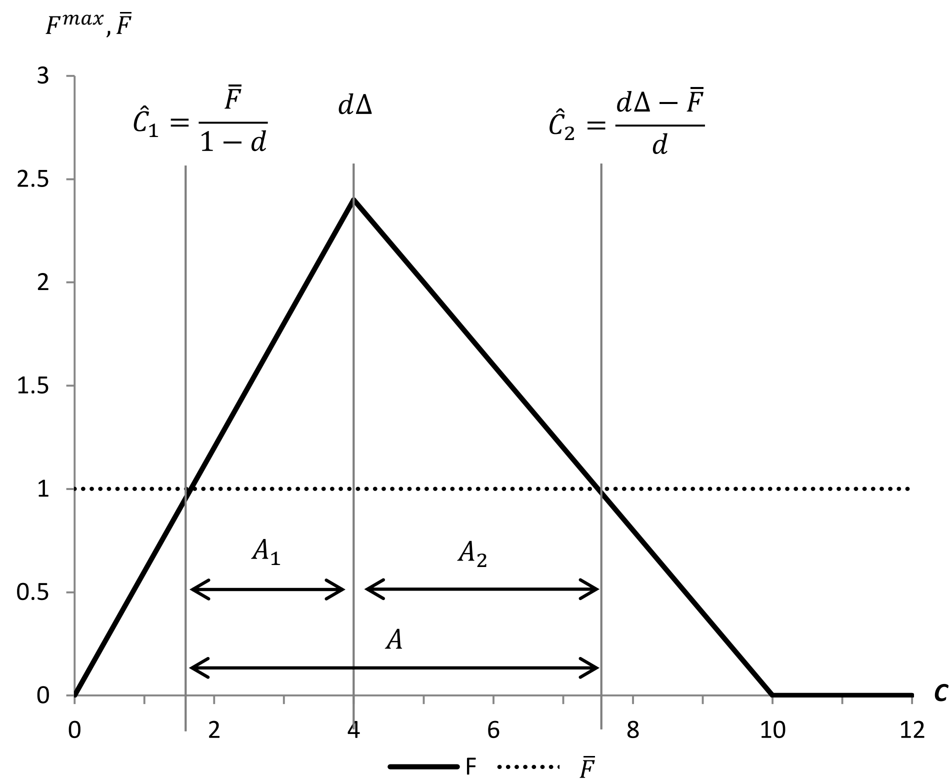

Figure 6. A comparison of the maximum fee F^{max} and the tax authority´s fee $\bar{F}$ for an ATR, depending on the pre-audit net cash flow C

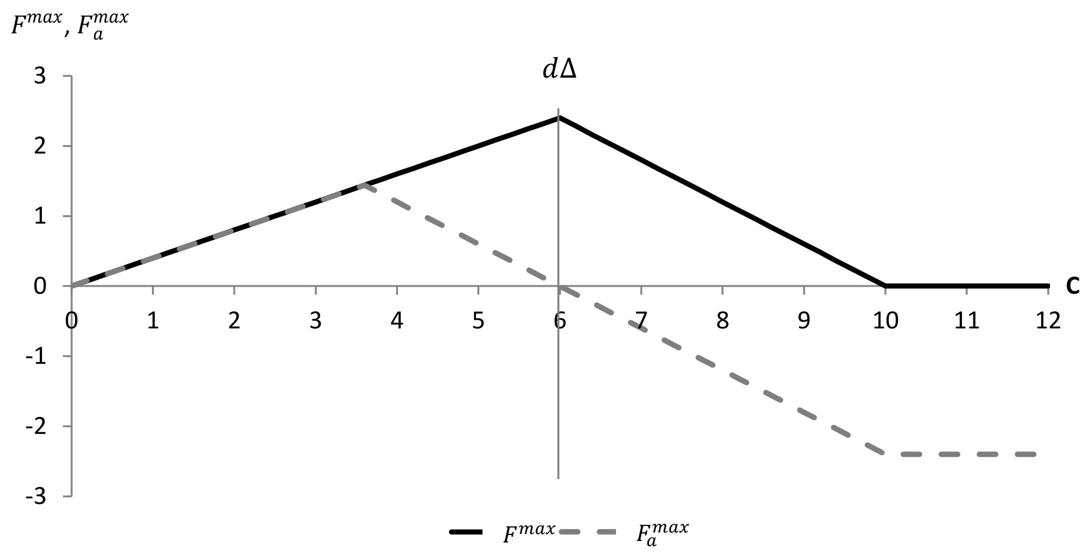

Figure 7. A comparison of the maximum fee standard model F^{max} and in the model with inspection risk F_a^{max}

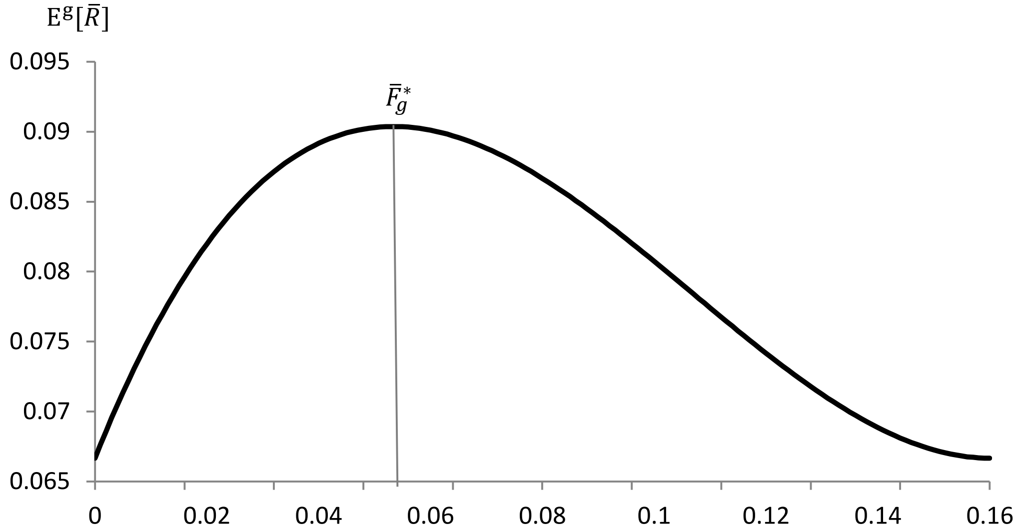

Figure 8. Optimal fee $\bar{F}_g^*$ if lower cash flows are more likely than high cash flows and a density function

Table 1. Possible states of the investor's decision problem

	investor's decision to request ATR	**ATR audit**	**investor's decision to invest**	**ex post audit**	**payoff**
investment opportunity	ATR for a fee	favorable $(1-d)$	invest	favorable	$C-\bar{F}$
			not to invest	$\mathrm{N/A}$	$-\bar{F}$
		unfavorable (d)	invest	unfavorable	$C-\Delta-\bar{F}$
			not to invest	$\mathrm{N/A}$	$-\bar{F}$
	no ATR	N/A	invest	favorable $(1-d)$	C
				unfavorable (d)	$C-\Delta$
			not to invest	$\mathrm{N/A}$	0

Table 2. The effect of an ATR on audit costs, considering additional audit costs K and audit cost reduction P

		$C < d\Delta$ no investment without ruling	$C \geq d\Delta$
no ruling		0	$-K$
ruling		$-(K - P)$	$-(K - P)$
difference		$-(K - P)$	$+P$

Table 3. Possible states of the investor's decision problem with increased inspection and detection risk

<table>
<tr><th>investor's decision to request ATR</th><th>ATR audit</th><th>investor's decision to invest</th><th colspan="2">ex post audit</th><th>payoff</th></tr>
<tr><td rowspan="4">ATR for a fee</td><td rowspan="2">favorable $(1-d)$</td><td>invest</td><td colspan="2">favorable</td><td>$C-\bar{F}$</td></tr>
<tr><td>not to invest</td><td colspan="2">N/A</td><td>$-\bar{F}$</td></tr>
<tr><td rowspan="2">unfavorable (d)</td><td>invest</td><td colspan="2">unfavorable</td><td>$C-\Delta-\bar{F}$</td></tr>
<tr><td>not to invest</td><td colspan="2">N/A</td><td>$-\bar{F}$</td></tr>
<tr><td rowspan="4">no ATR</td><td rowspan="4">N/A</td><td rowspan="3">invest</td><td rowspan="2">audit/detection $(1-a)$</td><td>favorable $(1-d)$</td><td>C</td></tr>
<tr><td>unfavorable (d)</td><td>$C-\Delta$</td></tr>
<tr><td colspan="2">no audit/detection (a)</td><td>C</td></tr>
<tr><td>not to invest</td><td colspan="2">N/A</td><td>0</td></tr>
</table>

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