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Examining the relationship between tax avoidance, effective tax rate, tax risk and tax uncertainty

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ABSTRACT

Purpose – This research aims to examining the relationship between tax avoidance, effective tax rate, tax risk and tax uncertainty

Design/methodology/approach – The data obtained in relation to the research variables were entered into an Excel spreadsheet and then analyzed using EViews software. The statistical population of this research is the systematic elimination method among 149 companies listed on the Tehran Stock Exchange during the period 2014 to 2021.

Findings – The research results showed that there is a significant relationship between the company's effective tax rate and the company's profitability. There is no significant relationship between tax avoidance and the company's tax risk rate, as well as between tax avoidance and tax uncertainty.

Practical implications – More Discussion and conclusion showed that People in a company are interested in the effective tax rate that is used when budgeting and planning. On the other hand, the agency theory encourages managers to increase company profits. When the earned profit increases, the amount of income tax will automatically increase in proportion to the increase in the company's profit.

Keywords: Effective tax rate of the company; profitability of the company; tax avoidance; Tax uncertainty

1. Introduction

When a company reduces its tax liability, it also has to reduce its "book" earnings—which are declared to the public—and its taxable income—which is reported to the tax authorities. This is known as conforming tax avoidance. Conversely, when these values vary, nonconforming tax avoidance results in lower tax obligations. Conforming tax evasion thus entails a special trade-off. A company must report less book income if it wishes to pay less in taxes. Consequently, a company may pay more in taxes if it seeks to artificially boost its book earnings (Eichfelder *et al.*, 2024). Governments rely on revenue from taxpayers to fund their activities, including providing necessary infrastructure facilities to their citizens. Therefore, activities that reduce the tax burden on taxpayers make it difficult for the government to raise sufficient funds to meet its obligations to the people (Pandey *et al.*, 2023). In developed countries, the issue of tax avoidance has gained attention, especially due to the loss of tax revenues needed to carry out government functions. For example, in the United States, annual tax revenue losses are reported to be nearly $70 billion, equivalent to nearly 20% of the annual corporate tax revenues collected. Tax avoidance is not a new trend in developing countries either, with estimated annual losses of US$9.6 billion across the West African region, and US$2.9 billion in Nigeria in particular (Aronmwan & Okaiwele, 2020). Despite media, academic, and research attention, there appears to be no widely accepted definition of tax avoidance, perhaps due to the diversity of tax avoidance criteria. In other words, there are many bottlenecks and disagreements in the conceptualization of tax avoidance, which may be due to the multifaceted nature of tax avoidance (Gebhart, 2017). One of the causes of the poor state revenue is tax avoidance. There are two ways to carry out this exercise (Pandapotan *et al.*, 2023). Tax avoidance is commonly defined as any decrease in a firm's taxes in relation to its pretax accounting income. However, certain research projects examine more focused types of tax avoidance, such as aggressive tax avoidance, tax sheltering, or tax risk. Because tax avoidance addresses the fundamental policy issues of tax equity (i.e., fairness) and tax efficiency, it is a topic of interest to academics, legislators, and the business press (Delgado *et al.*, 2023).

Tax avoidance, characterized by legally minimizing tax liabilities, is a common financial practice engaged in by corporations seeking to optimize their fiscal responsibilities (Pramesti & Harsono 2024, Stefhanie & Dewi, 2022).

Chen *et al.*, (2010) defines tax avoidance as any arrangement to reduce tax liability and state that when these arrangements are scrutinized, they form a chain of legitimate, gray or illegal activities. They also believe that arrangements that are grouped as gray arrangements better reflect the daring practice of tax avoidance. Therefore, although tax avoidance is legitimate, it can be illegal when it is done recklessly, which according to Hanlon and Heitzman (2010) is considered "tax law pressure".

Tax avoidance refers to lowering corporate taxes relative to pre-tax profits. Tax avoidance is considered a set of activities aimed at reducing tax liability. It will be difficult for companies to maintain their current tax avoidance strategies. Furthermore, a lower tax rate due to tax avoidance is a temporary investment in reducing tax expense and is one of several investment options that carry its own risks, resulting in a higher tax rate in the future (Choi & Park, 2022). But one of the indicators is closely related to the issue of tax avoidance, is the "effective tax rate". From the perspective of Shanmugam (2020), the effective tax rate is considered a key and important indicator regarding the company's tax burden as well as for policymakers and researchers, and it is an indicator that is widely used in effective tax planning and in the field of profit change. Gebhart (2017) examined tax avoidance measures for their similarities using existing data and found that “although different measures of corporate tax avoidance show differences and these differences persist over time. Measures based on the same logic (such as effective tax rate measures) are subject to high correlation between each other.

Hassan *et al.* (2014) provide evidence that firms with lower effective corporate tax rates incur higher interest costs for debt financing due to higher levels of tax avoidance. In contrast, Goh *et al.*, (2016) provided evidence that firms with higher levels of tax avoidance have lower capital costs and argued that tax avoidance increases cash flow, so investors demand a lower expected rate of return. Bauer & Klassen (2014) find that there is no significant relationship between effective corporate tax rates and the measure of tax avoidance, and actual future tax payments. Dyreng *et al.*, (2008) provided evidence that some firms can

maintain high levels of tax avoidance (low effective corporate tax rates) for long periods. Furthermore, Guenther *et al.,* (2017) showed that a relatively low effective corporate tax rate is more stable than a relatively high effective corporate tax rate. Furthermore, they provide evidence that there is no significant relationship between the effective corporate tax rate, a measure of tax avoidance, and the volatility of the effective corporate tax rate, which is a measure of tax risk. Despite evidence that lower effective cash tax rates are associated with greater risk, it is unclear whether this risk is associated with greater uncertainty regarding the sustainability of firms' tax positions. For example, it is possible that low effective cash tax rates are associated with greater risk of reputational costs, political costs, or agency costs.

According to the discussed topics and foundations, the problem of the present research is formed on the basis that, in the first place, avoiding incremental tax requires management effort, and managers of Iranian companies may not have enough motivation to pursue incremental tax avoidance (especially if it leads to to a temporary tax reduction that does not reduce the cost of tax on the company's financial accounting income). A second and related reason is that less constrained firms may not engage in more conventional tax avoidance and, accordingly, the initial costs of tax avoidance may increase, thereby reducing the potential benefit of additional tax savings; Managers may be reluctant to incur these additional costs unless the benefits of tax avoidance are also greater (eg, due to financial constraints). A third reason why less constrained firms may not engage in more conventional tax avoidance is that external stakeholders can pressure managers to avoid tax because of potential agency costs or because of negative credit effects the firm may face; to limit Finally, incremental tax avoidance may actually be more uncertain than amounts reflected as increases in uncertain tax reserves, but managers of more limited companies may be reluctant to record increases in uncertain tax reserves because doing so would reduce potential reporting benefits. Finance is about tax savings. Dyreng *et al*., (2019) examine the relationship between tax avoidance and tax uncertainty and, in particular, address the question of how increasing corporate tax avoidance, as measured by the level of the cash effective tax rate, is associated with uncertain tax avoidance (as which is reflected in the increase in the firm's unrealized tax benefit reserves), they find that firms with low cash effective tax rates have a significant increase in unrealized tax benefit reserves, and this positive association is stronger for firms with subsidiaries. According to the explanation of these four important issues, the current research aims to answer these questions: Does tax avoidance become more uncertain and ambiguous with the increase of the effective tax rate? And whether firms first use relatively safe tax avoidance strategies and only switch to more uncertain tax avoidance strategies as tax evasion rates increase. We are also trying to answer the question whether increasing or decreasing the effective tax rate will lead to more or less profitability of the company or not? And finally, what is the impact of tax avoidance on tax risk and tax uncertainty of the company?

2. Theoretical Background and Hypotheses Development

Tax avoidance

Although tax research has been done for a long time, Allingham and Sandmo (1972) developed the theoretical framework for individual tax evasion. Since then, the Taxpayer as Gambler model that they developed has served as the foundation for the theory of tax evasion (Kurniasih *et al.*, 2022). Corporate tax avoidance encompasses a wide range of actions that might be considered "aggressive" and can be either lawful or unlawful. It is defined as "anything that reduces the firm's taxes relative to its pretax income." (Velte, 2023).

Tax avoidance is a management strategy based on tax savings that is widely used by companies in many countries, and whether and how companies engage in this process is an important decision for managers. In adopting tax avoidance, a company retains more funds that should be handed over to the government. Some studies show that addressing tax avoidance can increase firm value, while others argue that tax avoidance incurs costs in terms of exacerbating corporate agency conflicts and/or unnecessary investigations and fines by tax authorities, and hence, after evaluating the benefits and costs, the firm chooses an optimal level of tax avoidance (Lei *et al.*, 2022). Corporate tax avoidance is usually defined as actions that reduce a company's relative tax relative to pre-tax accounting income (Dakhli, 2021).

Tax uncertainty

Since the beginning of the financial and economic crises, the international tax policy debate has focused especially on corporate taxation with the aim of limiting tax avoidance while improving investment conditions. Fiscal constraints imposed on public budgets combined with slow growth after multiple crises lead to a debate on how to generate additional and back-up revenues while minimizing the negative effects of taxes on investment and growth. Corporate income tax has been one of the relevant topics in this discussion. That's because a number of revelations show that some multinational companies systematically reduce their tax bill, sometimes with the help of governments and by exploiting differences in the tax system. This strong political pressure created the necessary conditions for effective measures (Jacob *et al.*, 2022). Tax uncertainty is the potential loss of tax savings upon challenge by tax authorities and measure it as additions to unrecognized tax benefits related to current year tax positions over a five-year period (Hutchens *et al.*, 2022).

Effective tax rate

For a considerable amount of time, economists who research corporate income taxation have recognized the significance of differentiating between statutory and effective tax rates (Janský, 2022). Researchers often use generally accepted accounting principles related to effective tax rates as an indicator of tax avoidance - with the implicit and reasonable assumption - that low effective tax rates indicate the highest levels of tax avoidance and high effective tax rates indicate no successful tax avoidance (Schwab *et al.*, 2022). However, as Hanlon and Heitzman (2010) point out, effective tax rates are also affected by things that "are not tax planning strategies, such as changes in valuation allowances or changes in the tax reserve" (Schwab *et al.*, 2022). An effective tax rate reduces the tax burden that companies face. There are two concepts of effective tax rates for corporate taxes: prospective effective tax rates, which measure the tax burden of a hypothetical investment project over its lifetime, and retroactive effective tax rates, which are based on taxes paid on sales and profits. It has been realized (Bachas et al., 2022).

Company profitability

Profitability is the performance of management in certain periods of recorded profits, which are usually obtained in a year, quarter or half year. In a company, profitability is a critical part of determining business continuity. Although a company that always records high profits cannot survive in the macro business environment, many factors determine whether a company is doing well or not. Based on a profitability measure that is used as a reference, many analysts predict whether the company is performing well or not (Kafouros *et al.*, 2022). In fact, profitability is a factor that should be given a lot of attention because it must be in a favorable condition for a company to survive. Without profits, it will be difficult for companies to attract capital from abroad. Profitability analysis is very important for lenders and equity investors. For creditors, profit is the source of interest and principal payment (Iskandar, 2021). Time profitability is the net outcome that the business achieves from its different strategies and choices. Not only does profitability help the business grow, but it also improves the state of its finances. For this reason, it is crucial to the organization. A business needs to be successful in order to continue existing, as it would be impossible for it to draw in outside funding without these advantages. One advantage of the profitability ratio is that it may be used to assess how profitable the company is in relation to specific assets, sales figures, or investments (Hermawan *et al.*, 2022).

Investigating the relationship between the company's effective tax rate and the company's profitability

Wilkie (1988) models the effective tax rate of firms as a function of the level of pre-tax income and the level of what he calls "tax preferences" and argues that if the two are not perfectly correlated, changes in the effective tax rate will result from changes in each One of the components is derived. He shows that "the effective tax rate moves asymptotically toward the statutory rate as (pre-tax) income increases, and that a firm's effective tax rate and pre-tax income are positively correlated. The implication is that as a firm's profitability increases, it should engage in increasing amounts of tax avoidance in order to keep the effective corporate tax rate low (Guenther *et al.*, 2019). The same argument has recently been made in a different

context by Sikes and Verrecchia (2020), who show how firm-wide tax avoidance can affect the cost of capital through the risk-sharing effect of income taxes; They state that "the tax liability of a firm consists of two parts: a tax/subsidy on firm size and an income tax, where the former represents a fixed tax and the latter represents a variable tax. According to the mentioned foundations, the first hypothesis of the research is drawn as follows:

Hypothesis (1): There is a significant relationship between the effective tax rate of the company and the profitability of the company.

Examining the relationship between tax avoidance and tax risk

Existing studies mainly show that investing in tax avoidance increases the tax risk of companies. The existing studies show three main reasons for increasing the tax risk of companies. Firstly, the reason is that the low tax rate due to tax evasion by companies increases the possibility of tax investigation by the tax authority and the possibility of paying higher tax costs due to tax investigations and fines of the tax authority increases in the future. In other words, reducing tax costs due to tax avoidance brings more risk. Existing studies show that the second reason is that companies reduce tax costs by avoiding taxes in a temporary way that can no longer be used in the future; Since the tax rate reduced by this tax strategy cannot be sustained continuously in the future, such tax avoidance entails more risk from the company's point of view. Third, existing studies argue that tax avoidance increases tax risk because a firm's low tax rate indicates that the firm is investing in a high-risk investment alternative. Finally, tax avoidance can incur agency costs and reduce firm transparency, which can also cause uncertainty in the firm's future cash flows (Choi and Park, 2022). According to the mentioned principles, the second hypothesis of the research is drawn as follows:

Hypothesis (2): There is a significant relationship between tax avoidance and the company's tax risk rate.

Examining the relationship between tax avoidance and unrecognized tax benefits

In a recent study, Dyreng *et al.*, (2019) investigated the relationship between tax avoidance and tax uncertainty. In particular, they ask how increased corporate tax avoidance (as measured by the level of the effective cash tax rate) is related to unspecified tax avoidance (as reflected in the increase in corporate reserves of unspecified tax benefits). be). They find that firms with low effective cash tax rates have a significant increase in uncertain tax benefits, and this positive association is stronger for firms with tax havens and frequent patenting. Although their analysis is relevant to ours, the two studies differ in a fundamental way that affects the conclusions that can be drawn from each. Dyreng *et al.*, (2019) examines whether the level of unspecified tax avoidance is associated with effective cash tax rates. In contrast, we examine whether the percentage of total tax avoidance that is unclear increases as the rate of tax avoidance increases. According to the mentioned principles, the third hypothesis of the research is drawn as follows:

Hypothesis (3): There is a significant relationship between tax avoidance and tax uncertainty.

3. Research methodology

3.1. Sampling Technique and Data Collection

Based on the purpose, the current research is considered to be of applied type. From the point of view of the inference method, the current research is descriptive-analytical. This type of research consists of collecting detailed information in order to test the hypothesis or answer questions related to the current state of the subject under study. This research is done from the point of view of the implementation process of the type of causal-correlational research, which is done by using past historical information (quasi-experimental) and based on deductive-inductive reasoning, the purpose of which is to test the stated hypotheses in order to observe the causal relationship between the independent variables and the rate Their effect on the dependent variable and discovering the degree of correlation between the variables. In the data analysis, the methods of correlation and regression of mixed data with fixed effects have been used by EViews 11 software. The type of data is second-hand and the information and figures available in the Tehran Stock Exchange will be used to collect financial information. For this reason, the required information is extracted from the financial reports published by the companies, the official website of the Tehran Stock Exchange, and also from the Rahavard Novin database

software. The scope of the research covers the period of 8 years from 1392 to 1400 and the place of research is the Tehran Stock Exchange and the companies admitted to the stock exchange.

3.2. Measures and Variables

The dependent variables

Company profitability ($PROF_{i,t}$)

Profitability is the first dependent variable in this research. The rate of return on assets is used to measure profitability, which is calculated through the following formula: (Hakim *et al.*, 2023):

$$\text{ROA} = \frac{\text{net profit}}{\text{total asset}}$$

Tax risk rate ($TAXR_{i,t}$)

In order to measure the tax risk, the fluctuation of tax evasion is used, based on which, the deviation of the tax evasion criterion (three years ago) is considered.

Tax uncertainty ($TAXU_{i,t}$)

Tax uncertainty represents current additions to "unrecognized tax benefits" scaled by total deferred assets. Previous research shows that current-year additions to unrecognized tax benefits have the highest statistical power in capturing tax uncertainty (DeSimone *et al.*, 2019) (based on analysts fully estimating the coefficient statistically and economically from do not recognize zero). A negative coefficient on unrecognized tax benefits ($\beta 1 < 0$) indicates that analysts systematically forecast effective tax rates that are higher than actually realized. Since positively biased effective tax rates reduce predicted performance, a negative coefficient on unrecognized tax benefits is consistent with analysts being pessimistic and with regard to information arising from tax uncertainty. In contrast, a positive coefficient on unrecognized tax benefits indicates optimism and implies that analysts' forecasts of performance are biased upward due to systematically forecasting effective tax rates that are lower than actual ones. Therefore, tax uncertainty is measured by estimating the standard deviation of the effective tax rate three years ago.

Independent variables

effective tax rate ($ETR_{i,t}$)

The indicators used to measure tax avoidance represent the effective tax rate. The effective tax rate can take all forms of tax deductions from the effect of temporary differences and through legal loopholes. This index is measured by calculating the total cost of income tax divided by pre-tax profit:

Effective tax rate= (tax cost)/(net profit before tax deduction)

Tax avoidance ($TAXAV_{i,t}$)

The following criteria adapted from previous studies were used (Atwood et al. 2012; Atwood and Lewellen 2019):

$$\text{Tax Avoidance}_{i,t} = \frac{\sum_{t-2}^{t} (PTEBX \times \tau)_i - \sum_{t-2}^{t} CTP}{\sum_{t-2}^{t} PTEBX_{\text{ll}}}$$

where in

PTEBX is pre-tax earnings before exceptional items,

CTP is the current tax paid.

Measurement the control variables is stated in the form of table (1):

Table (1): Measurement of research control variables

Abbreviation in the experimental research model	Variable Measurement	Control Variables
$SIZE_{i,t}$	It is calculated through the natural logarithm of the stock market value.	Firm Size
$LEVE_{i,t}$	It is calculated by measuring total liabilities divided by total assets.	Leverage
$INTA_{i,t}$	It is calculated by measuring the ratio of intangible assets to total assets in fiscal year t.	intangible asset
$CF_{i,t}$	It is defined by measuring the ratio of cash flow to the net income of the business in the financial year t	cash flow
INV i,t	It is calculated through the standard deviation of pre-tax profit (compared to three years ago) divided by total assets.	Income volatility
$MTB_{i,t}$	The ratio of market value to book value is obtained by dividing the product of the final share price by the number of issued shares in the hands of the	Market to book value

Abbreviation in the experimental research model	Variable Measurement	Control Variables
	shareholders by the book value of the total equity of the company.	
GRO $_{i,t}$	The growth opportunities of company i in year t, which is equal to the sum of the market value of equity and the book value of debt divided by the book value of assets.	Growth Opprtuuneies

Regression models of research

Model (1) to test the first hypothesis:

$$PROF_{i,t} = \beta_0 + \beta_1 ETRi_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

Model (2) to test the first hypothesis:

$$TAXR_{i,t} = \beta_0 + \beta_1 TAXA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

Model (3) to test the first hypothesis:

$$TAXA_{i,t} = \beta_0 + \beta_1 TAXUi_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

4. Data Analysis

Descriptive Statistics

Among the mentioned central indicators, the average is considered the most important, which indicates the balance point and center of gravity of the distribution. The mean is a suitable index to show the centrality of the data. For example, the average of the company size variable is equal to 14.659, which shows that most of the data related to this variable are concentrated around this point. The median is another central indicator. As can be seen in table (1), the mean of this variable is equal to 14.420, which shows that half of the data of this variable is less than this value and the other half is more than this value.

Stationarity test

Before estimating the model, the data should be tested for reliability. Non-significance of variables causes the problem of false regression. In this research, in order to detect the significance of the variables, we use the test of Levin, Lin, Chu. The results of the data reliability test are summarized in table (3):

The test of normality of research variables

The first step to start the hypothesis testing process is to check the normality of the data. To test the above hypothesis, the Jarque-Bera test was used, the results of which are presented in table (4):

The results obtained from the research hypothesis test

The results of the model data type selection test are presented in table (5):

The results of Limer's test presented in in table (5) show that the probability of the F-limer test is less than 5%, and therefore, the Mixed method is used to estimate the model. For this purpose, the model was estimated using the fixed effects method, but before examining the coefficients, it is necessary to make sure that the classical assumptions are met in this model.

Table (2): Descriptive statistics of quantitative research variables

Variable	Average	mn (median)	maximum	maximum	standard deviation	skewness	kurtosis
Financial Leverage	0.554	0.552	1.567	0.031	0.215	0.178	3.420
The ratio of book value to market value	3.57	2.43	27.040	-20.91	4.083	2.065	13.08
size of the company	14.75	14.53	2082	10.53	1.61	0.76	4.01
Cash flow	0.169	0.125	1.61	-0.82	0.24	1.37	8.07
growth opportunity	3.84	2.24	28.87	0.66	3.94	2.80	12.52
Effective tax rate	0.109	0.109	0.88	-0.23	0.104	1.65	11.38
Intangible assets	0.004	0.001	0.057	0.000	0.007	3.41	17.28
The rate of return on assets	0.141	0.115	0.68	-0.58	0.156	0.444	3.97
Tax avoidance	0.141	0.132	0.263	0.000	0.085	0.011	1.47
Tax risk rate	0.041	0.011	0.99	0.000	0.104	5.65	40.85
Tax uncertainty	0.048	0.026	0.64	0.000	0.070	4.031	25.42
Fluctuations in pre-tax income	0.072	0.054	0.38	0.0001	0.62	1.46	5.416

Table (3): Stationarity test of research variables

Variable	The value of Levin, Lin and Chu statistics	Levin, Lin and Chu's probability statistic
Financial Leverage	-15.04	0.000
The ratio of book value to market value	-18.29	0.000
size of the company	-4.88	0.030
Cash flow	-65.10	0.000
growth opportunity	18.95-	0.000
Effective tax rate	-18.04	0.000
Intangible assets	-9.20	0.00
The rate of return on assets	-11.41	0.00
Tax avoidance	541.3-	0.000
Tax risk rate	-79.63	0.000
Tax uncertainty	94.02-	0.00
Fluctuations in pre-tax income	-15.12	0.00

Table (4): normality of research variables

Variable	The value of Jarque-Bera	The probability of Jarque-Bera
Financial Leverage	17.004	0.000
The ratio of book value to market value	6636.02	0.000
size of the company	189.55	0.030
Cash flow	1858.75	0.000
growth opportunity	6823.4	0.000
Effective tax rate	4534.4	0.000
Intangible assets	14003.8	0.00
The rate of return on assets	97.48	0.00
Tax avoidance	31456	0.000
Tax risk rate	87230	0.000
Tax uncertainty	31726	0.00
Fluctuations in pre-tax income	807.51	0.00

Table (5): F-limer and Hausman test

	Test	statistics	significant	Result
The first hypothesis model	F-limer test	5.12	(0.000)	Validation of the Mixed model (panel) against the pooled model
	Hausman test	71.37	0.000	Confirmation of fixed effects versus random effects
The Second hypothesis model	F-limer test	2.27	0.000	Validation of the Mixed model (panel) against the pooled model
	Hausman test	29.89	0.000	Confirmation of fixed effects versus random effects
The third hypothesis model	F-limer test	44.96	0.000	Validation of the Mixed model (panel) against the pooled model
	Hausman test	49.82	0.000	Confirmation of fixed effects versus random effects

The test of heterogeneity of variance and autocorrelation

One of the classic assumptions is the variance heterogeneity test. In this study, the modified parent test was used to investigate this issue. Also, considering the important effect of variance heterogeneity on the estimation of standard deviation of coefficients and also the problem of statistical inference, it is necessary to investigate the presence or absence of variance heterogeneity before making any estimation. The results of these two tests are presented in the table below:

Table (6): The results of the heterogeneity of variance and autocorrelation test

	autocorrelation test	Value	probability	Heterogeneity test	Value	probability
The first hypothesis model	Godfrey's test	98.34	0.000	White test	20.21	0.000
The Second hypothesis model	Godfrey's test	107.90	0.000	White test	7.74	0.000
The third hypothesis model	Godfrey's test	76.77	0.000	White test	9.86	0.000

Testing the research hypotheses

Model estimation results for the first hypothesis

First hypothesis: There is a significant relationship between the effective tax rate of the company and the profitability of the company.

To test this hypothesis, model number (1) has been used:

$$PROF_{i,t} = \beta_0 + \beta_1 ETRi_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

According to the results of the hypothesis test presented in table (7), it shows that the value of the F statistic is equal to 8.069 Prob, which is less than the error level of 5% for the F statistic of the model and it is significant. The significance of the F statistic indicates the significance of the whole model. The variable coefficient of the effective tax rate is equal to 0.069 and according to the accepted error level of 0.000, which is less than five percent, it is significant; Therefore, the results show that there is a significant and positive relationship between the company's effective tax rate and the company's profitability. Durbin-Watson's statistic is equal to 2.11, which is in the range of 1.5 to 2.5, and indicates the absence of autocorrelation between the error sentences in the regression. The coefficient of determination and adjusted coefficient of determination are 89% and 87%, respectively, which shows that almost 87% of the changes in the dependent variable can be explained by the independent variable and control variables. Considering that the values of VIF statistics for all variables are less than 10. Therefore, it can be concluded that there is no collinearity between the independent research variables.

Table (7): The results of the first hypothesis test

Variable name	symbol	(Beta)	t statistic	P-Value	Variance Inflation Factor (VIF)
Fixed Value	α	-0.080	-1.92	0.000	----
Effective tax rate	ETR	0.069	3.75	0.000	1.069
size of the company	SIZE	0.018	6.94	0.000	1.055
Financial Leverage	LEV	0.29-	17.90-	0.000	1.210
Intangible assets	INTA	-1.123	-3.46	0.000	1.027
Cash flow	CF	0.072	7.45	0.000	1.162
Fluctuations in pre-tax income	INV	1.092	23.67	0.000	1.282
Market to book value ratio	MTB	0.00002	0.924	0.355	2.12
growth opportunity	GRO	0.0.002	3.025	0.002	2.26
	AR (1)	0.232	7.58	0.000	----
The whole regression model	F	P-Value	(D-W)	R2 AdjR2	
	54.72	0.000	1.95	R2 =0.89 AdjR2= 0.87	

Model estimation results for the second hypothesis

second hypothesis: There is a significant relationship between tax avoidance and the company's tax risk rate. To test this hypothesis, model number (2) has been used:

$$TAXR_{i,t} = \beta_0 + \beta_1 TAXA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

According to the results of the hypothesis test presented in table (8), it shows that the value of the F statistic is calculated as 3.42 Prob, which is less than the error level of 5% for the F statistic of the model and it is significant. The significance of the F statistic indicates the significance of the whole model. The variable coefficient of tax avoidance is equal to 0.022 and according to the accepted error level of 0.084, which is more than five percent, it is not significant; Therefore, the results show that there is no significant relationship between tax avoidance and the company's tax risk rate; But the hypothesis can be accepted at the confidence level of 90%.

Table (8): The results of the second hypothesis test

Variable name	symbol	(Beta)	t statistic	P-Value	Variance Inflation Factor (VIF)
Fixed Value	α	0.012	1.130	0.258	----
Tax Avoidance	TAXA	0.022	1.724	0.084	1.070
size of the company	SIZE	0.001	1.426	0.153	1.056
Financial Leverage	LEV	0.005	0.090	0.92	1.218
Intangible assets	INTA	0.232	2.54	0.011	1.029
Cash flow	CF	0.004-	1.22-	0.221	1.158
Fluctuations in pre-tax income	INV	0.059	4.26	0.000	1.271
Market to book value ratio	MTB	0.0001	2.97	0.003	2.14
growth opportunity	GRO	0.0.0002	1.84	0.064	2.27
	AR (1)	0.033	1.23	0.217	----
The whole regression model	F	P-Value	(D-W)	R2 AdjR2	
	54.72	0.000	1.96	R2 =0.34 AdjR2= 0.24	

Model estimation results for the third hypothesis

Third hypothesis: There is a significant relationship between tax avoidance and tax uncertainty.

To test this hypothesis, model number (3) has been used:

$$TAXA_{i,t} = \beta_0 + \beta_1 TAXUi_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVE_{i,t} + \beta_4 INTA_{i,t} + \beta_5 CF_{i,t} + \beta_6 INV_{i,t} + \beta_7 MTB_{i,t} + \beta_8 GRO_{i,t} + \varepsilon_{i,t}$$

According to the results of the hypothesis test presented in table (9), it shows that the value of the F statistic is calculated as 10.18 Prob, which is less than the 5% error level for the F statistic of the model and it is significant. The significance of the F statistic indicates the significance of the whole model. The variable coefficient of tax avoidance is equal to -0.012 and considering the accepted error level of 0.46 which is more than five percent, it is not significant; Therefore, the results show that there is no significant relationship between tax avoidance and tax uncertainty.

Table (9) The results of the third hypothesis test

Variable name	symbol	(Beta)	t statistic	P-Value	Variance Inflation Factor (VIF)
Fixed Value	α	0.010	1.181	0.237	----
Tax Avoidance	TAXA	0.012-	0.73-	0.46	1.077
size of the company	SIZE	0.001	2.43	0.015	1.048
Financial Leverage	LEV	0.021	9.05	0.000	1.250
Intangible assets	INTA	0.034	0.44	0.65	1.026
Cash flow	CF	0.002-	1.05-	0.29	1.143
Fluctuations in pre-tax income	INV	0.099	7.46	0.000	1.233
Market to book value ratio	MTB	0.0001	0.83	0.40	2.144
growth opportunity	GRO	0.0.0002	0.09	0.92	2.268
	AR (1)	0.41	7.72	0.000	----
The whole regression model	F	P-Value	(D-W)	R2 AdjR2	
	10.18	0.000	1.88	R2 =0.60 AdjR2= 0.54	

5. Discussion & conclusions

The results of the first hypothesis showed that there is a significant and positive relationship between the company's effective tax rate and the company's profitability.

In relation to the analysis of the results, from the researcher's point of view, it can be stated that tax collection in order to create social balance for the well-being of the society is incorruptible and based on real justice. This principle of justice is the basis for determining tax rates, which are expressed in terms of percentages. According to the researcher, calculating the company's tax rate is for the benefit of people inside and outside the company. Investors outside of a company can consider the company's effective tax rate and better understand the corporate structure and methods implemented to get the most resources. People in a company are interested in the effective tax rate used when budgeting and planning. On the other hand, the agency theory encourages managers to increase company profits. When the earned profit increases, the amount of income tax will automatically increase in proportion to the increase in the company's profit. Managers in agency theory try to minimize taxes so as not to reduce the rewards of managers' performance. Companies with high profitability can pay more taxes than companies with low profitability. The reason is that corporate income tax is levied based on the amount of income received.

The results of the second hypothesis showed that there is no significant relationship between tax avoidance and the company's tax risk rate.

In connection with the analysis of the results from the researcher's point of view, it can be stated that studies on the relationship between existing tax avoidance and tax risk mainly show that a high level of tax avoidance increases the tax risk of a company. Previous studies have shown that corporate tax evasion increases the probability of conducting a tax audit and doubles the probability of paying higher tax costs due to tax audits and fines from tax authorities; Therefore, it can be said that it is a temporary method that companies cannot use continuously in the future. In other words, a firm's tax avoidance indicates that the firm is investing in an alternative high-risk investment path, but our results did not show this; The reason may be the vagueness of tax mechanisms in the country and the lack of transparency of certain organizations and companies, which requires a general review.

The results of the third hypothesis showed that there is no significant relationship between tax avoidance and tax uncertainty.

Regarding the further analysis of the results from the researcher's point of view, it can be stated that achieving a long-term effective cash tax rate can be achieved through strategies that lead to little or no tax uncertainty (for example, investing in municipal bonds) and laws with Gained tax benefits (such as bonus depreciation rules). In addition, tax uncertainty can arise from ambiguity in the law or with regard to the facts (for example, whether the company is required to file a particular state tax return). On the other hand, according to the researcher, some

companies have an uncertain and ambiguous trend in tax avoidance strategies. Otherwise, we expect firms to choose safe tax avoidance strategies first and switch to uncertain strategies after exhausting these strategies.

Suggestions based on research results

It is suggested that senior managers, considering the experiences of successful companies in other countries from the point of view of having a board of directors with a proportional and balanced size, should balance the number of board members in terms of number as well as experience and expertise, especially in financial and Pay attention to taxes.

Since it seems hard and difficult to supervise the board members with a large number, it is suggested that senior managers reduce the tax avoidance and management mechanisms through the miniaturization and agility of the board of directors; Because with more monitoring of members, the desire to manage taxes among company managers will decrease.

It is suggested that legislators in the capital market, and especially the Tehran Stock Exchange Organization, should consider the presence of non-obligatory (independent) and expert members with a good reputation in the board of directors of companies, and in particular, large commercial companies with large financial transactions inside and outside country, to be careful and through the application of applicable laws, to strengthen and guarantee their presence in the board of directors of companies and supervision of financial and tax mechanisms.

References

Aronmwan, E. J., & Okaiwele, I. M. (2020). Measuring tax avoidance using effective tax rate: concepts and implications. The Journal of Accounting and Management, 10(1).

Atwood, T. J., & Lewellen, C. (2019). The complementarity between tax avoidance and manager diversion: Evidence from tax haven firms. Contemporary Accounting Research, 36(1), 259-294.

Atwood, T. J., Drake, M. S., Myers, J. N., & Myers, L. A. (2012). Home country tax system characteristics and corporate tax avoidance: International evidence. The Accounting Review, 87(6), 1831-1860.

Bachas, P., Brockmeyer, A., Dom, R., & Semelet, C. (2022). Effective tax rates and firm size: the case of the Dominican Republic.

Bauer, A., & Klassen, K. J. (2014). Tax risk as the likelihood of an unfavorable settlement with tax authorities. Unpublished working paper. University of Illinois at Urbana-Champaign.

Chen, S.; Chen, X.; Cheng, Q. & Shevlin, T. (2010). Are family firms more tax aggressive than non-family firms? Journal of Financial Economics, 95, pp. 41–61.

Choi, J., & Park, H. (2022). Tax Avoidance, Tax Risk, and Corporate Governance: Evidence from Korea. Sustainability, 14(1), pp. 441–469.

Dakhli, A. (2021). The impact of ownership structure on corporate tax avoidance with corporate social responsibility as mediating variable. Journal of Financial Crime.

De Simone, L., Nickerson, J., Seidman, J. K., & Stomberg, B. (2019). How reliably do empirical tests identify tax avoidance? Rock Center for Corporate Governance at Stanford University Working Paper, (200), 15-5.

Delgado, F. J., Fernández-Rodríguez, E., García-Fernández, R., Landajo, M., & Martínez-Arias, A. (2023). Tax avoidance and earnings management: a neural network approach for the largest European economies. Financial Innovation, 9(1), 19.

Dyreng, S. D., Hanlon, M., & Maydew, E. L. (2008). Long-run corporate tax avoidance. The accounting review, 83(1), 61-82.

Dyreng, S. D., Hanlon, M., & Maydew, E. L. (2019). When does tax avoidance result in tax uncertainty? The Accounting Review, 94(2), 179-203.

Eichfelder, S., Jacob, M., Kalbitz, N., & Wentland, K. (2024). How do corporate tax rates alter conforming tax avoidance? European Accounting Review, 1-33.

Gebhart, M. S. (2017). Measuring corporate tax avoidance: An analysis of different measures. Junior Management Sciences, 3, pp. 43-60.

Goh, B. W., Lee, J., Lim, C. Y., & Shevlin, T. (2016). The effect of corporate tax avoidance on the cost of equity. The Accounting Review, 91(6), 1647-1670.

Guenther, D. A., Matsunaga, S. R., & Williams, B. M. (2017). Is tax avoidance related to firm risk? The Accounting Review, 92(1), 115-136.

Guenther, D. A., Wilson, R. J., & Wu, K. (2019). Tax uncertainty and incremental tax avoidance. The Accounting Review, 94(2), 229-247.

Hakim, M. Z., Abbas, H., Kismanah, I., Mulyadi, M., Sarra, H. D., & Kimsen, K. (2023). The Effect of Profitability, Leverage, and Firm Size on ERC in the Industrials Sector on the IDX. International Journal of Economics, Business and Innovation Research, 2(01), 17-30.

Hanlon, M., & Heitzman, S. (2010). A review of tax research. Journal of accounting and Economics, 50(2-3), 127-178.

Hasan, I., Hoi, C. K. S., Wu, Q., & Zhang, H. (2014). Beauty is in the eye of the beholder: The effect of corporate tax avoidance on the cost of bank loans. Journal of financial economics, 113(1), 109-130.

Hermawan, S., Sari, Y. A., Biduri, S., Rahayu, D., & Rahayu, R. A. (2023). Corporate social responsibility, firm value, and profitability: Evidence from pharmaceutical companies in Indonesia and Malaysia. International Journal of Professional Business Review: Int. J. Prof. Bus. Rev., 8(2), 1.

Hutchens, M., Rego, S. O., & Williams, B. (2023). Tax avoidance, uncertainty, and firm risk. Uncertainty, and Firm Risk (May 1, 2023).

Iskandar, D. (2021). The Effect of Profitability and Sales Growth On Company Value Moderated By Leverage. International Journal of Management Studies and Social Science Research, 3(5), 32-41.

Jacob, M., Wentland, K., & Wentland, S. A. (2022). Real effects of tax uncertainty: Evidence from firm capital investments. Management Science, 68(6), 4065-4089.

Janský, P. (2023). Corporate effective tax rates for research and policy. Public Finance Review, 51(2), 171-205.

Kafouros, M., Chandrashekar, S. P., Aliyev, M., & Au, A. K. M. (2022). How do formal and informal institutions influence firm profitability in emerging countries? Journal of International Management, 28(1), 100890.

Kurniasih, L., Yusri, Y., Kamarudin, F., & Sheikh Hassan, A. F. (2023). The role of country-by-country reporting on corporate tax avoidance: Does it effective for the tax haven? Cogent Business & Management, 10(1), 2159747.

Lei, G., Wang, W., Yu, J., & Chan, K. C. (2022). Cultural Diversity and Corporate Tax Avoidance: Evidence from Chinese Private Enterprises. Journal of Business Ethics, 176(2), 357-379.

Pandapotan, F., Oktavianthie, N., & Setiany, E. (2024). Board Characteristics, Audit Quality and CEO Narcissism on Tax Avoidance: Evidence from Consumer Staples in Indonesia and Australia. Review of Integrative Business and Economics Research, 13(3), 322-335.

Pandey, K., Yadav, S. S., & Sharma, S. (2023). Drivers of tax avoidance by MNEs in the developing countries under the digital economy: a modified-TISM approach. Journal of Advances in Management Research.

Pramesti, D., & Harsono, B. (2024). The Moderating Effect of Sustainability Reporting on the Influence of Tax Avoidance on Firm Value. Ilomata International Journal of Tax and Accounting, 5(1), 221-233.

Schwab, C. M., Stomberg, B., & Xia, J. (2022). What Determines Effective Tax Rates? The Relative Influence of Tax and Other Factors. Contemporary Accounting Research, 39(1), 459-497.

Shanmugam, M. (2020). Research and Development Intensity and Effective Tax Rate: Empirical Evidence from India. Emerging Economy Studies, 6(2), 223-234.

Sikes, S., & Verrecchia, R. E. (2020). Aggregate corporate tax avoidance and cost of capital. Available at SSRN 3662733.

Stefhanie, S., & Dewi, S. D. (2022). Pengaruh Corporate Social Responsibility Terhadap Tax Avoidance Perusahaan Yang Terdaftar Di Bursa Efek Indonesia. eCo-Buss, 5(2), 685-699.

Velte, P. (2023). Sustainable institutional investors, corporate sustainability performance, and corporate tax avoidance: Empirical evidence for the European capital market. Corporate Social Responsibility and Environmental Management.

Wilkie, P. J. (1988). Corporate Average Effective Tax Rates and Inferences about Relative Tax Preferences. Journal of the American Taxation Association, 10(1).