sciendc
NS global economics
ECONOMICS
Innovative and Economics Research Journal
Volume 11, No. 2, 2023
www.economicsrs.com

RISK ON THE TAX SYSTEM OF THE E.U. FROM 2016 TO 2022

Constantinos Challoumis[1]

Received 20.07.2023. | Sent to review 31.07.2023. | Accepted 30.10.2023.

Original article

[1] National and Kapodistrian University of Athens (N.K.U.A.), Greece

Corresponding Author:

Constantinos Challoumis

Email:

challoumis_constantinos@yahoo.com

JEL Classification: D6, E1, H1

Doi: 10.2478/eoik-2023-0058

ABSTRACT

This paper discusses the risks that businesses face in the tax system from the point of view of the cycle of money. The current research is about the influence of companies that participate in global tax transactions on the tax revenue. The results show that controlled transactions have a negative impact on the GDP and tax revenue, discouraging any uncontrolled investments. The diminished risk increases the tax revenue. The objective of this research is to show that a tax policy of a low tax rate increases uncontrolled transactions, leading to a growth of GDP and tax revenue. This work complies with the theory of the Cycle of Money. The impact of risk on tax revenue has been determined by comparing results with and without this factor. The Q.E. method uses mathematics and programming, allowing the determination of an appropriate equation by a feedback procedure. An econometric analysis is applied to check the results of the model. A special technique is introduced, for the first time, to identify the risk by the sensitivity impact of one factor to another one. Sensitivity is determined as the ability of one factor to counteract instantly the changes of another one. If the counteract is instant, it is considered that the sensitivity is high. If the counteract delays, it is determined that the sensitivity is low. For high sensitivity, the risk is low, and the adjustment is the appropriate one. For low sensitivity, the risk is high, as the adjustment is not adequate.

Keywords: *risks, tax system, the cycle of money, sensitivity*

1. INTRODUCTION

The objective of this study is to specify the relationship between business risk and tax revenues. The results should show that their relationship is inversely proportional. This means that the risk of the companies is a factor with a negative effect on tax revenue. To prove this a quantitative analysis should be applied. The consistency of the model depends on real data of the economy, such as GDP, GDP deflator, and Unit Labor. The GDP deflator and the Unit Labor should comply with a very weak decline or increase in GDP, this shows that are very sensitive factors as they follow instantly the GDP. Contemporaneously the investments should not be affected so much by GDP over time, this means that are more sensitive, as they adjust to the GDP more slowly. The rationale is that the companies tend to avoid the risk, and the risk is there where the companies don't immediately follow the changes in GDP, showing their low sensitivity. The low sensitivity is making the risk higher for the companies, as they can't counteract the

changes in the economy. This paper aims to highlight the relationship between companies and the business risks they undertake through their economic activities. The theme of this paper aims to specify the link between the economic activity of businesses and the tax system. The research problem concerns the way companies should be taxed to favor entrepreneurship and not lead companies due to tax pressures to solutions, such as controlled transactions (Saragih and Ali, 2023a). The research problem focuses on the need to mention the imposition of low taxes on companies that do not engage in controlled transactions (Boldycheva and Klonitskaya, 2022; Protsenko and Koretsky, 2023). On the contrary, companies engaged in controlled transactions should be taxed at least at a fixed minimum tax to combat tax avoidance and evasion (Mangoting *et al.*, 2021). Because when companies are in a tax system with increased taxation, businesses are directed to solutions that involve elements of tax avoidance and evasion (Lin *et al.*, 2019). For the reliability of research, not only theoretical and mathematical analysis is used, but also quantitative methods and econometric analysis (Challoumis, 2023a). This research confirms the initial hypothesis that lower taxation allows companies to reduce their business risk, and along with companies the economy improves, with better revenues, because although there is lower taxation, there are more companies that do not avoid and do not evade taxes (Carolina, Oktavianti and Hidayat, 2021). The motivation for this research was the need to clarify that lower taxation increases the money cycle because it improves both its overall economic function and its economic structure (domism) (Challoumis, 2021). Every entrepreneur knows that running his business involves accepting a level of risk, that the business may not bring profits, and that there is a risk that may be that he/she does not recoup the investment made (Drake, Lusch and Stekelberg, 2019). The amount of risk varies between businesses and is an important factor in determining the value of a business (Eberhartinger and Zieser, 2021).

Financial risk refers to the possibility that a company's cash flow is not enough to pay creditors and fulfill other financial responsibilities (Chen, 2021). The level of financial risk, therefore, does not relate so much to the activities of the enterprise and concerns more the amount of debt that a company undertakes to finance them (Suwardi and Saragih, 2023). High debt is due to defaulting on its financial obligations due to weakness (Guedrib and Marouani, 2023). Taking higher levels of debt or financial liability, therefore, increases a firm's level of financial risk (Kovermann, 2018). Business risk refers to the probability that a company's cash flow is not enough to cover its operating expenses, such as the cost of products sold, rent and wages, etc (Artemenko *et al.*, 2017). Unlike financial risk, business risk is independent of the level of debt (Boateng, Omane-Antwi and Ndori Queku, 2022). There are two types of business risks: systemic risk and non-systematic risk (Saragih and Ali, 2023b).

Systemic risk refers to the possibility that an entire market or economy will experience a recession or even fail (Maslov, Kozhevnikov and Savoskin, 2021). Economic crashes, recessions, and interest rates are common sources of systematic risk (Gita Warastri and Suryaningrum, 2022). Every undertaking active in the market is exposed to this risk, and the amount of systematic risk does not differ between undertakings in the same market (Aulia, Rosdiana and Inayati, 2022). Therefore, small business owners can reduce their exposure to systemic risk (Siagian, 2023). Unorganized risk describes the likelihood that a business or branch of business will experience a recession (Plesner Rossing, 2013). Unlike non-systematic it varies significantly from business to business (Kayahan and Murat, 2022). Sources of non-systematic risks include the strategic management and investment decisions of small business owners that they are called upon to make daily (Strauss, Fawcett and Schutte, 2020). As a result, investors reduce their exposure to non-systematic risk by diversifying their owned portfolios of a variety of companies operating in different industries (Didimo *et al.*, 2020). A business that is more exposed to risk

is worth less than an identical business exposed to less risk (Chyz *et al.*, 2021). Reducing risk is important not only to help the business succeed but also to maximize its value (Egglezakis, 2023).

More specifically, the types of risks are:

1. Business risk: Business risk includes strategic risk, financial, operational, and technological (Irawan and Turwanto, 2020).
2. Commercial risk: Market risk refers to price movements in either local or international markets. They are the most common and difficult to control (Abernathy *et al.*, 2021).
3. Operational risk: Risks are mainly due to the human factor (Wunder, 2009). They are those who are found in labor relations and any possible malfunction of human resources.
4. Tax - Legal risk: It is the risk faced by the company due to non-compliance with international and national legislative frameworks. They are usually found in matters of transactions and their dispute.
5. The last two risks are also considered very important. The tax risk is included in the law risk.
6. Liquidity risk: It is found in the inability to liquidate an investment and leads to repayment problems and default on agreements. This risk is also caused by drastic changes in raw materials or service prices that disrupt the entire business operation.
7. Finally, the credit risk is due to any possibility of a breach of a pre-agreed agreement or transaction and the consequences it brings (Mangoting *et al.*, 2022).
8. However, risk management plays the most important role as it is a series of measures and decisions aimed at reducing the difference between the intended objective and the results it ultimately achieves (Ouyang and Fang, 2022). Risk management is therefore the process of planning, organizing, and coordinating to reduce any negative impact of risk on profits (Eurostat, 2023).

Therefore, for a small, medium, and large enterprise to be able to reduce business risk today, it must initially identify its objectives at regular intervals and proceed to risk forecasts (Firmansyah, Febrian and Falbo, 2022). To initially accept a certain amount of risk according to the intended result and the philosophy that governs the management but also the general climate prevailing in the sector to which it belongs (Takopoulos, 2023).

The cooperation of executives to identify each change according to the order of conditions from which the change originates (Neuman, Omer and Schmidt, 2020).

Dealing with any kind of risk requires actions on the part of the management but also invites each small business to a new, stricter, and controlled financial framework (Challoumis, 2018b). In recent years, great reference has been made to the usefulness and importance of internal audits specifically to the internal control framework, which is the most modern way of approaching risks (Wang and Guan, 2022). Within this framework, the management of each risk is determined by the decisions of the management, the general manager, and the personnel and their cooperation (Challoumis, 2018a).

The risk faced by businesses today is multifaceted and so control is constantly imposed on the course of results concerning the general economic climate, noting the efficiency and effectiveness in the utilization of every financial data contained in the financial statements of each

business. In conclusion, business risk, business philosophy, and internal control are the factors that their examination and utilization lead every business to succeed today.

2. LITERATURE REVIEW

This paper shows that low taxation on domestic companies that do not operate based on controlled transactions seems to reduce both cases of tax avoidance and tax evasion (Hamilton and Stekelberg, 2017). To achieve tax avoidance, companies apply several methods to reduce their tax burden. Such methodological practices may in principle involve shifting their risk under transfer pricing rules to reduce their business risk by joining a tax regime, with reduced taxation. In transfer pricing, what is achieved is the shift of profits to a tax regime that has lower tax rates (Masri *et al.*, 2019). Businesses that want to achieve impairment in their business risk distribute their profits to subsidiaries located in countries with a low tax rate (Puška et.al., 2018). In this way, business risk is reduced by shifting profits to low-tax tax regimes (Vlasenko, 2023). The allocation of business risk is achieved by distributing profits to favorable tax regimes (Becker, Johannesen and Riedel, 2020). Also, businesses through equity attempt to reduce business risk. What equity achieves is the distribution of risk between the company and creditors. Equity is used to share overall risks through dividends, protecting companies from tax changes that affect them (Gertler and Hubbard, 1993). Tax evasion depends on factors related to a country's institutional framework, while wealth inequality plays an important role in tax evasion. It is becoming clear that the overconcentration of wealth is driving its displacement to countries with low tax rates (Leenders et al., 2023).

In most cases, firms normally reduce business risk. This way is by sharing risk, or by shifting it. The theory of the money cycle identifies this and argues that these amounts eventually leave the economy because of the wrong tax policy. While, the more profits a business has, the more it intensifies its efforts to reduce its taxation (Donelson, Glenn and Yust, 2022). That is why reduced taxes must be imposed on companies to tackle the loss of profits outside the economic system. Whereas, undertakings engaged in controlled transactions must be subject to a minimum fixed tax (Challoumis, 2022). What matters for companies involved in controlled transactions is the reduction of their tax burden, with the result that the economies in which they operate are deprived of significant revenues. This is made clear through the relationship that shows that business risk is inversely proportional to tax revenues (Wencel, 2022). In other words, when business risk increases, tax revenues decrease, while tax revenues increase when business risk decreases. This means lowering tax rates for domestic companies, firstly to stay in the economy and secondly to prevent any controlled transactions. This is described by the impact factor of tax revenues, which is described by the following relationship, Eq. (1). The impact factor of tax revenues of countries which are tax heaves:

$$s = \frac{k+l}{r+c+t+i} \tag{1}$$

Therefore, countries are receiving the products that are taxed in different countries. This allocation of profits between profits and losses permits the enterprises that participate in controlled transactions of the transfer pricing activities to maximize their utility. But contemporaneously the tax revenue from a global view is declined. The loss of tax income from some countries is more than the profits that make the countries which are tax havens. Thereupon, the symbol of $\tilde{s}$ is the impact factor of tax revenue from a global view, and there are some coefficients which are *k, l, r, t,* i and *c*. The symbol of *k* is about the impact factor of capital, *l* is the impact factor about the liability of the authorities on the tax system. The interpretation of the liability is about

how unbalanced it is the tax system. The parameter of r is about the risk, the t is about how trustworthy is the tax system (bureaucracy). The symbol of i examines the case of intangibles (the intangibles charged to the subsidiaries) of the tax system. Additionally, the symbol of c is about the cost of enterprises. The symbols with the "~" are accordingly the same thing but from the view of uncontrolled transactions. The numerator is proportional to the income of taxes, as the investments and the stable tax environments, with liability enhance the tax income. On the other hand, the denominator is inverted and proportional to the tax income, as the risk, the cost, and the unbalance of taxation cause less tax income. Moreover, for $\tilde{s}$:

$$\tilde{S} = \frac{\tilde{k}+\tilde{l}}{\tilde{r}+\tilde{c}+\tilde{t}+\tilde{i}} \tag{2}$$

Since Eq. (3) is determined as the aggregate impact factor of tax revenues:

$$\hat{S} = s + \tilde{s} \tag{3}$$

It is plausible the identification of the behavior of the impact factors of tax revenues in the case of tax havens, and in the case of the non-tax havens. Consequently, using the prior equations is plausible to examine the controlled and the uncontrolled transactions. In addition, $\hat{s}$ is a factor that allows the comparison between the controlled with the uncontrolled transactions. Thence can have a standalone behavior analysis of controlled transactions and a combined behavior analysis between the controlled transactions with the uncontrolled transactions. The next section analyzes the impact factor of tax revenues with the rest of the impact factors.

3. METHODOLOGY

The applied methodology is based on two steps. The first step is used for the determination of the mathematical equation, and the clarification of the theoretical background. Factors like the k, I, l, r, c and t which were clarified in the prior section, are used to compile the model, and to confirm the mathematical connection between the dependent variable of and the risk, considering the same time all the previously described factors of the economy. In the second step through VAR, Durbin - Watchon econometric approach uses GDP and other factors like GDP deflator, unit labor, and investment funds to confirm the consistency of the model. Vector Autoregressive (VAR) analysis is applied for a dynamic economy analysis model that includes the change of time lag in the variables. The dynamic behaviors of the observed variables in Vector Autoregressive analysis would be further explained by property functions, specifically the Impulse Response function and the Variance Decomposition function (Li and Xiao, 2023). A vector autoregression analysis model could also be used to predict and forecast the amount of a variable (Puška et al., 2020). The economic model is represented by the risk on the tax system model, so Vector Autoregressive analysis considers that the model, which is estimated in a specific condition, can be used to predict different time conditions. Vector Autoregressive analysis can also incorporate a shock element into the analyzed model and examine the long-term response based on historical data (Olviana et.al., 2022). The study of exchange rate fluctuations is extremely sensitive to economic shocks. Vector Autoregressive is one of the analysis tools that not only shows the causal relationship between variables but also the extent to which economic shocks influence exchange rate stability which reflects the economic character of a country and indicates the growth and development of macroeconomy (Yuliadi, 2020). Moreover, Durbin-Watson was considered for the analysis. If the Durbin-Watson value is close to zero, the serial correlation indicates that the data in the model has a strong positive influence on the residual values. If the Durbin-Watson correlation is 4, it means that the data has a negative serial correlation. When the Durbin-Watson results are close to the value range of 2, the model

is considered stable. The Durbin-Watson test considers no serial correlation between 1.5 and 2.5, indicating that the residual value has no serial correlation or that there is no autocorrelation between the residual values (Kryeziu and Durguti, 2019).

The quantification analysis of the risks of the tax system with the tax revenue from a global view is done by the application of the Q.E. method. On that ground of this method is determined the behavior analysis of mathematical equations:

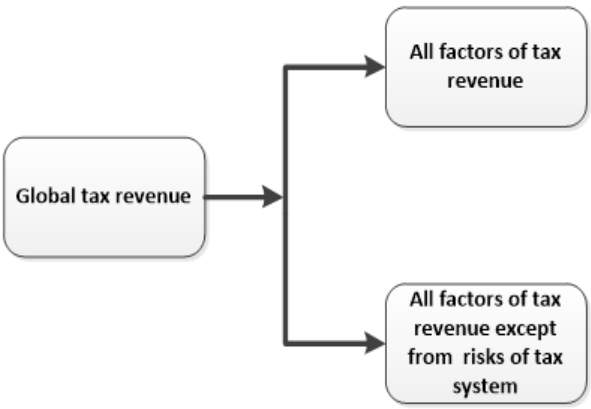
- The analysis of the behavior of the model stands on the scrutiny of the structural characteristics of each model accordingly, allowing with that way the extraction of general conclusions about the model which is under examination.
- The frequency analysis behavior scrutinizes the behavior of the dependent variables, but from the view of the number of appearances of a variable than another, estimating the impact that one dependent variable has with one or more other independent variables.

The determination of risks of the tax system is established by the impact factor of risk, which shows the level of influence of risks in the business plan of the enterprises. To clarify the way that risks affect global tax revenues:

- The first application of the Q.E. methodology uses all the factors of the global tax revenue. In that case, it is plausible to obtain the behavior of the global tax revenue using the completed form of Eq. (1).
- The second application of the Q.E. methodology uses all the factors except the factor that is under review. Thereupon, in that case, it is avoided the factor of risks of the tax system.

This methodology is illustrated below:

Figure 1. Steps of Q.E. application



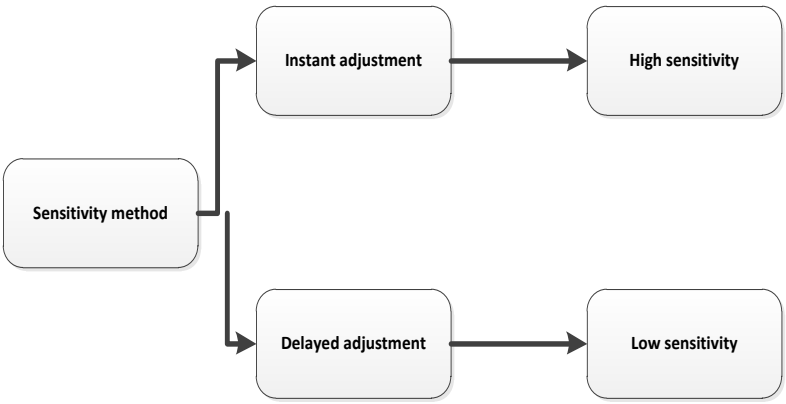
Source: Author's scheme

The previous scheme shows the methodology followed by the Q.E. method to determine the behavior of the global tax revenue in the case that there exist risks in the controlled transactions of the transfer pricing and the case that they don't exist.

Thereupon, using the previous two axes of the Q.E. method is plausible to extract conclusions about the behavior of mathematical equations, and the way that some factors react to changes. Consequently, it is plausible the transformation of quality data to quantity data. This method is applied for this study for controlled transactions and more precisely in the variables of the impact factor of the tax revenue (Challoumis, 2019). The mechanism of Q.E. is based on the dependent variable which are modified for the generator. The generator produces values for the independent variables (Challoumis, 2023b). The extracted values of the generator permit the creation of magnitudes, which are the base for comparisons, and for the scrutiny of mathematical equations. It is plausible to quantify qualitative data. In our analysis, this method is used to clarify the behavior of the impact factor of global tax revenue.

For the first time, a special technique is introduced, here is for the identification of the risk by the sensitivity impact of one factor on another. Sensitivity is defined as one factor's ability to react instantly to the changes of another.

Figure 2. Sensitivity method



Source: Author's scheme

The sensitivity is high if the counteract is instant. If the counteract delays, the sensitivity is determined to be low. The risk is high for low sensitivity, and there the adjustment is not appropriate. The risk is high for low sensitivity because the adjustment is insufficient.

4. RESULTS

The risks of the tax system are in interaction with the impact factor of tax revenues. This behavioral analysis is the model that explains the behavior of the impact factor of tax revenues with the existence and with the avoidance of the impact factor of tax entrepreneur risks.

All the necessary equations have been referred to in the previous sections, except for one condition. For the application of the Q.E. method:

$$t > l > i > r > k > c \tag{4}$$

Therefore, it is plausible to proceed to a quantity analysis using Eq. (1), (2), and (4). The examination of tangibles with the risks is critical for the transfer pricing theory. The study of risks is used many times by enterprises of controlled transactions to reach the arm's length principle.

Thence, applying the Q.E. method and choosing the appropriate values for the coefficients of global tax revenue:

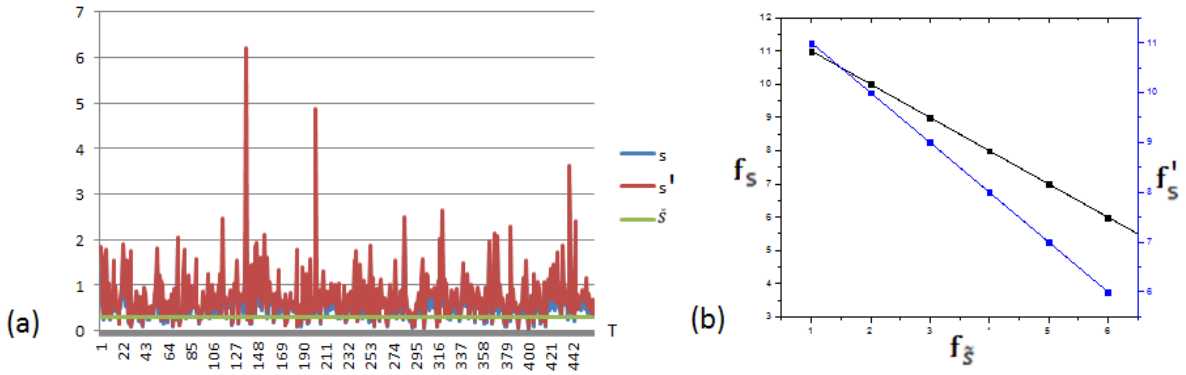
Table 1. Compiling coefficients

Factors	Values of s	Values of s'
k	0,4	0,4
i	0.6	0.6
l	0.7	0.7
r	0.5	-
c	0.3	0.3
t	0.8	0.8
fs	<0.3	<0.3
fs_i	<0.3	<0.3

Source: Author's data

Thereupon, using the previous factors can determine the behavior of the model through the generator of the Q.E. method. The factors of the prior table have an upper limit, of 1 and a lower limit the 0. But, the factors are plausible to receive values greater than one as their mathematical structure allows this. After 461 iterations (compile) on the equations extracted next diagrams:

Figure 3. (a) Impact factors of (series 1) and (series 2), (b) Frequencies



Source: Author's results

Figure 3 shows that global tax revenue is higher in the case that does not have the risks than in the case that has the risks. The frequency of the black line is higher than the frequency of the blue line. Figure 3 shows cases where there are risks and in the case that has avoided the risks (Challoumis, 2023c). The blue line symbolizes the case that the impact factor of has risks of the tax system. With (red line) it symbolized the case that has avoided the risks of the tax system. The global tax revenue is higher in the case that does not have the risks (red line) than in the case where the impact factor of risk is used (blue line). As expected, the existence of risks declines global tax revenues. The reason for the diminished global tax revenues is that the risks make the companies of controlled transactions stop their activities. Additionally, from the diagram (b) of Figure 3, it is obtained that the frequency of the f_s (black line) is higher than the frequency of f_s' (blue line).

Furthermore, the Q.E. method, which is about the source code of the mathematical approach to determine the relationship between the variables, follows the econometric analysis. The estima-

tions in that case stand on the prior behavior between the variables, using VAR analysis. The VAR (Vector Autoregressive) model has the form:

$$y_t = A_1 y_{t-1} + \cdots + A_n y_{t-n} + \cdots B_0 x_t + \cdots + B_m x_{t-m} + CD_t + u_t \quad (5)$$

Where $y_t = (y_{1t}, \ldots, y_{Pt})'$ is about the vector of P endogenous observations. Finally, $x = (x_{1t}, \ldots, x_{PQ})'$ is about the vector of Q exogenous observations. D_t contains all deterministic variables, and u_t is a P dimensional unobservable zero mean white noise process with a positive definite covariance matrix.

Table 2. Data of the E.U.

Period	GDP (percent)	GDP (trillions €)	GDP deflators (percent)	Investment funds (trillions €)	Unit Labor (percent)
Q4 (2022)	1.83	-	84.60	1.586E+13	82.40
Q3	2.45	-	81.99	1.607E+13	79.98
Q2	4.39	2.902E+12	83.45	1.636E+13	81.23
Q1	5.49	2.880E+12	84.90	1.735E+13	82.77
Q4 (2021)	4.84	2.861E+12	86.57	1.781E+13	84.01
Q3	3.99	2.847E+12	88.59	1.710E+13	85.79
Q2	14.24	2.786E+12	89.38	1.665E+13	86.64
Q1	-0.80	2.732E+12	90.11	1.598E+13	88.12
Q4 (2020)	-4.11	2.735E+12	90.48	1.509E+13	88.03
Q3	-3.84	2.744E+12	90.25	1.425E+13	88.80
Q2	-14.24	2.436E+12	88.93	1.393E+13	87.54
Q1	-2.83	2.754E+12	88.12	1.311E+13	86.99
Q4 (2019)	1.18	2.851E+12	88.54	1.428E+13	86.39
Q3	1.81	2.850E+12	89.28	1.396E+13	87.46
Q2	1.60	2.844E+12	88.70	1.348E+13	87.16
Q1	1.83	2.835E+12	89.04	1.316E+13	87.35
Q4 (2018)	1.19	2.817E+12	90.04	1.222E+13	88.78
Q3	1.36	2.799E+12	90.66	1.285E+13	90.01
Q2	2.13	2.799E+12	90.28	1.262E+13	89.47
Q1	2.39	2.784E+12	91.58	1.238E+13	90.34
Q4 (2017)	3.09	2.784E+12	90.91	1.226E+13	89.43
Q3	3.04	2.761E+12	90.89	1.204E+13	89.61
Q2	2.73	2.740E+12	88.00	1.178E+13	86.94
Q1	2.17	2.719E+12	86.46	1.164E+13	86.13
Q4 (2016)	2.04	2.700E+12	87.66	1.109E+13	87.00
Q3	1.74	2.680E+12	88.39	1.088E+13	87.68
Q2	1.67	2.667E+12	88.07	1.054E+13	87.54
Q1	1.91	2.661E+12	87.47	1.026E+13	86.85

Source: Eurostat

According to the code results follow a real case scenario from the case of the E.U. (European Union), for a recent period, between 2016 and 2022:

Q4, Q3, Q2, and Q1 correspond to 3 months period, of each year. Gross Domestic Product at market prices, total economy, domestic national currency (may include amounts converted to the current currency at a fixed rate), chain-linked volumes (rebased), growth rate over one year, seasonally and working-day adjusted. In addition, Gross Domestic Product at market prices, total economy, denominated in euro, chain-linked volumes (rebased, the reference year 2010), seasonally and working-day adjusted.

Harmonized Competitiveness Indicators (HCI) is based on Gross Domestic Product (GDP) deflators. GDP is a measure of economic activity. It is the value of an economy's total output of goods and services, plus net taxes on products and imports minus intermediate consumption. GDP deflators are derived from quarterly national accounts published by Eurostat (Molchanova and Kovtoniuk, 2023). The HCIs' goal is to provide comparable measures of eurozone countries' price and cost competitiveness that are also consistent with the euro's real effective exchange rates (EERs).

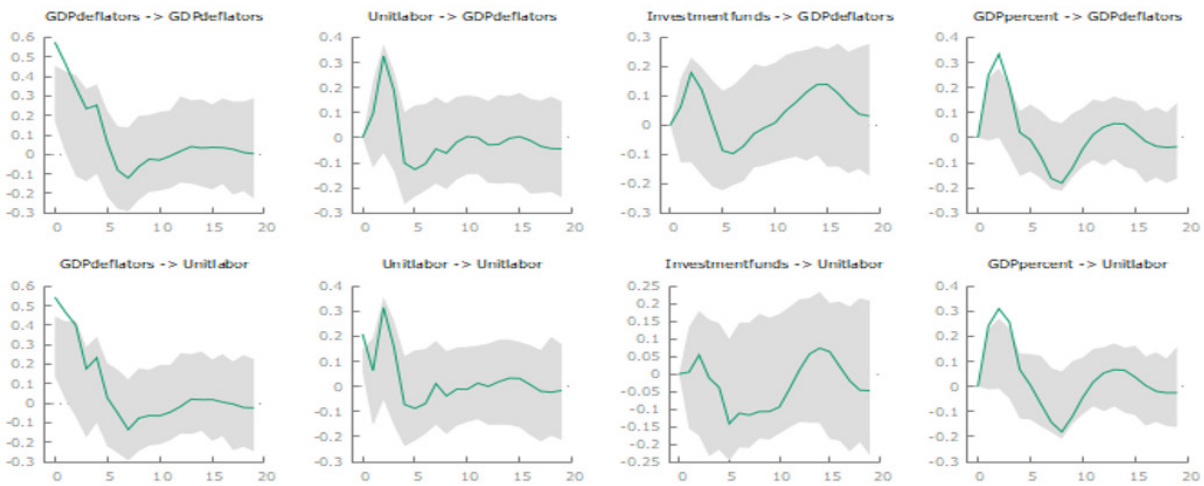
The HCIs are created using the same methodology and data sources as the euro EERs. Indicators of overall competitiveness based on unit labor cost indexes. The ratio of compensation per employee to labor productivity is used to calculate total economy unit labor costs.

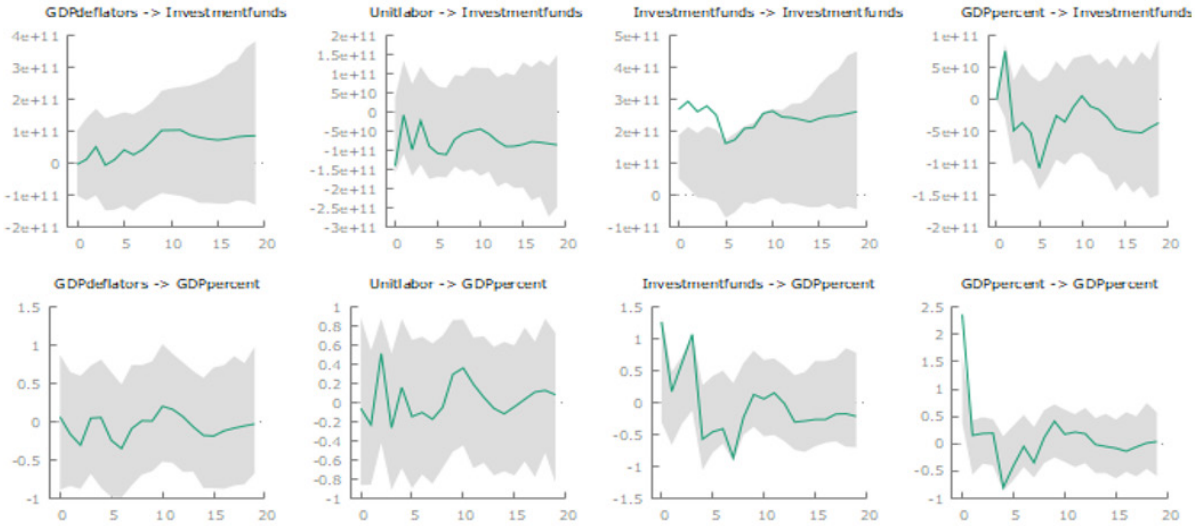
Labor productivity is calculated as GDP at constant prices divided by the total number of people employed using Eurostat's quarterly national accounts. The goal of HCIs is to provide comparable measures of price and cost competitiveness in eurozone countries that are also consistent with the euro's real effective exchange rates (EERs). The HCIs are created using the same methodology and data sources as the euro EERs. Total assets/liabilities of investment funds other than money market funds (outstanding amounts at the end of the period, total maturity, all currencies combined, denominated in euro, not seasonally adjusted, quarterly data). The estimated matrix of VAR applying Eq. (4):

$$\begin{bmatrix} GDP\ deflator \\ Unit\ labor \\ GDP\ percent \\ Investment\ funds \end{bmatrix} = \begin{bmatrix} 88.720 \\ 87.233 \\ 1.501 \\ 13579807166874.620 \end{bmatrix} [Constant] + \begin{bmatrix} u1(t) \\ u2(t) \\ u3(t) \\ u4(t) \end{bmatrix} \quad (6)$$

The VAR results according to Eq. (6):

Figure 4. Vector Autoregression result





Source: Author's results

Presenting the results for the consistency of the model:

Table 3. Correlation estimations

Equation	R-squared	Durbin-Watson
GDP deflators	0.820551	2.532614
Unit labor	0.837614	2.529852
Investment funds	0.977120	2.118941
GDP percent	0.666576	2.151586

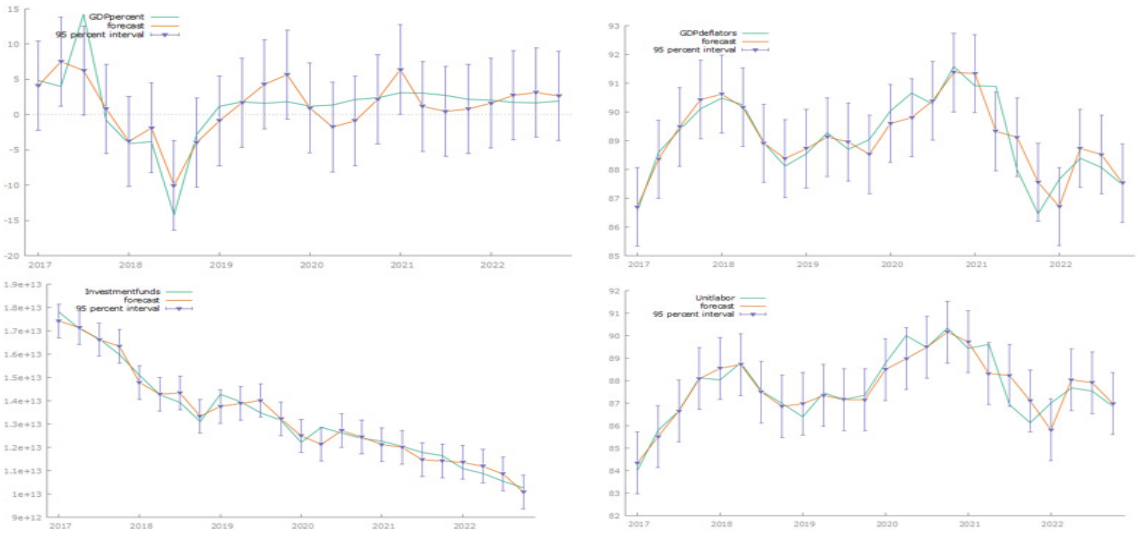
Source: Author's compile

The R-squared and the Durbin – Watson analysis reveal that the model is consistent without correlation, as the R-square has high values and the Durbin – Watson is close to values between 2 and 2.5.

5. DISCUSSION

The prior results show that the GDP relates to the capital and liability of the economy, in a real-case scenario, which are presented by investment funds. The risk, trustworthiness of the tax system, cost-price, and intangibles are presented by the GDP deflator and Unit labor.

Figure 5. GDP percent, GDP Deflator, Investments funds, and Unit labor in 0.95 intervals (Accordingly from left to right, and top to down)



Source: Eurostat

The risk as defined by prior results, by Figure 5, declines GDP, and tax revenue. Risk (presented by GDP deflator and unit labor) as expected by the prior results is inversely proportional to GDP, as Eq. (1) defined. Especially in the year 2022, the peaks of GDP Deflator and Unit labor GDP (percent) were very low. Moreover, the number of investments declined when the GDP diminished.

A unified interpretation of the elements affecting tax revenues, such as that offered by the theory of the money cycle, allows for an overall view of the economy. Other research points out that there is a link between GDP and tax revenues and confirms the current research. Such as that tax revenues and GDP are linked to each other and have a long-term connection (Dahal, 2020). As a result, the study suggests that countries with corporate tax rates that are higher than the continent average should reduce their tax rates to the mean tax rate (Eze and Owota, 2021). This research paper also determines how to increase tax revenues, which is achieved by reducing the tax rate on domestic companies while introducing a minimum and fixed tax on companies that engage in controlled transactions. So, the government should intervene in the economy to protect the companies of uncontrolled transactions from the competence of companies that participate in controlled transactions. From another paradigm, a government is taking measures to strengthen strategic, institutional, and financing mechanisms to ensure the sustainable development of special cases of entrepreneurship in a socio-economic development strategy (Huseyn, 2023). The intervention of the authorities is obvious and in different examples i.e. in the digitalization of the economy (Stepura and Kuzmak, 2023). In addition, the preparation of reports on tax expenditures and their use in the process of fiscal management has become a common practice in many countries of the world, increasing the transparency of tax systems. This is also one more hint that helps the uncontrolled transactions and shows the importance of regulation by the authorities (Sokolovska, Zatonatska and Rainova, 2023).

6. CONCLUSIONS

The objective of this study succeeded in determining the relationship between business risk and tax revenues. The results clarify that the relationship between business risk and tax revenues is inversely proportional. The risk of the companies is a factor with a negative effect on tax revenue. The GDP deflator and the Unit Labor comply with a very weak decline or increase of GDP, this shows that are sensitive factors to GDP, as they follow instantly the GDP. At the same time investments are not affected so much by GDP through time, this means that are not so sensitive to changes in GDP, as they adjust to the GDP at a slow rate. The companies tend to avoid the risk, and the risk is there where the companies don't immediately follow the changes in GDP, showing in that way their low sensitivity. The low sensitivity is making the risk higher for the companies, as they can't easily follow the changes in the economy.

Future research could happen in countries or by applying other factors affiliated with that of Eq. (1) about risk. For paradigm, extensive research could be made on the field of capital and risk, or the cost and risk on their impact on tax revenue. It could combine the current results with the capital or the costs of companies, to study the tax revenue. The sensitivity of a factor to the changes of an independent factor is used to determine the risk. The logic is that the more difficult the reaction to changes, the more difficult is to react. A similar study in future work could be made using other factors by using this technique in other factors, not only in economics but in any scientific field. Additional research in the same way could be achieved for countries and multiple periods.

The GDP deflator and the Unit Labor tend to work like a multiplier, as the diagram of Figure 5 revealed that, to a very weak decline or very weak increase of GDP, the GDP deflator and the Unit Labor tend to be very sensitive. Simultaneously the investments declined in a stable condition of GDP through time. This indicates that the companies tend to avoid the risk. This clarifies that the risk and investments are in a connection between them. Risk is inversely proportional to the GDP. The reason is that the companies tend to have lower investments than the growth of GDP, because of risk, and at the same time the prices (GDP deflator) and the unit labor market are more sensitive to changes in GDP. The GDP is inversely proportional to risk, because of the tendency of companies to avoid risk. This is the reason why the authorities should imply stable and well-fined regulations in favor of uncontrolled transactions. Because the companies are less sensitive to GDP, they have more risk by the negative changes in GDP. So, it is clarified the logic of inversely proportional relationship between risk and GDP. The compile of the program explained the prior argument and indicated that a decline in tax revenue, which is proportional to GDP, means an increased risk to the economy. Therefore, with a decline in the tax rate on the companies that do not participate in triangle transactions (or controlled transactions more generally), it is plausible to face the tax avoidance and tax evasion of the companies that participate in controlled transactions.

Risks decrease global tax revenue, reducing the number of transactions and leading companies to participate in controlled transactions. The number of firms involved in controlled transfer pricing transactions is higher than in the case where there are risks. The number of controlled transactions is lower when there are no risks, because the absence of risks increases the global tax revenue, and the companies of controlled transactions prefer to avoid tax paying causing lower tax revenue. The conclusion is that tax authorities should imply low and stable tax rates to decline controlled transactions, and to increase tax revenue, as tax risks have a negative impact on GDP and tax revenue.

APPENDIX

The source code of analysis:

```
%Q.E. (c)(r)2017 Constantinos Challoumis for Transfer Pricing
  q=0;
  while q<10
  q=q+1;
  count=0;
  counts=1;
  counts1=1;
  counts12=1;
  counts13=1;
  counts21=1;
  counts23=1;
  while count<10
  if rand()<9
      i=0.7*rand();
  end
  if rand()<9
      c=0.6*rand();
  end
  if rand()<9
      f=0.5*rand();
  r=i+c+f;
  r1=i+c;
  r2=i;
  s_tilda=0.3;
      count=count+1
      if r<0.3 %it is one limit for comparison above than this we think s_
  tilda but is not the same one as s_tilda
              %and it is used as a meter to compare all the different
  counts1,counts2,...
              %it could take any other value, it is just a constant
          counts=counts+1;
      else
          counts1=counts1+1;
      end
      if r1<0.3
          counts12=counts12+1;
      else
          counts13=counts13+1;
      end
      if r2<0.3
          counts21=counts21+1;
      else
          counts23=counts23+1;
      end
  end
  end
  tec=[count,counts,counts1,counts12,counts13,counts21,counts23,i,c,f,r,r1,
  r2;tec];
  end
```

REFERENCES

Abernathy, J. L. *et al.* (2021). External Auditor Responses to Tax Risk. *Journal of Accounting, Auditing and Finance*, 36(3), 489-516. https://doi.org/10.1177/0148558X19867821

Artemenko, D. A. *et al.* (2017). Causes of tax risks and ways to reduce them. *European Research Studies Journal*, 20(3), 453-459. https://doi.org/https://doi.org/10.35808/ersj/800

Aulia, S., Rosdiana, H. and Inayati, I. (2022). Trust, Power, and Tax Risk into the "Slippery Slope": A Corporate Tax Compliance Model. *Sustainability* , 14(22). https://doi.org/10.3390/su142214670

Becker, J., Johannesen, N. and Riedel, N. (2020). Taxation and the allocation of risk inside the multinational firm. *Journal of Public Economics*, 183. https://doi.org/10.1016/j.jpubeco.2020.104138

Boateng, K., Omane-Antwi, K. B. and Ndori Queku, Y. (2022). Tax risk assessment, financial constraints and tax compliance: A bibliometric analysis. *Cogent Business and Management,* 9 (2022),1-21. https://doi.org/10.1080/23311975.2022.2150117

Boldycheva, A. G. and Klonitskaya, A. Y. (2022). Tax Risks and Tax Planning. *Russian Engineering Research*, 42(9), 954-957. https://doi.org/10.3103/S1068798X22090064

Carolina, V., Oktavianti and Hidayat, V. S. (2021). Tax Avoidance, Tax Reporting Aggressiveness, Tax Risk & Corporate Risk. *Riset Akuntansi dan Keuangan Indonesia*, 6(1), 1-8. https://doi.org/10.23917/reaksi.v6i1.13315

Challoumis, C. (2018a). Identification of Significant Economic Risks to the International Controlled Transactions. *Economics and Applied Informatics*, 2018(3), 149–153. https://doi.org/10.26397/eai1584040927

Challoumis, C. (2018b). Methods of Controlled Transactions and the Behavior of Companies According to the Public and Tax Policy. *ECONOMICS - Innovative and Economics Research Journal*. 6(1), 33-43. https://doi.org/10.2478/eoik-2018-0003

Challoumis, C. (2019). The R.B.Q. (Rational, Behavioral and Quantified) Model. *Ekonomika*, 98(1), 5-18. https://doi.org/10.15388/ekon.2019.1.1

Challoumis, C. (2021). Index of the Cycle of Money - The case of Latvia. *Economics and Culture*, 5-12. https://doi.org/10.2478/jec-2020-0015

Challoumis, C. (2022). Conditions of the CM (Cycle of Money). Social and Economic Studies within the Framework of Emerging Global Developments, 1, V. Kaya, 13–24, https://doi.org/10.3726/b19907

Challoumis, C. (2023a). Impact Factor of Liability of Tax System According to the Theory of Cycle of Money. Social and Economic Studies within the Framework of Emerging Global Developments, 3, V. Kaya, 31-42 https://doi.org/10.3726/b20968

Challoumis, C. (2023b). Utility of Cycle of Money without the Escaping Savings (Protection of the Economy). Social and Economic Studies within the Framework of Emerging Global Developments , 2, V. Kaya, 53-64, https://doi.org/10.3726/b20509

Challoumis, C. (2023c). A comparison of the velocities of minimum escaped savings and financial liquidity, 4, V. Kaya, 41-56. https://doi.org/10.3726/b21202

Chen, W. (2021). Tax risks control and sustainable development: evidence from China. *Meditari Accountancy Research*, 29(6). https://doi.org/10.1108/MEDAR-05-2020-0884

Chyz, J. A. *et al.* (2021). The association between auditor provided tax planning and tax compliance services and tax avoidance and tax risk. *Journal of the American Taxation Association*, 43(2). 101-131. https://doi.org/10.2308/JATA-19-041

Dahal, A. K. (2020). Tax-to-GDP Ratio and the Relation of Tax Revenue with GDP: Nepalese Perspective. *Researcher: A Research Journal of Culture and Society*, 4(1), 80-96.

https://doi.org/10.3126/researcher.v4i1.33813

Didimo, W. *et al.* (2020). Combining Network Visualization and Data Mining for Tax Risk assessment. *IEEE Access*, 8, 16073-16086. https://doi.org/10.1109/aCCESS.2020.2967974

Donelson, D. C., Glenn, J. L. and Yust, C. G. (2022). Is tax aggressiveness associated with tax litigation risk? Evidence from D&O Insurance. *Review of Accounting Studies*, 27(2). https://doi.org/10.1007/s11142-021-09612-w

Drake, K. D., Lusch, S. J. and Stekelberg, J. (2019). Does Tax Risk Affect Investor Valuation of Tax Avoidance?. *Journal of Accounting, Auditing and Finance*, 34(1), 151-176. https://doi.org/10.1177/0148558X17692674

Eberhartinger, E. and Zieser, M. (2021). The Effects of Cooperative Compliance on Firms' Tax Risk, Tax Risk Management and Compliance Costs. *Schmalenbach Journal of Business Research*, 73(1), 125-178. https://doi.org/10.1007/s41471-021-00108-6

Egglezakis, G. (2023). Εκατομμύρια στρατηγικές σχεδιάζονται ετησίως σε όλο τον κόσμο, χιλιάδες μόνο επιτυγχάνουν, Hrstrategy.

Eurostat (2023). Euro area statistics. https://www.euro-area-statistics.org/?lg=en

Eze, G. P. and Owota, P. G. (2021). Tax Rate and Tax Compliance : The Africa Experience. *International Research Journal of Nature Science and Technology,* 3(1), 18-24. https://www.scienceresearchjournals.org/IRJNST/2021/volume-3%20issue-1/irjnst-v3i1p102.pdf

Firmansyah, A., Febrian, W. and Falbo, T. D. (2022). The Role Of Corporate Governance And Tax Risk In Indonesia Investor Response To Tax Avoidance And Tax Aggressiveness. *Jurnal Riset Akuntansi Terpadu*, 15(1), 11-26. https://doi.org/10.35448/jrat.v15i1.14033

Gertler, M. and Hubbard, R. G. (1993). Corporate Financial Policy, Taxation, and Macroeconomic Risk. *The RAND Journal of Economics*, 24(2),286-303. https://doi.org/10.2307/2555763

Gita Warastri, R. M. and Suryaningrum, D. H. (2022). Pengaruh tax avoidance, tax reporting aggressiveness, dan tax risk terhadap risiko perusahaan. *Fair Value: Jurnal Ilmiah Akuntansi dan Keuangan*, 5(2), 895-908. https://doi.org/10.32670/fairvalue.v5i2.2081

Guedrib, M. and Marouani, G. (2023). The interactive impact of tax avoidance and tax risk on the firm value: new evidence in the Tunisian context. *Asian Review of Accounting*, 31(2), 203-226. https://doi.org/10.1108/ARA-03-2022-0052

Hamilton, R. and Stekelberg, J. (2017). The effect of high-quality information technology on corporate tax avoidance and tax risk. *Journal of Information Systems*, 31(2), 83-106. https://doi.org/10.2308/isys-51482

Huseyn, A. (2023). Assessment of Tourism-Led Growth Risks in Resource-Rich Countries: Evidence from Azerbaijan. *ECONOMICS - Innovative and Economics Research Journal,* 11(2). https://doi.org/https://doi.org/10.2478/eoik-2023-0053

Irawan, F. and Turwanto (2020). The Effect of Tax Avoidance on Firm Value with Tax Risk as Moderating Variable. Test Engineering and Management, 83(4), 9696-9707. http://www.testmagzine.biz/index.php/testmagzine/article/view/5365/4340

Kovermann, J. H. (2018). Tax avoidance, tax risk and the cost of debt in a bank-dominated economy. *Managerial Auditing Journal*, 33(8–9), 683-699. https://doi.org/10.1108/MAJ-12-2017-1734

Kayahan, C. & Murat, T. (2022). The Evolution of Financial Risk Management. *Journal of Corporate Governance, Insurance, and Risk Management*, 9(S1), 155-168. https://library.acadlore.com/JCGIRM/2022/9/S1/JCGIRM_09.S1_10.pdf

Kryeziu, N. and Durguti, E. A. (2019). The Impact of Inflation on Economic Growth. *International Journal of Finance & Banking Studies (2147-4486)*, 8(1), 1-9. https://doi.org/10.20525/ijfbs.v8i1.297

Leenders, W. *et al.* (2023). Offshore tax evasion and wealth inequality: Evidence from a tax amnesty in the Netherlands. *Journal of Public Economics*, 217. https://doi.org/10.1016/j.jpubeco.2022.104785

Li, R. Q. and Xiao, Y. (2023). Identification Method for Unlicensed Taxis in Urban Areas: A Case Study. *Journal of Urban Development and Management*, 2(1), 22-33. https://doi.org/10.56578/judm020103

Lin, X. *et al.* (2019). Corporate social responsibility, firm performance and tax risk. *Managerial Auditing Journal*, 34(9). https://doi.org/10.1108/MAJ-04-2018-1868

Mangoting, Y. et al. (2021). The Effect of Tax Risk on Tax Avoidance. *Jurnal Keuangan dan Perbankan*, 25(3), 570-584. https://doi.org/10.26905/jkdp.v25i3.5629

Mangoting, Y. *et al.* (2022). Ownership Structure, Tax Risk, and Tax Avoidance in Indonesia Manufacturing Companies 2016-2020. *Jurnal Ilmiah Akuntansi dan Bisnis*, 17(2), 346-361. https://doi.org/10.24843/jiab.2022.v17.i02.p11

Maslov, K. V., Kozhevnikov. O. A. and Savoskin, A. V. (2021). Methods of Tax Risks Management by the State in the Context of the Corona Virus Pandemic (Experience of Russia and Poland). *Public Administration Issues*, 2021(1). https://doi.org/10.17323/1999-5431-2021-0-4-159-184

Masri, I. *et al.* (2019). The role of tax risk management in international tax avoidance practices: Evidence from Indonesia and Malaysia. *International Journal of Trade and Global Markets*, 12(3–4),311-322. https://doi.org/10.1504/IJTGM.2019.101561

Molchanova, E., and Kovtoniuk, K., (2023). Recession or recovery: The fifth stage of the Kondratiev wave. *Collection of Papers New Economy,* 1(1), 17-29. https://doi.org/10.61432/CPNE0101017m

Nataliia, H., Olena, M. (2023). The Key Administrative Competencies of Managers Required for Company Development in the Bani World. *ECONOMICS - Innovative and Economics Research Journal*, 11(1), 289-305. https://doi.org/10.2478/eoik-2023-0012

Neuman, S. S., Omer, T. C. and Schmidt, A. P. (2020). Assessing Tax Risk: Practitioner Perspectives'. *Contemporary Accounting Research*. 37(3), 1788-1829. https://doi.org/10.1111/1911-3846.12556

Olviana, T., Nendissa, D. R., Pellokila, M. R., Lerik, M. D. C., and Khoiriyah, N. (2022). Vertical Market Integration and Behavioral Variations of Medium-Quality Rice Prices Before and During Covid-19. *Journal of Urban Development and Management*, 1(1), 58-66. https://doi.org/10.56578/judm010107

Ouyang, S. and Fang, Y. (2022). Enterprise Financial and Tax Risk Management Methods under the Background of Big Data. *Mathematical Problems in Engineering*, 2022. https://doi.org/10.1155/2022/5831866

Protsenko, I., and Koretsky (2023). Legal status and peculiarities of taxation of e-residents in Ukraine. *Collection of Papers New Economy,* 1(1), 244-255. https://doi.org/10.61432/CPNE0101244p

Puška, A., Kozarević, S., and Okičić, J. (2020). Investigating and analyzing the supply chain practices and performance in agro-food industry. *International Journal of Management Science and Engineering Management*, 15(1), 9-16. https://doi.org/10.1080/17509653.2019.1582367

NPR: Puška, A., Maksimović, A., Stojanović, I., (2018). Improving organizational learning by sharing information through innovative supply chain in agro-food companies from Bosnia and Herzegovina. O*perational Research in Engineering Sciences: Theory and Applications*, 1(1), 76–90. https://doi.org/10.31181/oresta19012010175p

Plesner Rossing, C. (2013). Tax strategy control: The case of transfer pricing tax risk management. *Management Accounting Research*, 24(2). https://doi.org/10.1016/j.mar.2013.04.008

Saragih, A. H. and Ali, S. (2023a). Corporate tax risk: a literature review and future research directions. *Management Review Quarterly*, 73(2), 527-577. https://doi.org/10.1007/s11301-021-00251-8

Saragih, A. H. and Ali, S. (2023b). The impact of managerial ability on corporate tax risk and long-run tax avoidance: empirical evidence from a developing country. *Corporate Governance (Bingley)*, 23(5),1117-1144. https://doi.org/10.1108/CG-08-2022-0346

Siagian, P. S. A. S. H. (2023). The Effect of Tax Avoidance, Tax Risk, and Profitability on the Cost of Debt in Energy Sector Companies Listed on the Idx for the 2019-2021. *Jurnal Scientia*, 12(1), 98-106. https://doi.org/10.58471/scientia.v12i01.1036

Sokolovska, A., Zatonatska, T. and Rainova, L. (2023). Benchmark and Tax Expenditures on Personal Income Tax in Ukraine. *ECONOMICS - Innovative and Economics Research Journal,* 11(1), 159–175. https://doi.org/10.2478/eoik-2023-0008

Stepura, T. and Kuzmak, O. (2023). Capability of Higher Education in Overcoming Digital Inequality in the Conditions of the Crisis in Ukraine. *ECONOMICS - Innovative and Economics Research Journal,* 11(2). https://doi.org/10.2478/eoik-2023-0028

Strauss, H., Fawcett, T. and Schutte, D. (2020). Tax risk assessment and assurance reform in response to the digitalised economy. *Journal of Telecommunications and the Digital Economy*, 8(4), 96-126. https://doi.org/10.18080/JTDE.V8N4.306

Suwardi, E. and Saragih, A. H. (2023). The effect of tax risk on audit report delay: Empirical evidence from Indonesia. *Cogent Business and Management*, 10(1). https://doi.org/10.1080/23311975.2023.2192315

Takopoulos, A. (2023). *Ανάλυση* Κινδύνων Επιχειρήσεων (Risk Analysis), Specisoft. https://www.specisoft.gr/home/news/docs/Arthro_kindinoi_Epihiriseon.pdf

Vlasenko, T., (2023). Dimensions of the analysis of the organizational culture of multinational companies. *Collection of Papers New Economy*, 1(1), 110-125. https://doi.org/10.61432/CPNE0101110v

Wang, N. and Guan, Y. (2022) Calculus Logic Function in Tax Risk Avoidance in Different Stages of Enterprises. *Applied Mathematics and Nonlinear Sciences*, 8(2023),1889-1900. https://doi.org/10.2478/amns.2022.2.0176

Wencel, A. (2022). The disclosure of tax risk in the financial reports of public companies. *Zeszyty Teoretyczne Rachunkowosci*, 46(3), 197-215. https://doi.org/10.5604/01.3001.0015.9604

Wunder, H. F. (2009). Tax risk management and the multinational enterprise. *Journal of International Accounting, Auditing and Taxation*, 18(1), 14-28. https://doi.org/10.1016/j.intaccaudtax.2008.12.003

Yuliadi, I. (2020). An analysis of money supply in Indonesia: Vector Autoregressive (VAR) approach. *Journal of Asian Finance, Economics and Business*, 7(7), 241-249. https://doi.org/10.13106/jafeb.2020.vol7.no7.241