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Taras Tunytsya

Doctor of Science, Economics, Professor,
Professor of the Department of International Economic Analysis and Finance,
Ivan Franko National University of Lviv
ORCID: <https://orcid.org/0009-0007-5024-3667>
E-mail: taras.tunytsya@lnu.edu.ua

Ihur Hurnyak

PhD in Economics, Associate Professor, Associate
Professor of the Department
of International Economic Analysis and Finance, Ivan
Franko National University of Lviv
ORCID: <https://orcid.org/0000-0003-0926-2456>
E-mail: hurnyakihor@gmail.com

Olena Yanchyshyn

PhD Student of the Department of International Economic Analysis and Finance,
Ivan Franko National University of Lviv
ORCID: <https://orcid.org/0009-0001-1696-693X>
E-mail: oyanchyshyn@yahoo.com

Yaroslav Hurnyak

Master of Computer Science
ORCID: <https://orcid.org/0009-0008-6934-2638>
E-mail: hurnyakyaroslav@gmail.com

THE IMPACT OF BUSINESS STRATEGY ON THE FULFILLMENT OF TAX OBLIGATIONS TO THE STATE: FOREIGN EXPERIENCE

Abstract. *The purpose of the article is to represent a key role of the choice of business strategy combined with the greatest profitability, transparency, social orientation, which ultimately manifests itself in the amount of taxes paid. The taxes paid by enterprises in the formation of the state budget and economic development of the country. These funds are used to finance a variety of government programs and services, such as education, health, infrastructure and social protection. The question is especially significant for Ukraine in terms of financing military expenditures. The amount of taxes paid is a critical factor that businesses considers developing strategies to achieve financial stability and growth. Operating a business akin to Schumpeter's concept of entrepreneurship, characterized by risk-taking, simultaneously contributes to societal benefit by generating higher tax revenues. However, while this thesis holds true for American markets, it doesn't necessarily apply to European markets. The research method of comparative analysis of the US market, which represents the Anglo-Saxon model of corporations, and the Finnish market, which represents the continental model, is used. Companies are recognized as the largest tax payers among analysing corporations. The methodological basis of the study is the application of the Fama-French 5-factor model and an alternative based on Axelrod competition, which is a typical illustration of game theory. A range of Python packages is used. The obtained results confirm the hypothesis regarding the determinability of the chosen business strategy for the agreed tax burden. The specifics of the analyzed markets are noted. It is noted that employing market analysis to understand the fundamentals of market leader behavior represents a viable approach in contemporary economic analysis. The originality of the research lies in the demonstration that the adopted business strategy dictates the level of transparency within a considerable number of cases, thereby exerting a notable influence on taxation levels. The suitability of utilizing the Fama-French model for delineating business strategies has been affirmed. In instances where such a statistical model isn't applicable, employing the Axelrod tournament model is proposed.*

Keywords: *business strategy, taxation, tax avoidance, Fama-French, market institutions.*

Тарас Туниця

доктор економічних наук, професор,
професор кафедри міжнародного економічного аналізу і фінансів,
Львівський національний університет імені Івана Франка
ORCID: <https://orcid.org/0009-0007-5024-3667>
E-mail: taras.tunytsya@lnu.edu.ua

Ігор Гурняк

кандидат економічних наук, доцент,
доцент кафедри міжнародного економічного аналізу і фінансів,
Львівський національний університет імені Івана Франка
ORCID: <https://orcid.org/0000-0003-0926-2456>
E-mail: hurnyakihor@gmail.com

Олена Янчишин

аспірант кафедри міжнародного економічного аналізу і фінансів,
Львівський національний університет імені Івана Франка
ORCID: <https://orcid.org/0009-0001-1696-693X>
E-mail: oyanchyshyn@yahoo.com

Ярослав Гурняк

магістр комп'ютерних наук,
ORCID: <https://orcid.org/0009-0008-6934-2638>
E-mail: humyakyaroslav@gmail.com

ВПЛИВ БІЗНЕС-СТРАТЕГІЇ НА ВИКОНАННЯ ПОДАТКОВИХ ЗОБОВ'ЯЗАНЬ ПЕРЕД ДЕРЖАВОЮ: ЗАРУБІЖНИЙ ДОСВІД

Анотація. Податки, сплачувані підприємствами, відіграють ключову роль у формуванні державного бюджету та економічному розвитку країни. Метою дослідження є показати, що вибір бізнес-стратегії пов'язаний з високою прибутковістю, прозорістю, соціальною орієнтацією, у кінцевому підсумку проявляється у сумі сплачених податків. Ці кошти використовуються для фінансування різноманітних державних програм і послуг, таких як освіта, охорона здоров'я, інфраструктура та соціальний захист. Дане питання є особливо значущим для України з точки зору фінансування військових витрат. Сума сплачених податків є критичним фактором, який підприємства враховують при розробці стратегій для досягнення фінансової стабільності та зростання. Ведення бізнесу за принципами концепції підприємництва Шумпетера, яка характеризується ризикованістю, одночасно сприяє суспільному добробуту за рахунок генерування вищих податкових надходжень. Однак, хоча ця теза є справедливою для американських ринків, вона не обов'язково можлива для європейських ринків. У дослідженні використано метод порівняльного аналізу шляхом співставлення ринку США, який представляє англосаксонську модель корпорацій та фінського ринку як представника континентальної моделі. Обрано компанії, які є найбільшими платниками податків. **Методологічною основою дослідження** є застосування 5-факторної моделі Фама-Френча та альтернативи на основі турніру Аксельрода, який є типовою ілюстрацією теорії ігор. Використано низку пакетів Python. **Отримані результати** підтверджують висунуту гіпотезу щодо визначеності обраної бізнес-стратегії для узгодженого податкового навантаження. Відзначено ряд особливостей аналізованих ринків. Відзначено, що використання аналізу ринку для розуміння основ поведінки лідерів ринку є життєздатним підходом у сучасному економічному аналізі. Оригінальність дослідження полягає у демонстрації того, що обрана бізнес-стратегія диктує рівень прозорості у значній кількості випадків, що, у свою чергу, суттєво впливає на рівень оподаткування. Підтверджено доцільність використання моделі Фама-Френча для окреслення бізнес-стратегій. У випадках, коли таку статистичну модель не можливо застосовувати, пропонується використовувати модель турніру Аксельрода.

Ключові слова: бізнес-стратегія, оподаткування, ухилення від сплати податків, Fama-French, ринкові інститути.

Introduction. At the beginning of the last century, Professor Joseph Schumpeter from Chernivtsi, the creator of innovative economics, defined an entrepreneur as a person who disrupts the market. Such a definition immediately gave rise to a flurry of questions: is it useful for society? Should such perturbations be regulated? Will it hurt the budget?

We will try to show that even this behavior of a Schumpeterian entrepreneur can be represented by a separate strategy and, moreover, predicted, for example, with the use of machine learning methods.

Hypothesis: *the functioning of business as an "entrepreneur in the sense of Schumpeter", i.e. conducting business in a risky manner is at the same time beneficial for society from the position of accumulating a larger volume of taxes. However, if this thesis works for the American markets, it does not work for the European markets at the same time.*

Review. Corporate responsibility is about "how a business takes into account the impact that its operations have on the economic, social and environmental fabric of society with a view to maximizing the benefits and minimizing the downsides that it perceives". These three elements could be identified as the "triple bottom line" [1].

PWC pays a lot of attention to the difference between 'financial' and 'economic' [2]. The 'financial' focuses on the market value of transactions and how they pass through the accounts, while the 'economic' takes a wider perspective, "extending beyond the boundaries of the

organization". Paying tax is considered to be "an important part of a company's economic impact and contribution to society, as taxes fund social investment". But a call for a corporate responsibility on tax is not simply a call for companies to pay more. It is about applying the relevant principles of corporate responsibility. PWC means: accountability; transparency and disclosure; engagement with stakeholders; an ethical approach; a commitment to add economic value; and setting an appropriate tax strategy.

But not only economic and financial factors play a significant role. Fernández-Rodríguez & al [3] showed that institutional factors also have a significant effect on the tax burden for firms in emerging countries.

Sadjiarto & al [4] looked for the explanation of whether business strategy and financial distress have a significant effect on tax avoidance. They chose for the research basement Indonesian market.

Feller & al [5] proposed three-hurdle concept incorporating "skill" and "will" of managers to avoid taxes. They added a new factor of tax manager power, "which determines whether or not certain tax planning methods can be implemented in the company". They provided "convincing evidence that the level of tax expense is not simply a function of certain firm or management characteristics, but that the complex organizational setting matters, too".

Prawati & al [6] research was concentrated on the effect of business strategy, tax avoidance, and dividend policy on company value. They argued that "business strategy is one

of the variables that investors consider when determining if a company is performing well. Tax avoidance is a risky business practice; thus, investors will be skeptical about the company and might choose not to invest in it”.

Method and data. All data are derived based on company's ticker and the corresponding programming languages packages. We get all the data for calculations from yahoo.finance. Machine learning methods are chosen to estimate business predictability. In the case of gradient boosting (gb), in each stage, a regression tree is fitted on the negative gradient of the given loss function. The Support Vector Machine Regressor (svr) helps us because of our interest in the radial kernel. To implement prediction models following Python packages have been used: sklearn.tree, sklearn.svm, sklearn.linear_model, sklearn.ensemble and others.

We intend to reveal the presence or absence of a long-term strategy based on the 5-factor model of Fama-French (maximum possible period, factors for developed or emerging markets). A five-factor model is aimed at determining at capturing the size, value, profitability, and investment patterns in average stock returns [7].

The five-factor model time series regression traditionally has the equation below:

$$R_{it} - RF_t = a_i + b_i(RM_t - RF_t) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it} \quad (1)$$

Where R_{it} is the return of one of portfolio i in month t ; RF_t is the risk free return; RM_t is the return on the value-weight market portfolio; SMB is the return on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks (i.e. the size effect); HML is the return spread of cheap minus expensive stocks (i.e. the value effect); RMW is the return spread of the most profitable firms minus the least profitable; CMA is the return spread of firms that invest conservatively minus aggressively; $a_i, b_i, s_i, h_i, r_i, c_i$ – some coefficients; e_{it} is a zero-mean residual.

If the exposures to the five factors, $b_i, s_i, h_i, r_i,$ and c_i , capture all variation in expected returns, the intercept a_i in (1) is zero for all securities and portfolios i [7].

The best tax payers in USA could be taken from “Biggest U.S. Companies by Income Taxes” [8]. For analysis we chose 10 biggest in this aspect companies. For comparison selected Finnish companies with the same positive attribute for society. The best source for it we found was ‘The financial sector is one of the biggest taxpayers in [9].

Some general descriptions of chosen market segments we’ll analyse graphically using adjusted daily price change

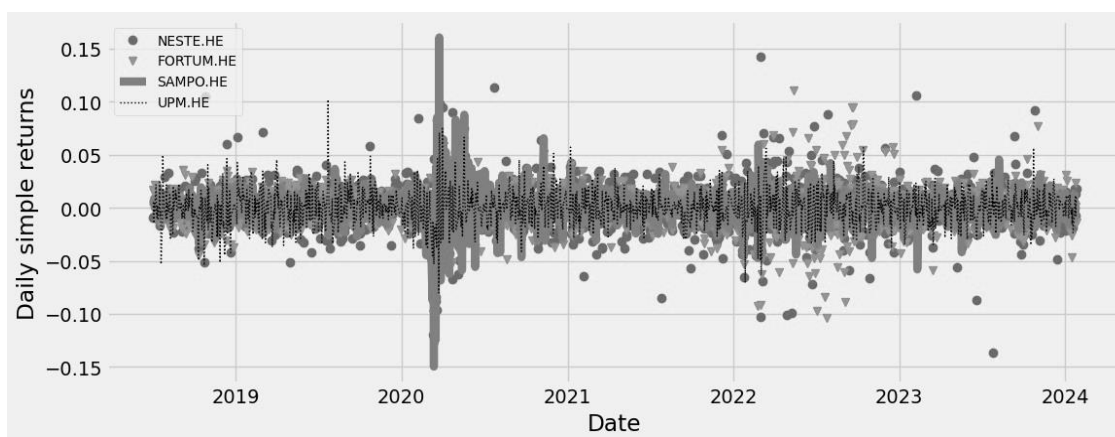


Figure 1. Finland daily stock price change

Source: authors' processing based on yahoo.finance historical prices [10]

Note: For other companies from our sample, the Fisher criterion is not fulfilled.

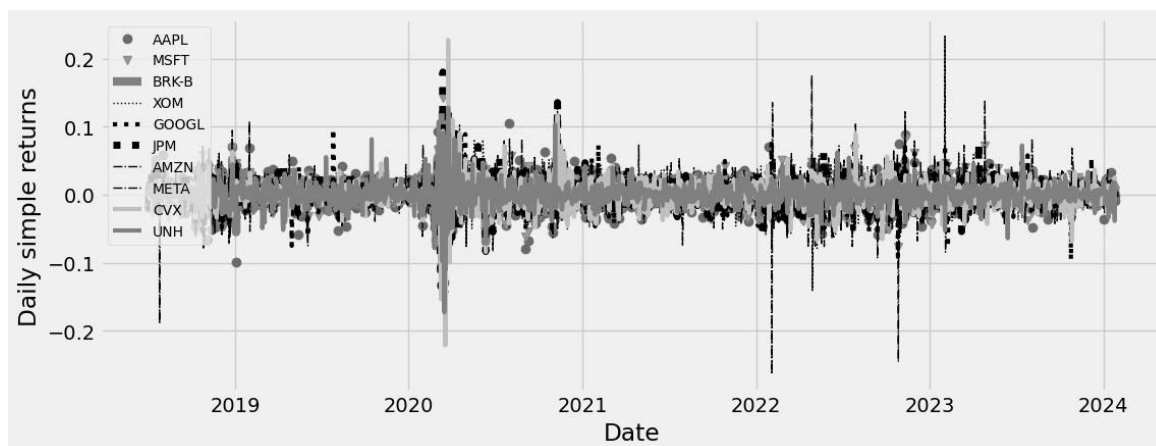


Figure 2. USA portfolio daily stock price change

Source: authors' processing based on yahoo.finance historical prices [10]

(as a risk) and cumulative return (as a basement for investment growth).

Research. How to reveal type of business strategy? Two approaches are proposed.

Next question will be which strategy is most associated with paying significant tax liabilities?

Based on the largest taxpayers of the USA and Finland selected for analysis, we will conduct a brief market

analysis. As we can see from Figures 1 and 2, the daily price fluctuation on these markets differs slightly.

On the other hand, we see some benefits in terms of cumulative revenue (Figure 3, Figure 4) for the much larger US market, which is expected. But such an analysis does not allow us to draw conclusions about the strategies of these selected businesses. We can talk about the significant impact of both the pandemic and Russian aggression on



Figure 3. Finland portfolio Investment growth (based on cumulative return dynamics)

Source: authors' processing based on yahoo.finance historical prices [10]



Figure 4. USA portfolio Investment growth (based on cumulative return dynamics)

Source: authors' processing based on yahoo.finance historical prices [10]

the territory of Ukraine (which is reflected by the rapid movement of the cumulative income curve below), but such information is clearly not enough to determine strategies. One could apply some combination of estimates such as the Sharpe ratio or Sortino, but this would also provide little information on the long-term business strategy.

Approach 1. Fama – French model based

In this case, the riskiness of the business is determined by comparing it with the market index (average level) and, if possible, evaluating all five factors. In majority of cases Mkt-RF factor is bigger than 1: business is riskier than average level (Table 1).

But this risky behavior could be predicted at least for the short periods using machine learning methods that are accepted broadly by investors (Figure 5).

In case of Finnish companies (best payers of taxes) the same rule about higher risk was not working (Table 2). For the working Fama – French model Mkt-RF was significantly smaller.

Approach 2. Type of interaction with market institutions. Strategy identification.

It could be created a business strategy based on the analysis of business interaction with the main market institutions. A newly created business, possessing ideas,

Table 1

Fama – French model based strategies description (USA portfolio)

Ticker	Adj. R ²	Prob. (F)	Mkt-RF (β)	HML(β)	CMA (β)	SMB (β)	RMW (β)
AAPL	0.374	6.89e-27	1.26*	-0.566*	-0.776*	-	-
MSFT	0.397	3.15e-48	1.08*	-0.461*	-0.69*	-	-
BRK-B	0.426	1.42e-38	0.736*	0.45*	-	-0.41*	0.219*
XOM	0.336	4.39e-40	0.766*	0.27*	0.53*	-	0.189*
GOOGL	0.329	2.71e-19	1.08*	-	-0.835*	-0.42*	-
JPM	0.514	2.85e-70	1.2*	1.24*	-0.65*	-	-0.74*
AMZN	0.312	1.08e-24	1.43*	-0.74*	-0.81*	-0.65*	-
META	0.19	2.56e-06	1.11*	-	-	-	-
CVX	0.374	9.03e-46	0.908*	0.372*	0.158*	-	-
UNH	0.182	1.73e-19	0.905*	-	-	0.26*	0.6*

Notes: * - significance is less than 0.05. β-coefficients are used in analysis.

Source: authors' estimation

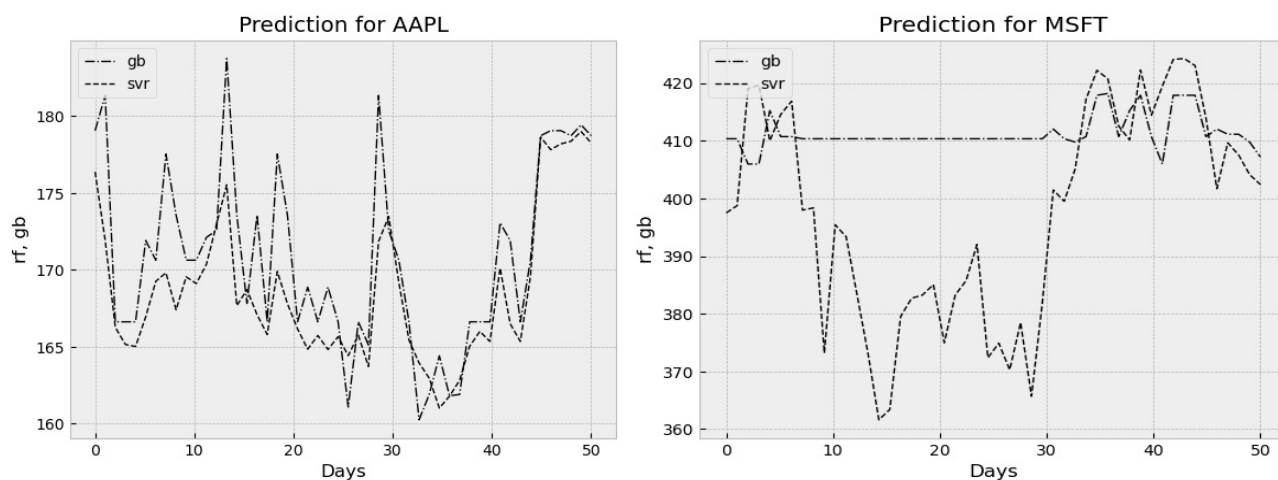


Figure 5. 50-days predictions for Apple and Microsoft

Notes: R² of the model bigger than 98% for both methods.

Source: authors' processing based on yahoo.finance historical prices [10]

Table 2

Fama – French model based strategies description (Finland portfolio)

Ticker	Adj. R ²	Prob. (F)	Mkt-RF (β)	HML(β)	CMA (β)	SMB (β)	RMW (β)
NESTE.HE	0.03	0.05	-	-	-	-	-0.69*
FORTUM.HE	0.02	0.07	0.3*	-	-	-	-
SAMPO.HE	0.03	0.04	0.2*	-	-	-0.38*	-
UPM.HE	0.02	0.07	-	0.47*	-	-	-

Notes: * - significance is less than 0.05

Source: authors' estimation

skills, and education at the currently acquired level, tries to find external resources for self-realization. Business applies to the bank, participates in public procurement, and at a certain stage uses special regimes for SMEs on the stock markets. If it fails or the level of such institutions is insufficient, the business turns to the shadow market. All these interactions require different levels of transparency, which can be considered an indicator of risk. If such transparency is maximal for the stock market (especially in the case of government oversight in the US based on the Sarbanes-Oxley act), then it is minimal in the case of the shadow market.

A curious situation happens when business tries to combine its presence on all possible capital markets. For example, performing a part of the business as completely transparent and presenting it on the stock

market, while at the same time providing some activity in the shadow market. Finally, we can obtain the intersection of the five different strategies, solving the resulting strategy problem. It can be determined on the basis of the Axelrod tournament as we can in the Table 3.

How does such a scheme proposed by us work? First, we choose the types of interaction of a particular business with the main institutions (for the purpose of obtaining external resources and positioning in society), and then we use the Axelrod tournament to determine what is the resulting strategy of this particular business. Practically, such a competition is a repeated game in which each player has the opportunity to choose between cooperating and defecting at each stage. In the Table 4, it is proposed the implementation of such an approach for some average company.

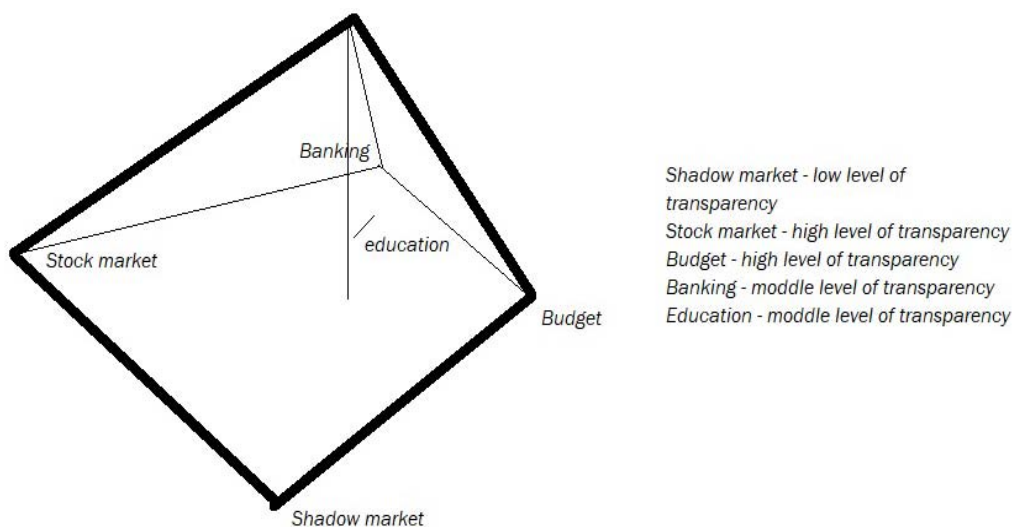


Figure 6. General schema of the market institutions interaction

Notes: The point of intersection of the height of the pyramid with the base determines the current state of the business. By manipulating different levels of the state of institutions, it is possible to graphically represent stable and unstable states of business.

Table 3

Main strategies description [11]

Strategy	DESCRIPTION
Anticycler	A player that follows a sequence of plays that contains no cycles: CDD CD CCD CCCD CCCCCD ...
Backstabber	Forgives the first 3 defections but on the fourth will defect forever. Defects on the last 2 rounds unconditionally. 'Even my patience has its limits'
BushMosteller	The probability of playing C or D will be updated using a stimulus which represents a win or a loss of value based on its previous play's payoff in the specified probability.
Collective Strategy	'It always cooperates in the first move and defects in the second move. If the opponent also cooperates in the first move and defects in the second move, CS will cooperate until the opponent defects. Otherwise, CS will always defect
'Cycler CCCCCD, 'Cycler CCCDCD	Corresponding cyclic cooperative and destructive actions.
Grumpy	A player that defects after a certain level of grumpiness. Grumpiness increases when the opponent defects and decreases when the opponent co-operates.
GTFT	Generous version of TitForTat
HandShake	Starts with Cooperative, Defect. If the opponent plays the same way, cooperate forever, else defect forever.
LookerUp	This strategy uses a Lookup Table to decide its next action.
MemoryOnePlayer	Uses a four-vector for strategies based on the last round of play
Stalker	This is a strategy which is only influenced by the score.
TrickyCooperator	A Cooperator that is trying to be tricky.
WinStayLoseShift	a strategy that shifts if the highest payoff was not earned in the previous round

Table 4

Result for virtual middle company

Country	Strategies – Players*	Game	Winner
USA	WinStayLoseShift, Tricky Cooperator, DefectorHunter, HardProber, Defector	Moran A single ‘mutant’ (e.g., a new opinion, strain, social trait etc.) invades a population of residents spread over the nodes of a graph.	Win-Stay Lose-Shift
Ukraine	BackStabber, HardProber, Defector, Cooperator, Defector	Chicken Game describes a very risky situation for the losing side, as well as an awkward situation if all players have given up the intention to win	Cooperator
EU	Cooperator, TrickyCooperator, CollectiveStrategy, DefectorHunter, Defector	Stag Hunt Game describes a conflict between safety and social cooperation	Collective Strategy
China	GoByMajority, Cooperator, Stalker*, Defector, Cooperator	Investment Game demonstrates a case where the cooperation of the majority guarantees a positive result, and mistrust leads to significant losses	Cooperator

Source: authors' development

Notes: interactions with institutions. *in case of China strategy Stalker is more appropriate for interaction with Budget. In case of USA for realisation of entrepreneurial activity in the stock market we have chosen Tricky Cooperator. Logically, there is always some freedom of choice between several strategies. The twinning of the axel rod also allows the possibility of adding your own strategy.

Table 5

The character of strategy

Risky	WinStayLoseShift, Tricky Cooperator, Anticycler, Backstabber, Stalker, etc.
Neutral	Grumpy, GTFT, Cooperator, etc.
Conservative	BushMosteller, LookerUp, HandShake, Cyclor CCCCCD, Cyclor CCCDCD, MemoryOnePlayer, Collective Strategy, etc.

Source: authors' development

How to identify the riskiness of a specific strategy? Obviously, certain strategies are rather difficult to unambiguously identify as risky, neutral or conservative. For example, regarding Grumpy or Cyclor CCCCCD, the answer is not clear. The authors gave their vision of such a division regarding the main strategies in the Table 5.

Conducting an analysis of the selected strategies for a specific company with a later manifestation of its transparency and social responsibility is the object of another study. At the same time, we see that the impossibility of applying an analysis like the Fama-French model is not a problem if we are ready to use the tools of game theory.

The Fama-French approach assumes the presence of a linear relationship between factors (riskiness, scale, and profitability, type of shares, conservatism or aggressiveness of business, etc.) and the change in the company's price on the market. At the same time, this is quite difficult to achieve, for example, for developing markets. Just imagine the differences between Brazil, Mexico and Eastern Europe. The authors of the study are proposing an attempt of the transition to the construction of such a non-linear connection using neural networks. At the same time, this

approach significantly complicates the description of the strategy of such a company and the analysis of the influence of individual factors.

Conclusions. The type of business strategy in a significant number of cases determines how transparent this business is, and therefore has a significant impact on the amount of taxation. At the same time, this model differs significantly for different countries. If in the US we talk about the riskiness of business as a prerequisite for higher taxation (provided that the use of avoidance schemes is minimized), then no such connection was found in the example of Finland. Our hypothesis within the framework of the proposed sample was completely fulfilled. At the same time, we note that the approach of market analysis to the basics of the behavior of market leaders is an acceptable approach in modern economic analysis. The appropriateness of using the Fama-French model for determining business strategy has been confirmed. If such a model based on statistical indicators cannot be used, it is suggested to use the Axelrod tournament. The players in this case choose certain types of business behavior in relation to the main market institutions.

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