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TABLE OF CONTENTS

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Financial Internet Quarterly 2024, vol. 20 / no. 1, p. 1-13

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ANALYSIS OF THE PAYMENT DISCIPLINE OF TRADE-LICENCE HOLDERS REGARDING SOCIAL INSURANCE CONTRIBUTIONS IN THE SLOVAK REPUBLIC

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Abstract

Guarantee of autonomy and stability of economic subjects from the government can be considered an important gauge of state security. Due to the financial, migration and energy crisis, we can observe a notable increase of social problems, which gives more importance to the policy for social security of the population. In this article we address the ongoing problem of an excessively high number of debts owed to the Slovak Social Insurance Agency in recent years. The social security system for trade-licence holders, its financing and the method of enforcement are briefly characterised. The development of the payment/non-payment of taxes and levies to the Social Insurance Agency is tracked against the background of legislative changes. In the conclusion, the ineffectiveness of selected legal provisions and processes of exacting taxes and social security contributions is evaluated in terms of their impact on the financial disciplines of trade-licence holders in the Slovak Republic. Severity of the deficit in money collected on social insurance poses a threat in several areas, such as providing social security to all citizens in some required quality as guaranteed by the government, or sustainability of the public finance which poses a risk for the whole economic security of the country.

JEL classification: H63, J28, K22

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Introduction

Activity of country's population on the labour market is determined by various demographic and socio-economic factors (see: Aarson et al. (2014); Nestić & Tomić, (2017)). However, theoretical models and empirical literature indicate that one of the important factors lays also in the domain of fiscal policy in the form of tax burden on labour income.

In terms of market-oriented economic policies, the state plays an important role in creating conditions that allow people to be economically active, for which they should be appropriately rewarded financially. For the long-term stability of a society, the economic power of individuals must be sufficient not only to meet their own existential needs but also to enable their own satisfying self-realisation and to support the functioning of families as a whole, from the care of children to the elderly. Every larger society includes people who, for various objective reasons, are incapable of working, and who thus becoming dependent on social assistance and support Rievajová (2013). The complexity of socio-economic problems, as well as their mutual feedback and synergistic character, all lead to all developed countries paying increased attention to socioeconomic issues in Prokop et al. (2017) is competitiveness an entity's ability to be successful in a competitive environment so that its goals are achieved to the greatest possible extent (and in the most effective way). The funds needed to carry out a state's social policies tend to be drawn largely from the redistribution of taxes, levies and insurance premiums for social security and contributions to the state's employment policy. The basis of a country's economic progress emerges from the responsible management of public finances, the revenues of which, to a notable extent, are shared in by the business environment. Without an efficient and competitive business environment, financial resources delivered to the state budget would not suffice to cover social security for the population or for the functioning of the state or public administration. Taxation, as an economic category, is one of the oldest compulsory forms of monetary payments. Taxes were originally paid to a sovereign and only later for the benefit of the state; therefore, taxation is as old as the institution of the state itself. For these reasons, the conscious creating and supporting of a favourable and fair environment for business activities must be among the primary interests of the state. In the view of Jakúbek and Tej (2016), deliberate avoidance or non-fulfilment of the obligation to pay levies destabilises the system and compels the creation of corrective measures. Especially in a period of ongoing financial and the energy crisis, social problems and thus also the importance of social policy, including consolidation and economic management of public funds, are increasing. The state can provide social security to its citizens to the extent that citizens actively participate in it Bušovská (2014) and Marr (2022). The balance between contributions to the system and the entitlements provided is a key challenge, and the responsibility of the state lies in setting up systemic measures so that the collection of taxes and insurance premiums is functional, fair and efficient.

Literature review

The state must aim for a balanced budget and avoid deficit spending while ensuring the rate of economic growth and economic stability. The sustainability of the social security system is a highly discussed problem, which intensifies with the consequences of the economic, energy or debt crisis against a background of local and global problems. Social systems founded on an ongoing system of financing are getting into financial deficits that put ever higher demands on the economically active population through increased taxation. In recent years, it has been necessary to adopt a number of measures to solve the escalating economic and financial problems. Krebs et al. (2007) states in principle that the higher the stability of a state, the smaller or more stable are its social expenditures. The fundamental issue of all budgets from the system of public budgets is achieving a balanced budget. The ideal case is when revenues regularly cover ordinary expenses. The social security system ensures the satisfaction of social needs and the prevention of social risks while providing assistance to families and individuals and resolving social events that could not be prevented. Aksman (2017) and Ivančík (2012) points out that from an international point of view, social security is also defined as a set of tools and institutions which provides protection and assistance in the case of threats to health, illness, disability, work accidents, invalidity, old age, maternity and pregnancy, the death of a breadwinner and other cases. Rievajová et al. (2013) define the social security system as "(…) a set of legal, financial and organisational instruments and measures whose goal is to compensate for the unfavourable financial and social consequences of various life circumstances and events that endanger recognised social rights or to prevent such life situations from occurring". Historically, social security was implemented with the aim of compensating for the adverse results of various life events. Economic policy uncertainty is the lack of clarity about how and why the government will run a certain economy in the future Pastor and Veronesi (2012).

An assessment of the system of personal income taxation for taxpayers, the efficiency of tax collection and their historical development have been the subject of several studies. In the Czech Republic, researchers in the area of personal income tax focus on research into

the progressivity of fictitious incomes (mostly multiples of the average wage), for example Krajňák (2020, 2021), Krajňák et al. (2022), and Ratmanová (2011). Široký and Maková (2009) analysed the effect of replacing the nominal progressive tax rate with a nominal linear tax rate in the Czech Republic in the years 1993 – 2007. Dušek et al. (2014) report that the reform of personal income tax in 2008 led to a reduction in the tax burden in some cases, but this income tax remains a progressive tax. According to Tepperová and Pavel (2016), these reforms significantly affected the level of tax revenues and the distribution of the tax burden of personal income tax in the Czech Republic. All the mentioned authors determined that this reform lowered the tax burden on personal income tax, in particular for taxpayers with children or taxpayers with an average wage level.

Several studies focus on the impact of the tax burden on employment. For example, Blažić (2006) points out that Croatia has a high tax burden (especially due to social contributions). The effects of labour taxation on labour market indicators are subject to many international studies which include various countries and regions (for more extensive literature review see: Dolenc et al. (2011)). As reported by Deskar-Škrbič et al. (2018), excessive taxation can disrupt the proper functioning of the labour market by disrupting incentives for work, and at the same time it stimulates employment in the informal sector of the economy, where there are more problems in controlling the fulfilment of tax obligations than in the formal sector.

Compulsory levies to the social insurance agency

The main and most extensive component of social security in Slovakia is compulsory public social insurance, which is based on the payment of contributions and the drawing of benefits. Social insurance addresses those social situations that citizens can prepare for in advance (i.e. by insuring themself) through deferring a portion of their current consumption to cover future uncertain short-term or long-term social situations (Krebs et al., 2007). Social insurance is a mandatory financial system intended to provide protection to the economically active population and their family members during productive and post-productive age upon a period of loss of income from economic activity. In Slovakia, social insurance is governed by Act No. 461/2003 Coll. on Social Insurance, as amended, which determines the payer of insurance premiums for individual types of insurance and the obligation to pay insurance premiums for social insurance and sets the premium rates, assessment basis, levy of insurance premiums, fines in case of a violation of obligations, or penalties if an obligated person does not pay the insurance premium on time or pays too little.

Social security is financed mainly from collected premiums paid by individual payers, i.e. employees, employers, trade-licence holders, voluntarily insured persons and the state. According to Act No. 461/2003 Coll. on Social Insurance, as amended, for the purposes of paying social insurance, the abbreviation trade-licence holders means a natural person who has reached the age of 18 and in the calendar year relevant to the establishment or continuation of compulsory health insurance and compulsory pension insurance of the trade-licence holder, earned income from doing business and from other self-employed activities according to the Income Tax Act, carried out gainful activities, the income from which is not subject to income tax due to regulations and international treaties on the avoidance of double taxation, or performs gainful activities, the income from which is not subject to income tax according to a special regulation, if the regulations of the Slovak Republic are applied to the natural person, who conducts this gainful activity within the legal relations of social insurance.

The Social Insurance Act regulates several obligations following from the purpose of sickness insurance, pension insurance and unemployment insurance for employees, trade-licence holders, insured persons as well as employers. The amount of insurance premiums for sickness insurance, pension insurance, disability insurance, accident insurance, guarantee insurance and unemployment insurance are calculated by a percentage rate from the assessment basis achieved in the relevant period. The key value for determining the minimum assessment base for trade-licence holder in a given year (for example in 2022) is half of the average gross monthly wage in the Slovak economy two years before (i.e. in 2020). The minimum payment to the Social Insurance Agency is set by an automatic mechanism in Act No. 461/2003 Coll. on Social Insurance, as amended, as 33.15% of the minimum assessment base. The amount of social contributions to be paid for trade-licence holder is assessed on the basis of the income tax return submitted for the previous calendar year.

For the purpose of the empirical part of the study, we will narrow the group of persons obligated to pay social insurance to self-employed persons (trade-licence holders) who carry out a trade business according to Act No. 455/1991 Coll. on Trade Licensing (Trade Licensing Act). According to § 2 of the Trade Licensing Act, a trade is defined as a systematic activity operated independently, in one's own name, at one's own responsibility, for the purpose of achieving profit or for the purpose of achieving a measurable positive social impact, if it is an economic activity of a registered social enterprise based on a special regulation and under the conditions established by this act. Profits from trade-licensing activities according to Act No. 455/1991 on Trade Licensing are subject to taxes and social contri-

butions on the basis of a submitted tax return. Whether a person must pay them after one year of business and how much they will be is determined by the income from the business the trade-licence holder has achieved. The threshold for the paying of levies usually goes up every year. For example, if a trade-licence holder did not earn at least 6,799 EUR in 2022, he or she does not have to pay taxes in 2023. The amount of monthly contributions then depends on the assessment base according to the amount of revenues. For the calculation of the amount of levies, it also applies that if the health and social insurance companies calculate the monthly assessment base for a self-employed person as being below the minimum, he or she will pay contributions from the minimum assessment base. On the other hand, according to Act No. 461/2003 Coll. on Social Insurance, as amended, if the monthly assessment basis for social levies is higher than the maximum, the self-employed person will only pay contributions from the maximum assessment basis. The Social Insurance Agency does not perform an annual settlement of insurance premiums; the premium paid is the final amount of the insurance premium.

The Social Insurance Act defines the recovery of a debt, the assignment of a debt and the writing off of a debt, but it does not define the meaning of the term debt itself. In general, the term debt is understood to be the right of a creditor to demand from the debtor the fulfilment of a certain liability arising from a legal relationship. The payment of insurance premiums for social insurance is a typical example of an obligation that persons are required to meet properly and on time according to the amendment of the Social Insurance Act. If an obligated person does not fulfil these obligations properly and on time, claims against him or her arise for the Social Insurance Agency, which are prescribed by a valid and enforceable decision of the Social Insurance Agency or a court. Expectations regarding the voluntary fulfilment of the levy obligation, although mandatory by all affected subjects, would be an exaggerated idealisation that would be realistically unachievable. This is one reason why application practice is forced to permanently create instruments to improve the efficiency of compliance with legal standards.

A specific step in the area of social insurance contributions was the adoption of Act No. 2/2017 Coll, which amends the Act No. 233/1995 Coll. on Court-Appointed Executors and Executions (Execution Regulations) and on amendments to certain acts, as amended. An execution order principally changes the method of debt collection for creditors and the activities of executors. With effect from 1 July 2017, the enforcement of claims against debtors is governed and preferentially performed ex officio by the Social Insurance Agency itself, instead of enforcement by means of an executor's office. The introduction of administrative performance is considered to be a significant legislative change in the processes of social insurance administration in recent years.

Data and methodology

The aim of this academic study is to reflect on the growth of the public finances deficit in the Slovak Republic, which in the second quarter of 2023 totalled -3.3% of GDP, which is the fourth worst position among 30 European countries. One reason for the lack of public finances is the mismatch between incomes and outlays to the Social Insurance Agency. In the article, we specify the legal and illegal behaviour through which trade-license holders consciously try to minimise contributions to the Social Insurance Fund. We point out legal regulations in the business of trade-license holders, the aim of which was to facilitate the business of trade-license holders, but in reality which had a negative impact on the state budget.

In conducting the research, we set the following questions:

1. Were improvements achieved in the recovery of arrears in Social Insurance contributions in line with Act No. 2/2017 Coll. carried out by the Social Insurance Agency itself as an official duty?
2. Do most arrears in levies and taxes occur unintentionally due to forgetfulness, misunderstanding, short-term insolvency, etc. and are then paid off in a short time?
3. Is the repressive instrument of a penalty a motivating factor for the payment of contributions and taxes to the Social Insurance Agency?

In the analytical part of the study, we point out the partial portion of Social Insurance Agency's income in the form of debts on social insurance contributions from trade-licence holders between the year 2011 to 2022. More detailed results of debtors for the months of 2022, which is the regularity with which trade-licence holders are obliged to make payments, are based on the analysis and synthesis of debt records of approximately 120,000 trade-licence holders. The whole basic file in the records of the Social Insurance Agency of the Slovak Republic was analysed using frequency analysis and comparison. In order to explain the relationships and links of the studied issue, the connecting of several freely available and commercial registers in time contexts was used. From the traditional statistical methods, descriptive statistics, frequency analysis, time series and linear regression analysis were used. In the context of the results, recommendations for practice were formulated such that the administrative burden associated with the registration of debtors as well as the burden of law enforcement agencies and

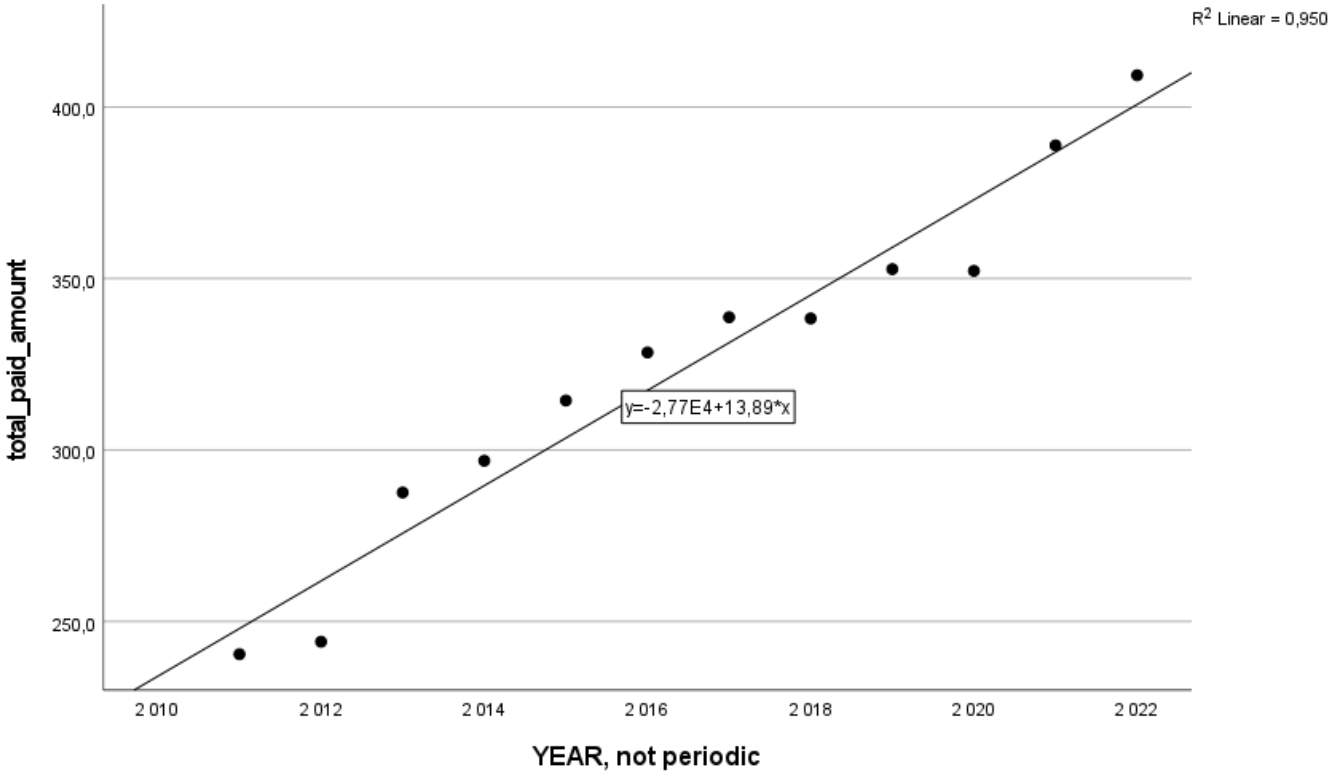
the courts is reduced by means of prevention, enforceable measures and legal regulations.

Development in the number of trade-licence holders in Slovak Republic

We can deduce a partial answer to the first question from the development of the total amount transferred to the Social Insurance Company by trade-licence holders (in millions of euros) in the Slovak Republic over the last 11 years in Figure 1.

The linear trend line brought forward by the observed values has a high R2 = 0.95 and approximates them well. In the years 2018 to 2020, i.e. after the adoption of the Act No. 2/2017 Coll, the collection of contributions to the Social Insurance Agency was recorded below the linear trend line, which is mainly associated with anti-pandemic measures, which were the most intensive in this period. A more accurate picture of the situation is provided by Figure 2, which, alongside the total amount paid to the Social Insurance Agency by trade-licence holders (in millions of euros), also shows the development in the number of trade-licence holders (in thousands) in the Slovak Republic over the last 11 years and the minimum social security contribution.

Figure 1: Development of the total amount transferred to the Social Insurance Company by trade-licence holders in the Slovak Republic, 2010-2022



Source: Author´s own processing based on data from the Slovak Social Insurance Agency.

The lower hatched curve represents the minimum contribution to Social Insurance for the given year, which is calculated from the average monthly wage in the economy of the Slovak Republic as set by the Statistical Office for the calendar year two years before the relevant period. A clear, relatively stable and simple linear relationship is evident from the course of the minimum contribution curve.

Figure 2: Development of number of trade-licence holders and total paid amount to the Social Insurance Company in the Slovak Republic, 2010-2022

Source: Author´s own processing based on data from the Slovak Social Insurance Agency.

A legislative change in July 2017 raised the maximum amount of flat-rate expenses of trade-licence holders from 5,040 EUR per year to 20,000 EUR. What's more, from 2020, natural persons with income from business and other trade-licence activities, as well as legal entities, have the opportunity to claim a linear tax rate of 15% after meeting the conditions, which was reflected in the sharp increase in the number of trade-licence holders. Employers rapidly calculated that tax and insurance contributions for an employee are 2.3- to 6-times higher than for a worker who does not have an employment relationship, such as trade-license holders.

In the next step, we carried out a linear regression step by step on these time series.

Table 1: Correlations between total paid amount, minimal social security contributions and number of self employed people

Correlations				
Characteristics		Total paid amount	Minimal social security contributions	Number of self employed people
Pearson Correlation	Total paid amount	1.000	0.983	-0.212
	Minimal social security contributions	0.983	1.000	-0.140
	Number of self employed people	-0.212	-0.140	1.000
Sig. (1-tailed)	Total paid amount		0.000	0.254
	Minimal social security contributions	0.000		0.332
	Number of self employed people	0.254	0.332	
N	Total paid amount	12.000	12.000	12.000
	Minimal social security contributions	12.000	12.000	12.000
	Number of self employed people	12.000	12.000	12.000

Source: Author´s own processing.

Table 2: Model Linear regression summary

Model Summary[b]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.983[a]	0.965	0.962	10.0352	0.965	278.543	1	10	0.000
a. Predictors: (Constant), minimal social security contributions									
b. Dependent Variable: total paid amount									

Source: Author´s own processing.

Table 3: Coeficients of Linear Regression

Coefficients [a]									
Model		Unstandardized Coefficients		Standardize Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	22.706	18.304		1.240	0.243			
	Minimal social security contributions	2.061	0.123	0.983	16.690	0.000	0.983	0.983	0.983
a. Dependent Variable: total paid amount									

Source: Author´s own processing.

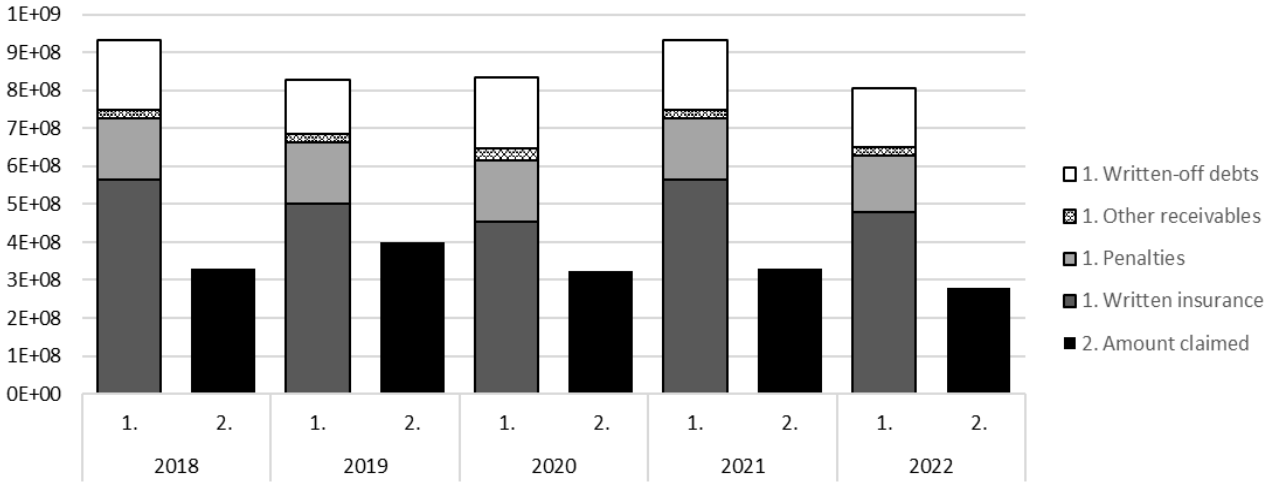
In the model, the linear relationship between total amount paid and minimal social security contributions, in which trade-license holders who paid social insurance taxes honestly participated, was shown to be statistically significant. A negative correlation coefficient was found between the total paid amount and the number of trade-license holders; therefore, the number of trade-license holders was not included in the linear model. The correlation result for this pair of parameters would change significantly if we were to shorten the observed time to the last 5 years, i.e. from 2018, which is related to the previously mentioned legal changes. The significant and visual shape between them associated with the increase in 2020 is of note. The findings point to an improvement in the total paid amount as a consequence of the increase in the number of trade-licence holders and not as a result of the Execution Regulations. A look at the development of the Social Insurance debt will give us certainty in this conjecture.

Development in the number of debtors and debts of the social insurance agency

In general, the term debt is understood to be the right of a creditor to demand from the debtor the fulfilment of a certain liability arising from a legal relationship. The payment of insurance premiums for social insurance is a typical example of an obligation that persons are required to meet properly and on time according to the amendment of the Social Insurance Act. If an obligated person does not fulfil these obligations properly and on time, claims against him or her arise for the Social Insurance Agency, which are prescribed by a valid and enforceable decision of the Social Insurance Agency or a court. Expectations regarding the voluntary fulfilment of the levy obligation, although mandatory by all affected subjects, would be an exaggerated idealisation that would be realistically unachievable. This is one reason why application practice is forced to permanently create instruments to improve the efficiency of compliance with legal standards.

The state of the payment discipline in the Slovak Republic with regard to the payment of contributions to the Social Insurance Agency has been wanting in recent years.

Figure 3: Development of the total amount owed for social insurance of trade-licence holders*



* Written-off debts because the debt is less than 5 euros, the entity was deleted from the Commercial Register or the debtor died

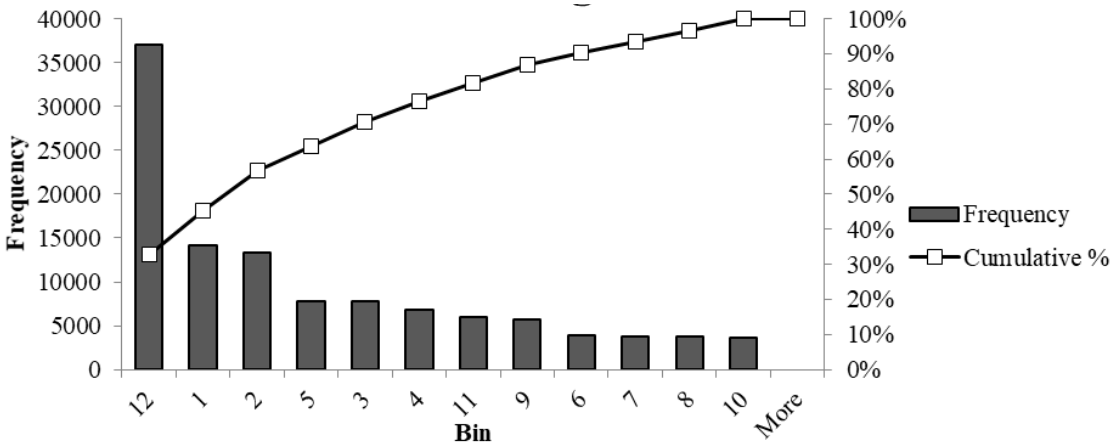
Source: Author´s own processing based on data from the Slovak Social Insurance Agency.

The second group of columns represents the owed amount from receivables recorded for the last five years in the Slovak Republic. This amount did not reach even half of the recorded receivables in any of the monitored years, and the lowest share occurred last year, 2022, which we will focus on in more detail in particular. In these contexts, we gain confidence that the Act No. 2/2017 Coll, did not bring the expected improvement in the collection of taxes and insurance premiums to the Social Insurance Agency.

Despite the targeted easing of conditions for trade-licence holders, even in 2022, a large number of debtors for taxes and contributions to the Social Insurance Agency were registered in the system. We will conduct a detailed analysis of debtors for the year 2022 at monthly intervals, which is the regularity with which trade-licence holders are obliged to pay levies.

The main vertical axis on the left side is the scale for the amount of debts owed for social insurance for the individual months of 2022, the axis on the right is the scale for the number of trade-licence holders who incurred debts for social security of more than 5 EUR during 2022. The use of two vertical axes is necessary due to the large disparity between the presented frequencies, which we want to show at the same time. During the entire year, the number of debtors fluctuated slightly around the value of 70,000, while their number declined slightly from August and at the end of the year stopped at almost the same level as at the start of the year. The real dynamics in the number of self-employed debtors/non-debtors was more intense than is visible from the monthly numbers on the graph, because the number of debtors that cancelled out one another cannot be identified; i.e. if a debt arose, for example, to five trade-licence holders and in the same month another five paid their claim, the resulting number of debtors remained the same.

Figure 4: Pareto's histogram of the duration of a trade-licence holder's debt in months 2022



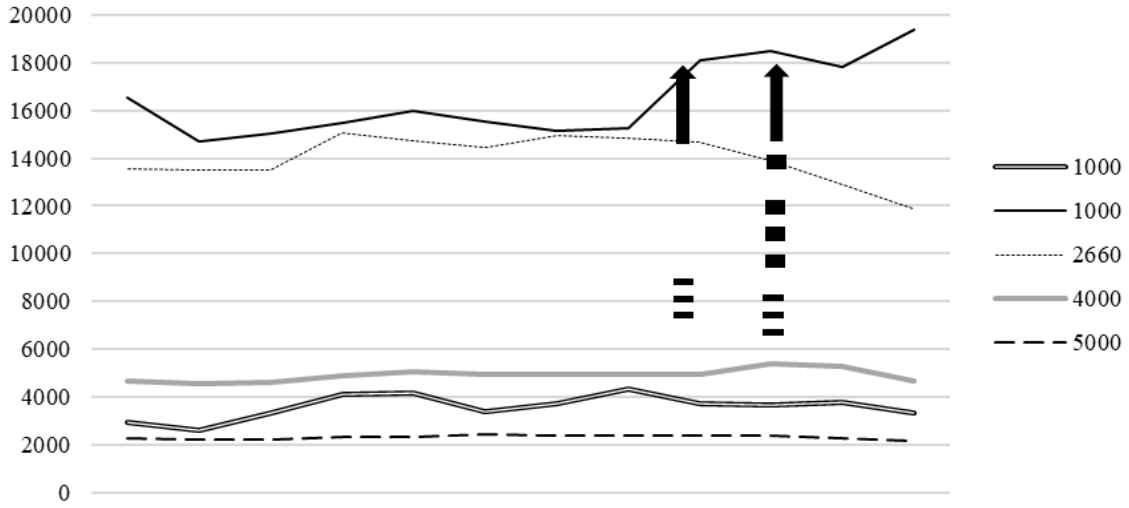
Source: Author´s own processing based on data from the Slovak Social Insurance Agency and the Cribis.

The CRIF Slovak Credit Bureau is the operator of the important information portal Cribis Universal Register, which provides a flexible range of monitoring of important information about companies, natural persons–entrepreneurs and natural persons with the possibility of continuously removing or adding monitored subjects and monitored information by the client. It contains a complete picture of the structure of the examined company, key persons in management, financial health, warning information and obligations of the subject in Slovakia and the Czech Republic. It is thus an effective tool for screening companies and individuals.

The largest group of debtors were year-round, i.e. in the duration of 12 months with the highest average debt of more than 3,200 EUR. This finding is a serious negative of the systematic transfer of tax and insurance premiums to the Social Insurance Agency, because long-term debtors not only overload the registration system of levies, but also act as a negative example for trade-license holders who do pay. The second research question was also not confirmed in this case. Among the most frequently occurring debts were short-term debts lasting one and two months, but they reached lower average debt values of around 300 EUR and were distributed relatively evenly throughout the entire year. These are for the most part formal non-payers due to a misunderstanding or forgetting, which is quickly corrected.

The following Figure 5 continues the overview of the number of trade-licence holders with debts of more than 266 EUR, which, according to the Criminal Code, represents the boundary for assessing the criminality of intentional behaviour.

Figure 5: Number of trade-licence holders by category of the amount owed for social insurance over 266 EUR



Source: Author´s own processing.

On the graphic representation of the development over time, shown in Figure 5, the dynamics of the changes in the top two curves in the shape of open scissors are of interest. The crossing of these development curves means the movement of trade-licence holders between the categories of the amount owed. The number of debtors with a liability of more than 266 EUR and less than 1,000 EUR (the most prominent upper curve shown by a double line) grew mainly due to the partial repayment of debts from a value of more than 1,000 EUR and less than 2,660 EUR (the solid curve below it), but also those who owed more than 2,660 EUR and less than 4,000 EUR (dotted curve) and more than 4,000 EUR and less than 5,000 EUR (dashed curve), such that their debt in the end remained less than 1,000 EUR. The number of debtors above 2,660 EUR in comparison to other categories of debtors, indicates significantly less effort, greater speculation or genuine insolvency to pay or reduce debts for social contributions. The horizontal, slightly wavy development curve during the entire twelve months of the year is testimony to this. The bottom three curves show "chronic" debtors, without significant changes, with the kind of debt they entered the calendar year with and which persisted throughout the year. Indicators of the efforts to pay or reduce the debt for social insurance appeared in the third quarter of 2022.

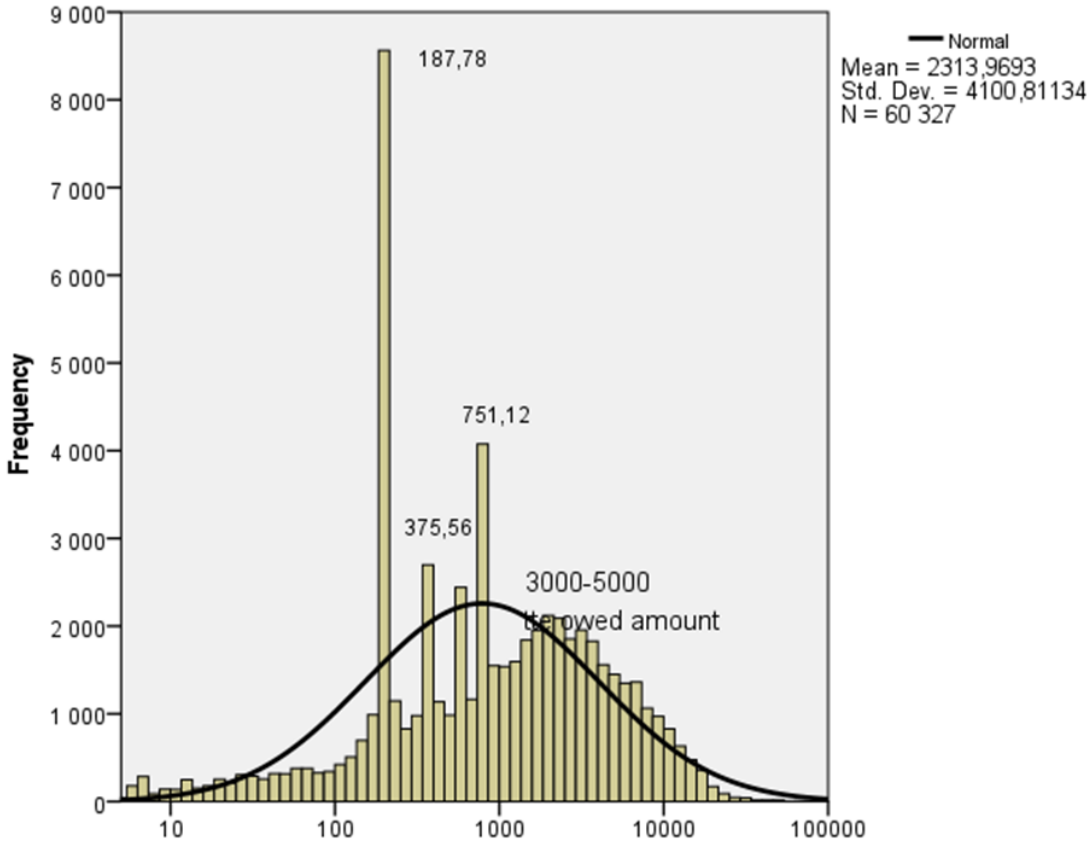
Repayment of social insurance premium debts

In further monitoring, to display the results, we chose a frequency analysis presented using a histogram of the number of debtors, which had a registered debt for social insurance premiums of at least 50 EUR in December. The horizontal axis of the histogram shows the

average amount owed, if they had debts for several months. With respect to the width of the interval of owed amounts and the large representation of small values up to 100 EUR, the logarithmic scale is much clearer than the linear scale, which is why we applied it to the figure. Persistent trade-licence holders are 60,327 whose total average debt exceeded 2,300 EUR. The distribution of these debtors is dispersed over the entire breadth of debt from 5 EUR to 100,000 EUR. There were also debtors for insurance premiums whose liabilities to the Social Insurance Agency reached nearly 100,000 EUR though not many of them. It is assumed that the creation as well as the disappearance of such a high debt for social insurance premiums took a long time, possibly even several years. The payment of the debt could have been preceded by administrative enforcement, or enforcement by an executor or by criminal proceedings, as a consequence of which such a large amount was paid. The significant decrease in premiums owed could also have occurred as a result of the Social Insurance Agency transferring the debts of debtors in bankruptcy to Slovenská konsolidačná, a.s. With the assignment of such debts, the insurance premium owed is considered paid.

The high number of debtors with a debt of 187.78 EUR (the minimum contribution to social insurance for 2022) and its multiples (double to 375.56 EUR triple to 563.34 EUR and quadruple to 751.12 EUR) significantly stand out over the other almost evenly distributed numbers. The most common arrears of this group of debtors was a one-time or repeated failure to pay the minimum contribution to the Social Insurance Agency. Unlike the previous groups, the growth in the number of debtors continuously climbed to higher values at the level of 3,000 to 5,000 EUR from which the numbers began to steadily decline.

Figure 6: Distribution of trade-licence holders with social insurance debts in December 2022



Source: Author´s own processing based on data from the Slovak Social Insurance Agency.

Discussion

With amendment to the Social Insurance Act in 2022, the Social Insurance Agency shall waive or not impose a penalty on debtors, if they pay their debt by 31 August 2023 at the latest. The condition for the penalty forgiveness is the payment of the entire due insurance premium at once. The adjustment applies to debts incurred during the insurance period prior to 1 July 2022 without limitation of the past. In our case, this exceptional legislative instrument should affect trade-licence holders from the third monitored group (more than 60,000 persons), so long as they became

debtors by 1 July 2022 and have not yet paid their debt. Because this involves debtors whose debt was largely carried over from 2021 or earlier, the general amnesty will affect the majority of them. The debts that we based our analysis on do not include the amount of the prescribed penalty[3]; therefore, the amount of the debt registered of these trade-licence holders should be higher if the penalty is included. From the average total debt 2,314 EUR the penalty for one year of non-payment would total approx. 461 EUR and 1,017 EUR for two years. The purpose of the increasing penalty on a daily basis is to motivate debtors to repay the debt quickly.

In the case of a true inability to pay the debt, for example, as a consequence of pressure to engage in self-employment during the coronavirus pandemic or insufficient assistance, high penalties can represent a liquidation issue. Penalties falling under the general pardon should preliminarily total approximately 885 million[4] EUR. With estimates of the development of paying debts to the Social Insurance Agency in 2023, it will evidently be possible to collect debts that would have otherwise remained unpaid without the effect of the general pardon, at the price of the forgiveness of the penalty.

From a long-term view, the selected solution has a non-systemic and demotivating impact not only on honest and timely paying trade-licence holders, but also on those who are less responsible. Based on the experience of previous[5] general pardons, expectations may arise for the repetition of penalty forgiveness in the following years, and it will become hard to define the limits of tolerance. In these cases, the tactic of waiting proved to be more beneficial for the individual. Furthermore, there is quite often in practice an actual prolongation of the recovery and satisfaction of a debt for several months; that is, in today's system, a delay contrary to the penalty calculation mechanism is tolerated. For these reasons, we consider the set system of gradation of penalties on a daily basis to be demotivating and dysfunctional.

[3] According to the Social Insurance Act, the Social Insurance Agency is obligated to impose a penalty on the debtor, namely in the amount of 0.05% of the amount owed for each day of delay from the date the premium is due until the day when the owed amount was transferred to the account of the Social Insurance Agency in the State Treasury, paid in cash or until the day of the start of the inspection. A claim for a penalty arises only when this amount is prescribed by a decision. The Social Insurance Agency will send the debtor a decision on the imposing of a penalty, the amount of which he or she is obligated to pay within the specified period.

[4] Social Insurance Agency. Until the end of August 2023, debtors will be able to use the so-called general pardon (penalty waiver) available online: https://www.socpoist.sk/najdolezitejsie-zmeny-v-socialnom-poisteni-od-roku-2023 (Accessed: 10. 01.2023).

[5] Forgiving of the obligation to pay penalties for debts to the Social Insurance Agency was approved in 2008 and 2010.

Conclusion

As a result of the financial and energy crisis, a noticeable increase in social issues is evident, and thus the importance of the social policy securing the population is also increasing. The state can provide social security to its citizens to the extent that they actively take part in it. The role of the state is not only to manage public funds economically, but also to create a functional legal environment and to have coercive means that would lead to respect for tax and social contributions. The social insurance system in Slovakia has undergone many changes, and since its inception it has been adjusted several times. The study reflects on the continuing problem of the disproportionate amount of Social Insurance debts in Slovakia for the recent period in relation to trade-licence holders. With 120,000 participants in the proceedings in 2022, it is hard to distinguish who does not pay their social insurance contributions because they do not want to or who cannot, because the payment of debts could have particularly adverse consequences for that person or his/her family members. We pointed in our results to some 60,000 participants in the proceedings who did not comply with the social insurance levy system the whole year 2022 and more and perhaps some even knowingly abused the overload of control mechanisms. A year-long or multi-year persistence of debt to the Social Insurance Agency is a sign of the non-functioning of the tax and insurance premium payment system as a whole. With effect from 1 July 2017, the collection of receivables from debtors is managed and preferably carried out by the Social Insurance Agency itself as an official duty. The study results did not show an improvement in the enforcement of collecting levies; rather the opposite. The introduction of this administrative exercise was considered a significant legislative change in the processes of social insurance administration; however, upon analysing it, we determined that it did not actually bring measurable results in practice.

With one of the last legislative amendments from 2020 natural persons with income from business and other self-employment, as well as legal entities, gained the opportunity to claim a linear tax rate of 15% after meeting the stipulated conditions. The reaction to this change is a jump in the number of trade-licence holders at the expense of employees, for whom the employer is obligated to pay more than double the tax and insurance premiums to the Social Insurance Agency. Results of the article point out many real world problems that arise with controlling how tax and social security contributions obligations are fulfilled, specifically in the non-formal sector of the economy.

The answer to the third question examined and proof that the penalty for late payment of tax and insurance does not work as a motivating factor is the

repeated declaration of a general pardon (most recently in 2023), by which the payment of the penalty under the conditions mentioned in the discussion was waived.

The harmonisation of expenditures is a natural effort of trade-licence holders, employees and employers, who cannot be reproached by anyone, as long as they respects the boundaries defined by the law. We would not seek a solution in this situation in increasing or decreasing the tax burden on trade-licence holders (78% of all paying trade-licence holders pay minimum taxes) but in more consistent enforcement of the set rules, where we see the greatest deficiency.

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COMPLEX PENSION PRODUCTS: A MULTIDIMENSIONAL APPROACH[1]

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Abstract

The study analyzes and assesses the economic and linguistic complexity of individual retirement products in Poland. For this purpose, an original multidimensional approach was used and various research methods were applied. We analyzed 75 out of 86 individual pension products (IKEs and IKZEs) offered in Poland in the first half of 2017, covering our analysis of nearly 90% of Poland's market of individual pension products. We performed the nonparametric Spearman's rank correlation analysis, we used hierarchical cluster analysis, analysis of variance, and a chi-square test to verify if there was a statistical relationship between the clusters and the type of financial provider and the type of individual pension product (IKE or IKZE). We also built also a map of the products that shows their economic and linguistic complexity. We find that high-fee products tend to have the most complex fee systems, suggesting that the complex fee system may be a strategy used by the providers of individual retirement products. Our results also indicate that individual retirement products are too complex for most individuals.

JEL classification: J3, G53, O16

Keywords: Supplementary Pension Plans, Individual Retirement Accounts, Linguistic Complexity, Economic Complexity, Investments

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Introduction

Well-being in retirement depends on many choices regarding both the final stage of the disposition of wealth at retirement (Clark et al., 2019), and also earlier when people make crucial decisions about saving for retirement (McKenzie & Liersch, 2011). Managing pension savings has economic (e.g. source of contributions, expected value on the savings account) and personal dimensions (e.g. risk aversion, preferences on portfolio composition) (Konicz & Mulvey, 2015). Pension reforms around the world shifted the financial risk onto consumers, increasing the importance of individual choice. With a larger role of defined-contribution (DC) plans in pension systems than defined-benefit plans, future pensioners are exposed to greater risk (Vickerstaff & Cox, 2005; Hinrichs, 2021, Gierusz et al., 2022). Wealth accumulation under DC plans depends on how the participant allocates assets across different investment options (Poterba et al., 2007). The expansion and innovation of financial markets have increased the importance of finance, financial markets, and financial institutions to the workings of the economy (Gerald & Suntae, 2015; Hodula & Ngo, 2022). In aging societies, retirement savings are one of the most important financial assets. Thus, these changes have led to the importance of such factors as cost efficiency in pension plans and their simplicity for participants. Bikker et al. (2012) point out that complex financial products raise costs and affect financial market returns. However, some other authors found that although financial markets are often an example of growing complexity in the modern world, this complexity may lead to innovations in the market (Wieland, 2015; Farmer et al., 2012).

The market for supplementary pension plans is often complicated in its institutional structure and products offered. This complexity might cause problems for individuals when they make decisions about supplementary pension saving, especially when potential savers want to compare individual pension products. Decision-making difficulty occurs because these products come in a wide variety of forms. Potential investors choose from many pension fund options with different risk profiles and complex fees (Harrison et al., 2006; Turner, 2013; Samborski & Turner, 2015; Rutecka-Góra, 2019; Rutecka-Góra et al., 2020; Dziawgo, 2022). For individuals, complexity arises at the extensive margin, which relates to the range of products, and at the intensive margin, which relates to the complexity of each product.

Decision-making in Poland becomes even more problematic given the low level of Poles' financial knowledge and financial literacy. Pieńkowska-Kamieniecka et al. (2021) found that men, people well-educated and living in cities have higher knowledge of pension issues. At the extensive margin, they might decide not to participate in supplementary pension schemes because they find the decisions to be too complex. At the intensive margin, individuals might purchase inappropriate products that do not fit their needs. A provider might intentionally design complex products and services to make it difficult for potential clients to research across competing products or services. High-fee or high-priced providers sometimes use this strategy (Turner, 2013; Muller & Turner, 2016; Cash & Tsai, 2018). Complexity raises the individual's costs to search for pension products, making it less likely that the potential client will choose a lower-priced competitor.

This study analyses the complexity of individual supplementary pension products in Poland. For economic complexity, we base our analysis on data from the supplementary pension products market in Poland. The assessment of linguistic complexity uses data from the study by Rutecka-Góra et al. (2020) however, we present our synthetic index of linguistic complexity. We also study in more depth the details that increase the economic complexity of retirement contracts.

Following the introduction, Section 2 provides a literature review of supplementary pension schemes and their complexity for individual savers. This section describes the basic characteristics of individual retirement plans in Poland and presents the Poles' levels of financial knowledge and pension awareness. Section 3 describes the data and methodology for analysing the economic and linguistic complexity of individual pension products. Section 4 reports the empirical results, and Section 5 discusses them. Section 6 provides our conclusions.

Literature review

Research background

With the development of the Polish financial market over time it has offered increasingly diverse financial products that can improve people's financial situations in old age. However, the complexity of these products for participants might diminish the positive economic results of these advances (Cwynar, 2020). Only a few empirical analyses cover the functioning of supplementary pension provision in Central and Eastern European countries (e.g. Szczepański, 2010; Rutecka-Góra et al., 2020; Chłoń-Domińczak et al., 2020). This is due to problems with microdata availability on the functioning of supplementary pension systems and individual pension decisions made by participants in the system.

Some studies assess the financial literacy and motivations of pension participants, specifically looking at pension planning and attitudes about security in old age (e.g. Pieńkowska-Kamieniecka et al., 2021; Rutecka

-Góra & Pieńkowska-Kamieniecka, 2023). However, these studies do not address the complexity of financial market products concerning the financial knowledge of individual savers.

The complexity of individual pension products can be analysed in several dimensions (Turner, 2013; Rutecka, 2014; Muller & Turner, 2016; Rutecka-Góra et al., 2020). These dimensions include the complexity of the supplementary pension system's architecture; the variety of available financial instruments within a scheme; the financial mechanisms of pension products; the complexity of the language and structure of contracts; the fee structures; and the tax incentive system.

Individual pension plans in Poland's old -age pension system

Supplementary old-age pension schemes in Poland consist of individual and collective schemes. Both types of schemes are very important for providing individuals with adequate benefits in old age because the public DC pension system offers relatively low replacement rates amounting to 38.2% and 32.1% for men and women respectively (Szczepański et al., 2022).

In this paper, we focus on information complexity in the supplementary individual pension plans in Poland. Third-pillar individual pension saving schemes take the form of individual retirement accounts (IKE in Polish) and individual retirement security accounts (IKZE in Polish), which were introduced in 2004 and 2012, respectively. All individual pension product contracts are voluntary. An individual can have only one IKE plan and only one IKZE plan. There is no official data on how many individuals have both IKE and IKZE accounts. Official statistics report only that at the end of 2002 the coverage rate was 4.78% for IKE and 2.84% for IKZE (Commain et al., 2023). The key differences between IKE and IKZE plans are their tax treatment and contribution limits. In IKE plans, the tax treatment is TEE, meaning that contributions are taxed but investment earnings and benefit payments are tax-exempt. In IKZE, the tax regime is EEt, meaning that contributions and investment earnings are exempt and that benefit payouts are taxed at a reduced rate, as indicated by the lowercase t. Thus, IKZE plans receive more favorable tax treatment than IKE plans. IKE plans, however, have a considerably higher contribution limit than IKZE plans. The cap on annual contributions in IKE plans is 300% of the monthly average wage (20,805 PLN in 2023, or about 44,749 USD). In IKZE plans, the cap is 120% of the monthly average wage (8,322 PLN, or about 1,900 USD) (more: Rutecka-Góra & Rutkowska-Tomaszewska, 2023).

The complexity facing pension participants arises in part because Poland has five different types of pension investment providers, each providing different types of investments. The types of pension providers and investments are explained below.

Table 1: IKEs and IKZEs assets by pension fund provider at the end of 2017

	Life insurance companies	Investment fund companies	Banks	Pension fund companies	Brokerage house companies	Total
Number of companies	16.00	20.00	8.00	14.00	8.00	66.00
Assets (mln PLN)	3,137.27	3,166.80	1,379.36	1,687.95	296.80	9,668.18
% of assets	32.45	32.75	14.27	17.46	3.07	100.00
Average assets per company (mln PLN)	196.08	158.34	172.42	120.57	37.10	146.49

Source: The Polish Financial Supervision Authority (UKNF) https://www.knf.gov.pl/knf/pl/komponenty/img/IKE_IKZE_12_2017_61392.pdf (Accessed: 02.01.2024).

In all of the investment products available to participants in IKE and IKZE plans, the investment risk is borne entirely by the participant. Table 1 provides data on the different types of pension providers. Table 2 summarizes the different types of fees.

Table 2: Types of fees charged by different types of pension providers

Type of fee	Life insurance companies	Investment fund companies	Banks	Pension fund companies	Brokerage companies
Account opening fee	X	X			
Fee on contributions	X	X		X	
Management fee	X	X		X	X
Loyalty fee discount		X		X	
Handling (transaction) fee		X			
Asset transaction fee					X
Early termination fee	X	X	X	X	X

Source: Authors' research.

Life insurance companies

The IKE and IKZE market is dominated by life insurers and investment fund companies. These firms manage roughly 85% of the individual retirement accounts. Individual retirement accounts (IKE) and individual retirement security accounts (IKZE) offered by life insurance companies are unit-linked life insurance policies that combine the insurance and saving functions.

All of the products we analysed allow pension savers to choose funds from an array of insurance capital funds (UFKs) with different risk profiles. The insurance products have an extensive fee system that makes it difficult for most people to compare their fees. The fee system includes an account opening fee, a fee on contributions, a management fee sometimes charged by the insurance company and the investment fund companies that manage the fund, and a liquidation fee if the participant terminates the contract within twelve months of its start. The institutions also can collect other fees related to the high volatility of the investment portfolio, but also a conversion fee and a fee if the participant changes the premium allocation.

Investment fund companies

Individual pension products offered as investment funds by investment fund companies (TFI) operate similarly to insurance capital funds. A saver can choose more than one fund. The contributions, after fee deductions, are used to purchase units of investment funds with various risk profiles. The number of available funds varies considerably among institutions, up to as many as thirty.

Products offered by investment fund companies have an even more complex fee system than products offered by insurance companies. In addition to a fee on contributions, a management fee, and a liquidation fee, some providers charge a fee for opening an account. Some charge a handling fee based on the difference between the purchase or sale price of the unit and its current value. The handling fee means that the participant buys (or sells) the units of the investment/insurance fund at a price that is higher (or lower) by a certain percent than the current value of a unit. It may apply only to purchase or only to sale or to both.

Some institutions also have loyalty programs that offer lower fees. The reduction in fees depends not only on the saving period or tenure with the plan, but also on the amount savers spend in fees and premiums and on the saver's age. Loyalty programs with these complex structures can make it even more difficult for individuals to understand and compare the fees for these products.

Banks

Savings accounts offered by banks as IKEs or IKZEs are among the most conservative of the investment products. They are offered with a variable interest rate. However, the methods of setting the interest rate and of calculating the interest require savers to understand various capitalisation practices (e.g., annual capitalisation versus daily capitalisation). These products do not have distribution and management fees, except a possible fee for terminating a contract within twelve months since its start (Rutecka-Góra, 2021).

Pension fund companies

Pension fund companies (PTE) offer IKEs and IKZEs for investing the pension savings contributed by individuals. Almost all pensions fund companies offer only one voluntary pension fund with an active allocation

strategy. The system of fees is much less complex than for those charged by life insurance companies and investment fund companies. Pension fund companies charge a fee on contributions and asset management fees, both fixed and variable.

Brokerage companies

The most complicated and most flexible mechanism available for IKEs and IKZEs is a security account in a brokerage house. It allows the participant to invest pension savings directly in publicly traded securities and fit the investment portfolio to individual needs. However, this option is for people with high levels of financial knowledge and competence. The cost can also be high. The individual is charged for transaction costs relating to buying and selling assets. A saver can avoid those fees by investing in fixed-rate or inflation-based government bonds through a brokerage house. In this case, the cost structure includes an account management fee and sometimes a liquidation fee.

Data and methodology

Data

We analyse 75 out of 86 individual pension products (IKEs and IKZEs) offered in Poland in the first half of 2017. These products were offered by 10 life insurance companies (14 products), 15 investment fund companies (30 products), 9 banks (9 products), 8 pension fund companies (12 products), and 6 brokerage houses (10 products). The 75 products included 43 IKEs and 32 IKZEs, covering nearly 90% of Poland's market of individual pension products. Products for which contract terms were unavailable online or by email with providers were excluded.

Linguistic complexity

We assess the linguistic and economic complexity of individual retirement products. For linguistic complexity, we studied three dimensions of key documents: the transparency level, FOG index, and difficulty class.

First, the transparency level (Table 3) measures how text formatting influences the reader's perception of a text's complexity. We used a transparency measure proposed by Rutecka-Góra et al. (2020) as well as Hadryan and Rutecka-Góra (2023). It takes into account formatting features of written contracts. For example, a text is less complex if the font size is at least 10 points and if paragraphs have a maximum of 15 lines. The measure also applies to the analysis of graphics (e.g. headings, graphs, tables), metatext (e.g. table of contents, summary), and direct phrases (e.g. sign the contract). The maximum number of points is five (one point in each of the above areas), which would mean that product documentation is fully transparent.

Table 3: Transparency level measure

Total points granted (for font size, structure, graphics, metatext, and direct phrases)	Level of text transparency
0-1	Very low
2	Low
3	Medium
4	High
5	Very high

Source: Authors' research based on Rutecka-Góra et al. (2020) as well as Hadryan and Rutecka-Góra (2023).

Among the analysed products, only two received five points (high transparency). The rest scored three or less, with most scoring less than three, which means low or very low transparency.

The second measure of linguistic complexity we used is the FOG index (Gunning, 1952). This index measures the complexity of text based on sentence length and word difficulty. In Polish, words considered difficult are those consisting of four or more syllables (In English, the FOG index considers words of three or more syllables as difficult). The FOG index score indicates how many years of education are necessary to understand a text. It is calculated according to the following formula (Gruszczyński & Ogrodniczuk, 2015):

$$T = 0.4 * (T_w + T_s) \quad (1)$$

T_w is the average number of words in a sentence, and T_s is the percentage of difficult words in a text.

The third aspect of linguistic complexity is the difficulty class, which we measured using the Jasnopis application. Polish linguists and psychologists created this in 2015 (Gruszczyński & Ogrodniczuk, 2015). This measure is much more comprehensive than the FOG index because it includes 20 measures of text complexity and is based on psycho-linguistic studies of Poles. For example, it includes nouns-to-all-words ratio, verbs-to-all-words ratio, nouns-to-verbs-ratio, the average paragraph length, the average word length and the average sentence length. According to its assumptions, individu-

al pension products have ranged in difficulty class from one to seven in relation to the stages of education in Poland required to understand a given text, as explained in Table 4. Most were rated as six or seven in difficulty.

Table 4: Difficulty class of the texts determined by the Jasnopis application

Class	Characteristics	Indicative stage of education
1	Extremely easy text	Primary school grades 1-3*
2	Very easy text	Primary school grades 4-6*
3	Easy text, understandable for the average Pole	Junior secondary school*
4	Somewhat more difficult text	Secondary school*
5	More difficult text	Bachelor's/Engineering degree
6	Difficult text for the average Pole	Master's degree
7	Text very complicated/professional, whose understanding requires specialist knowledge	Doctoral degree or specialisation in the field of the text

*According to the stages of education in Poland organised before education reform in Poland in 2017

Source: Gruszyński and Ogrodniczuk (2015).

To assess the total value of the linguistic complexity, we added the scores for difficulty class (dc), FOG index, and the transparency level (tl). However, in the case of the transparency level, we first multiplied the scale by -1 to adjust it to the other two parameters. A higher value of the linguistic complexity index (LCI) parameter indicates a less understandable text.

$$LCI = dc + FOG\ index - tl \quad (2)$$

A higher value of the linguistic complexity index means that the pension product text was less understandable for the participant. Considering the ranges of the components of the formulas shown above, we assigned the following interpretation of LCI level as a measure of linguistic complexity:
- less than 10 - very low,
- 10 - 12.99 - low,
- 13 - 15.99 - average,
- 16 - 18.99 - high,
- 19 and more - very high.

Economic complexity

In our study, the economic complexity index (ECI) is the sum of the ratios for four features: 1) the complexity of the economic mechanism (c_{em}); 2) the number of funds available within a given product (nf); 3) the complexity of the rules determining the rate of return (c_r); and 4) the complexity of the fee system related to a product (c_f), counted as the number of fees charged, except a cancellation fee. We exclude the cancellation fee because it is not part of the ongoing fund fee structure.

$$ECI = c_{em} + nf + c_r + c_f \quad (3)$$

In each of the above aspects of economic complexity, we assigned points on the scale according to the criteria shown in Table 5. As with the linguistic complexity index, a higher sum of points indicates a more economically complex retirement product.

Table 5: The points scale in particular categories of economic complexity index (ECI)

Complexity of the economic mechanism	Number of funds available	Complexity of the rules determining the rate of return/interest rate	Complexity of a fee system (number of fees charged)
0 - a bank account 1 - one pension fund 2 - a portfolio of investment funds 3 - a unit-linked life insurance 4 - an account in a brokerage house (direct investing in financial markets)	0 - 1 fund 1 - 2-5 funds 2 - 6-20 funds 3 - more than 20 funds 4 - all instruments available on the market	0 - fixed rate or a rate based directly on external indexes (clear mechanism, e.g. 40% of index A) 1 - a rate of return resulting directly from the market prices of financial instruments 2 - rate depending on the decision of financial provider representatives, even if related to some extent to external indices	0 - no fees (except cancellation fee) 1 - only one fee (usually management fee) 2 - two fees 3 - three fees etc.

Source: Author's own research.

Statistical methodology

To better understand the economics of complexity of pension products, we investigate if and how the costliness of individual pension products relates to their economic and linguistic complexities. We also investigate whether there is a relationship between economic and linguistic complexity, which might suggest a marketing strategy of complexity, perhaps to increase participants' search costs across products.

In our analysis, we first standardised the linguistic and economic complexity measures. We calculated the linguistic complexity index and economic complexity index for each product using the formulas and scales described above. Then we used hierarchical cluster analysis to determine which products were similar and how many product groups we could distinguish. The results demonstrated the possibility of three or four such clusters. In the next step, using the k-means clustering method, we chose a variant with four clusters. Then, using analysis of variance, we checked to see if the clusters differed in terms of the mean values of the variables. Then we did a chi-square test to verify if there was a statistical relationship between the clusters and the type of financial provider and the type of individual pension product (IKE or IKZE).

Finally, we verified if and how the costliness of individual pension products related to their economic and linguistic complexities. We also checked to see if there was any relationship between economic and linguistic complexity. We performed the nonparametric Spearman's rank correlation analysis. We used the following variables for the analyses of dependence: cost ratio (CR), the economic complexity index (ECI), and the linguistic complexity index (LCI).

The cost ratio is the ratio of fees to contributions. We calculated the cost ratio for five years (see: Pieńkowska-Kamieniecka et al., 2021). We considered three types of fees charged by voluntary pension funds, asset management companies, and life insurance companies. These are fees for opening an account, fees on contributions, and management fees. In the case of banks, where saving is cost-free, we used the cancellation fee charged by banks if the pension account was closed within the first year of its opening. We assessed the costliness of individual pension products by using the level of fees charged by financial institutions in the first half of 2017.

Correlation analyses were conducted separately for banks, voluntary pension funds, investment management companies, and life insurance companies. We excluded brokerage houses due to the lack of data on investment portfolios and behaviors of individual savers that made costliness assessments impossible.

Empirical results

Our examination of 75 retirement products finds that the majority of them are very complicated in linguistic and economic terms (Table 6 and Table 7) with average linguistic and economic complexity levels, in points, 19.38 and 7.27, respectively (Table 8). We discuss these results in this section.

Table 6: Linguistic Complexity Index (LCI) – number of products in each class by type of provider

Level of complexity (LCI score)	Life insurance companies	Investment fund companies	Banks	Pension fund companies	Brokerage house companies	Total
Very low (less than 10)	0	1	0	0	0	1
Low (10 - 12.99)	0	0	0	0	0	0
Average (13 - 15.99)	2	2	0	5	2	11
High (16 - 18.99)	2	7	0	1	3	13
Very high (19+)	10	20	9	6	5	50

Source: Author's own research.

Table 7: Economic Complexity Index (ECI) – number of products in each class by type of provider

Level of ECI (score)	Life insurance companies	Investment fund companies	Banks	Pension fund companies	Brokerage house companies	Total
Very low (0-2)	0	0	9	0	0	9
Low (3-5)	0	0	0	12	0	12
Average (6-8)	7	26	0	0	0	33
High (9-11)	7	4	0	0	0	11
Very high (12+)	0	0	0	0	10	10

Source: Author's own research.

Table 8: General characteristics of the basic values of the linguistic complexity index (LCI) and economic complexity index (ECI) of the individual pension products*

Specification	Min.	Max.	Av	SD	LI	IFC	BH	B	PFC
LCI	9.63	24.06	19.38	2.94	19.29	20.04	18.8	20.46	17.54
ECI	0.00	18.00	7.27	3.75	8.36	7.37	14.4	1.11	4.42

*LI - life Insurers, IFC - Investment Fund Companies, BH - Brokerage Houses, B - Banks, PFC - Pension Fund Companies

Source: Author's own research.

When analysing the linguistic complexity of individual pension products by the type of institution, the lowest level (9.63) was for a product offered by an investment fund company, and the highest level was for insurance products (24.06). The average level of 19.38 is a high level of linguistic complexity.

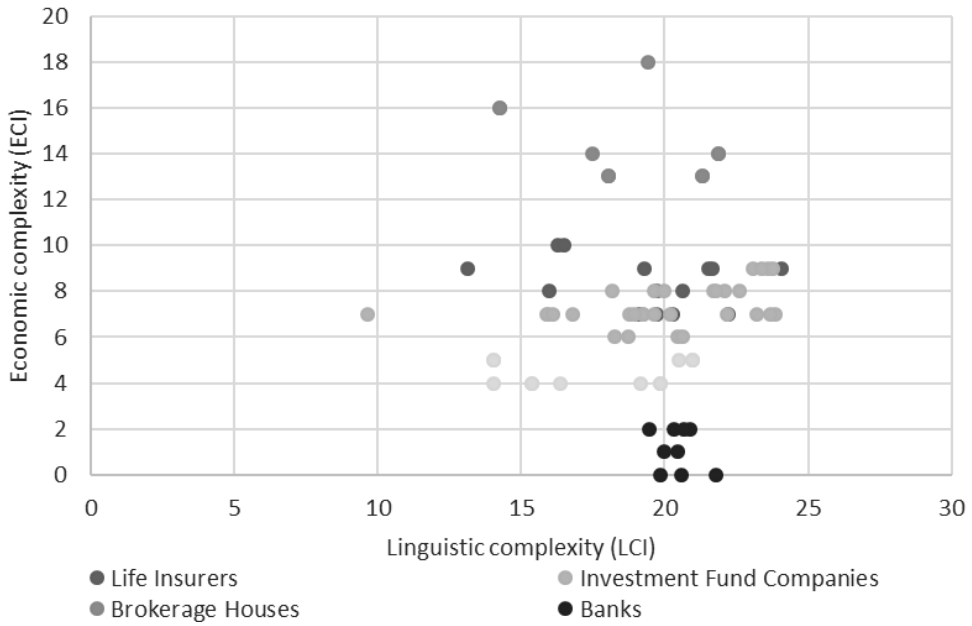
For economic complexity, the lowest value was for a bank product (0.00) and the highest was for brokerage houses (18.00). The average level of economic complexity was 7.27. Thus, we find a higher level of linguistic complexity than economic complexity. The products are more complex in their linguistic presentation than in their economic structure.

For the linguistic complexity by type of product (IKE, IKZE), the number of points ranged from 9.63 to 23.08 for IKE, and from 13.15 to 24.06 for IKZE. For the economic complexity index of individual pension products, it ranged from 0.00 to 16.00 for IKE, and from 2.00 to 18.00 for IKZE. Thus, the more popular IKE contracts are slightly more readable and less complex. However, both types of retirement products have large variations among the values of the indicators of linguistic and economic complexity for the same products. This result suggests that much of the complexity is unnecessary.

In the next step, we analysed the scatter diagram of the data showing the linguistic complexity index and the economic complexity index for every retirement product we examined. First, we analysed the linguistic complexity LCI and economic complexity ECI of each individual pension product concerning the type of financial provider (Figure 1).

Our findings show that the pension products offered by banks have low economic complexity but the documents explaining them have a relatively high linguistic complexity. Pension products provided by brokerage houses have a relatively high degree of economic complexity and varying degrees of linguistic complexity. Overall, there appears to be no relationship between economic complexity and linguistic complexity, so economic complexity can be explained with simple language and lack of economic complexity can be explained with complex language.

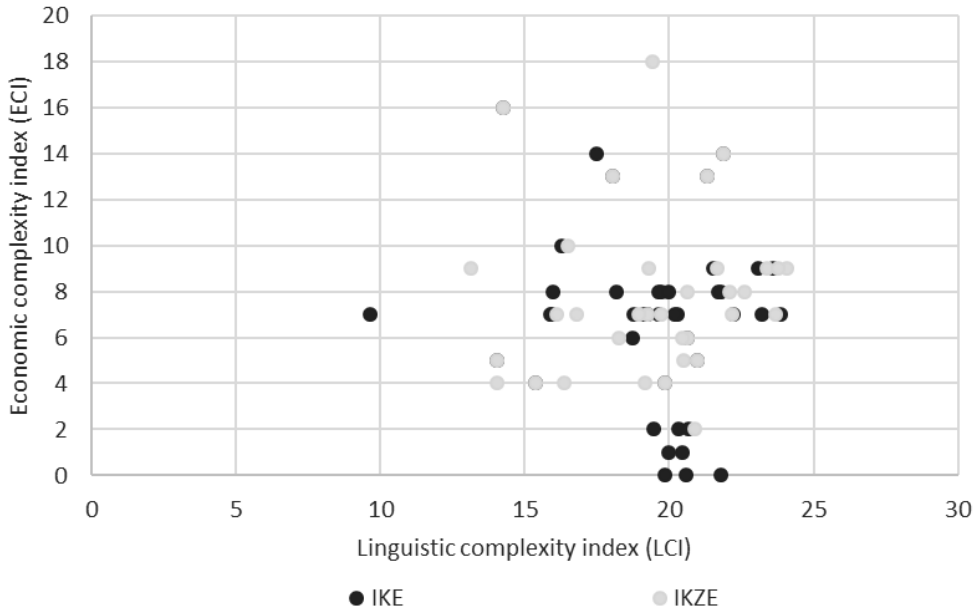
Figure 1: Linguistic vs economic complexity of individual retirement products by type of financial providers in Poland, 2017



Source: Author's own research.

Figure 2 suggests that the IKE plans tend to have lower economic complexity than the IKZE plans, and there appears to be no relationship between plan type and linguistic complexity. As mentioned earlier, IKE plans have a considerably higher contribution limit than IKZE plans and thus are designed for higher-income workers, who presumably have higher levels of financial literacy. This finding suggests that more complex plans are provided to workers with lower financial literacy. However, this is not supported by the cluster analysis.

Figure 2: Linguistic and economic complexity of individual retirement accounts (IKE) vs. individual retirement savings accounts (IKZE) in Poland in 2017



Source: Author's own research.

In the next stage of our study, we examined whether it is possible to create groups of individual pension products that are similar within groups but differ across groups in their linguistic and economic complexity. The cluster analysis reveals four groups (Table 9), and the analysis of variance indicates that the average values of variables are significantly different ($p < 0.05$) between them (Table 10).

Table 9: The results of the clustering pension products into similar groups

Specification	Cluster 1	Cluster 2	Cluster 3	Cluster 4
LCI	-0.19833	0.29262	-1.48191	0.54475
ECI	1.90401	-1.45025	-0.19574	0.03418
N	10.00000	12.00000	15.00000	38.00000

Source: Author's own research.

Table 10: The analysis of variance

Specification	Between Sum of Squares		Within Sum of Squares		F	p-value
	Mean square	df	Mean square	df		
LCI	15.213	3	0.399	71	38.084	0.000
ECI	20.704	3	0.167	71	123.636	0.000

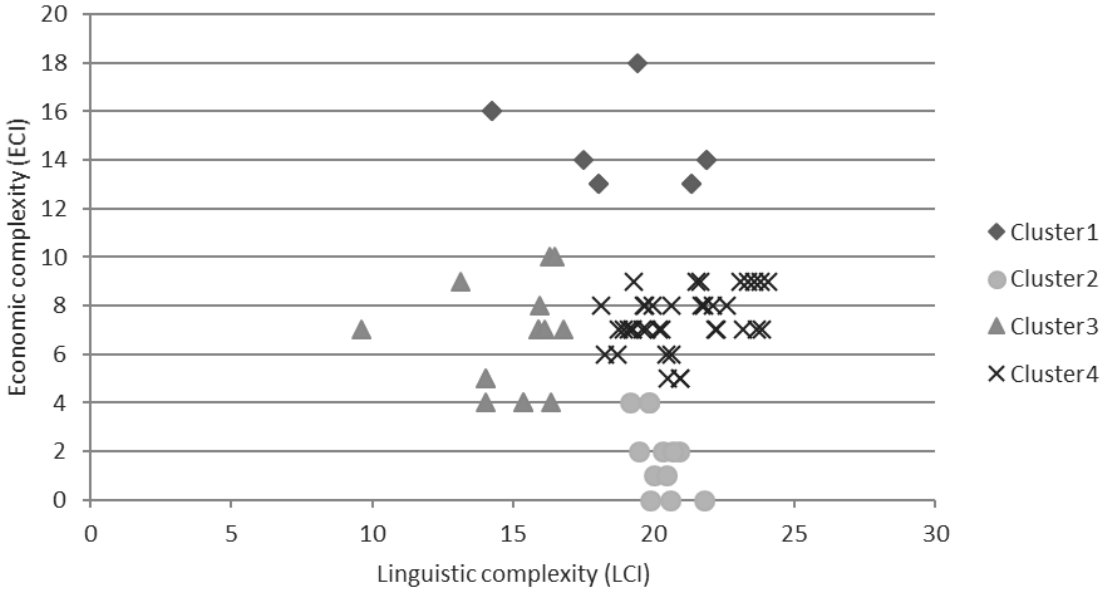
Source: Author's own research.

We found that the first group of individual pension products contains IKE and IKZE plans slightly less complicated linguistically and much more complicated economically (low LCI, high ECI) than their average values. The second group contains products characterised by higher linguistic complexity and much lower economic complexity (high LCI, low ECI). The third group contains simpler individual pension products economi-

cally and especially linguistically (low LCI, low ECI). The fourth group contains products more complex than their average values in both linguistic and economic complexity (high LCI, high ECI).

We also present the results of the cluster analysis on a map. It shows the proximity of the groups of individual pension products (Figure 3).

Figure 3: The results of cluster analysis for IKE and IKZE products



Source: Author's own research.

Table 11: The structure of clusters according to the products offered by various institutions

The type of the institution	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Banks	0.0%	75.0%	0.0%	0.0%
Brokerage houses	100.0%	0.0%	0.0%	0.0%
Voluntary pension funds	0.0%	25.0%	40.0%	7.9%
Investment fund companies	0.0%	0.0%	33.3%	65.8%
Life insurance companies	0.0%	0.0%	26.7%	26.3%
Total	100.0%	100.0%	100.0%	100.0%

Chi-square = 142.515; p - value = 0.000; V - Cramer = 0.796

Source: Author's own research.

Next, we find statistically significant associations between clusters and the types of financial providers (Table 11).

There is intermediate diversity within investment fund companies and life insurance companies, with both offering pension products in two cluster groups. By contrast, voluntary pension funds offer products in three different cluster groups, which makes these funds the most diverse financial institution group. In these diverse groups, we argue that complexity may be a strategy adopted by some of the companies.

Table 12: Distribution of financial institutions by cluster

Type of financial provider		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Banks	Number of products	0.0	9.0	0.0	0.0	9.0
	% of products by cluster	0.0%	100.0%	0.0%	0.0%	100.0%
Brokerage Houses	Number of products	10.0	0.0	0.0	0.0	10.0
	% of products by cluster	100.0%	0.0%	0.0%	0.0%	100.0%
Pension Fund Companies	Number of products	0.0	3.0	6.0	3.0	12.0
	% of products by cluster	0.0%	25.0%	50.0%	25.0%	100.0%

Type of financial provider		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Total
Investment Fund companies	Number of products	0.0	0.0	5.0	25.0	30.0
	% of products by cluster	0.0%	0.0%	16.7%	83.3%	100.0%
Life Insurers	Number of products	0.0	0.0	4.0	10.0	14.0
	% of products by cluster	0.0%	0.0%	28.6%	71.4%	100.0%
All providers	Number of products	10.0	12.0	15.0	38.0	75.0
	% of products by cluster	13.3%	16.0%	20.0%	50.7%	100.0%

Chi - square = 142.515; p - value = 0.000; V - Cramer = 0.796

Source: Author's own work.

When analysing the relation between the clusters and the individual pension products (IKE and IKZE), our study does not find any statistically significant dependencies ($\chi 2 = 4.149$; $p = 0.656$). The linguistic and economic complexity depends only on the type of financial institution offering IKE and IKZE, and not on differences between the two types of plans.

In the final part of our paper, we examine the correlations between the cost ratio, economic complexity index, and linguistic complexity index of individual pension products by type of financial institution (Table 13).

Table 13: Dependencies between the cost ratio (CR), the economic complexity index (ECI), and the linguistic complexity index (LCI) of individual pension products (Spearman's rank correlation)

Institution	Variables	Correlation coefficient	p-value
Banks	CR and ECI	-0.154	0.715
	CR and LCI	-0.619	0.102
	ECI and LCI	-0.283	0.497
Voluntary pension funds	CR and ECI	-0.641	0.034*
	CR and LCI	-0.070	0.838
	ECI and LCI	0.235	0.487
Investment fund companies	CR and ECI	-0.369	0.045*
	CR and LCI	-0.312	0.093
	ECI and LCI	0.454	0.012*
Life insurance companies	CR and ECI	0.841	0.000**
	CR and LCI	0.232	0.425
	ECI and LCI	-0.236	0.417

Significant individual coefficients indicated by ** $p < 0.01$; *$p < 0.05$

Source: Author's own research.

First, we find statistically significant correlations between costliness and the economic complexity index for almost all analysed financial institutions (except banks). However, Spearman's correlation coefficient indicates that the direction of dependencies can differ. For the companies that manage voluntary pension funds and investment fund companies, there are negative correlations. In contrast, for life insurance companies, the most popular type of provider, a higher cost ratio is linked to products with higher levels of economic complexity. This could result from insurance companies offering funds managed by external investment fund companies. The management fee is sometimes charged by the life insurer and external managers, which increases the cost ratio.

Second, we find no significant correlations between the costliness of individual pension products and the linguistic complexity in any group of providers. This suggests that financial institutions do not tend to make costlier products less readable. However, it may also signal that pension product providers do not strategize the linguistic complexity of contracts.

Third, we find a significant positive correlation between linguistic complexity and economic complexity in the products offered by investment fund companies.

Discussion

A Polish saver must be a university graduate to understand pension contracts, with few exceptions. The linguistic complexity makes it difficult for many Poles to make informed choices, given low levels of financial literacy. This problem could explain, at least in part, the low level of participation by workers in the supplementary pension system. We argue that linguistic complexity is not an inherent feature of these plans

and that steps should be taken to provide documents with lower linguistic complexity.

Our results support the findings by Rutecka-Góra et al. (2020) about the high levels of economic complexity in many individual pension contracts. However, we conducted further analysis and calculated an Economic Complexity Index for each pension product.

The most economically complex individual pension plans are managed by life insurance companies and investment fund companies. This result is surprising in that these are the two most popular providers of IKEs and IKZEs. Moreover, the complexity of plans offered by investment fund companies is associated with complex fee systems. Savers might pay fees for the purchase and sale of fund units, management fees, and fees related to contribution amounts, account balances, or the ages of savers. Because Poles are often overconfident concerning their financial knowledge (OECD 2016), they could mistakenly buy inappropriate pension products and end up with inadequate pension benefits.

Our analysis of products managed by investment fund companies finds a positive correlation between linguistic and economic complexity of the products that together with high-cost ratios might result in many low rate-of-return pension plans. However, if we only compare the cost ratio with the complexity of a fee system, we observe that high-fee products have more complex fee systems. This finding confirms the results of other studies (Turner, 2013; Muller & Turner, 2016).

Conclusions

In the supplementary system in Poland, where individuals must choose from many products and bear the full cost of mistakes, the risk of a poor decision is high because of the economic and linguistic complexity of the products. However, there is a large variation among the values of the indicators of linguistic and economic complexity for the same products, suggesting that complexity is a strategy adopted by some companies and is unnecessary. Overall, there appears to be no relationship between economic complexity and linguistic complexity, so that economic complexity can be explained with simple language and lack of economic complexity can be explained with complex language. However, we do find a positive correlation between economic and linguistic complexity for products offered by investment fund companies.

In summary, our results can be grouped into three areas. First, we describe the heterogeneity and complexity of pension products by examining three aspects of pension accounts and contracts: cost, economic complexity, and linguistic complexity. We document considerable heterogeneity in all three aspects of pensions. We find that many pensions have complex fee systems and that the level of linguistic complexity differs across the types of pension providers. However, most providers use linguistically complex documents.

Second, we examine the possible causes of these findings. Linguistic complexity could be the result of intentional marketing strategies designed to make it more difficult for average people to search for less costly providers, thereby allowing high-fee providers to stay in business. Our research shows that the most linguistically complex products are provided by banks; however, banks provide the least economically complex products. Thus, economic complexity is not the cause of linguistic complexity, but by increasing linguistic complexity, providers could be causing potential clients to perceive products as being complex. We also find that high-fee products have highly complex fee systems.

Third, we examine the possible consequences of our findings. Most pension funds provide linguistically complex documents. The consequences of linguistic complexity might include a low level of participation in these products and poor decision-making by people who choose products.

While efforts to raise financial literacy are one possible approach to dealing with these issues, an alternative and perhaps more effective approach would be to focus on policies that require providers to simplify pension-related products and make information about them more readable. For example, the current fee structure for many pension products is highly complex. This system could be simplified so that only an asset management fee is charged. The current system involves numerous fees, making it impossible for many savers to compare products in relation to the fees they will be required to pay. Our proposed fee system would make it easier for savers to compare fees among competing products. Moreover, by introducing this proposal with an official ranking of individual pension products - published by the financial supervisory commission - individuals could protect themselves against the problem of choosing inadequate pension products or products misaligned with their needs and goals.

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A METHODOLOGICAL APPROACH TO OPTIMIZING FINANCIAL RESOURCES TO INCREASE THE LEVEL OF ECONOMIC SECURITY IN A DYNAMIC EXTERNAL ENVIRONMENT

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Abstract

The purpose of the article is to present a new approach to the optimal selection of financial resources to increase the level of economic security in a dynamic external environment. The scientific question arises as to which of the possible options is optimal, taking into account the dynamism of the external environment and security needs. The object of the study is the economic safety of industrial companies. The methodology is based on modern methods of system analysis, multi-criteria evaluation and paired comparison. The main result of the study is the proposed approach to assessing resource support for the implementation of a security mechanism, which, based on the actual limitations of human, organizational and financial resources at the disposal of most Ukrainian enterprises, can significantly improve the efficiency of their use without reducing the effectiveness of actions which are aimed at increasing competitiveness. The study has limitations, since it only takes into account the specifics of enterprises in the industrial sector of this economy, and therefore the options for financial resources are adjusted accordingly.

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Introduction

In modern conditions of increasing unpredictability of the global economic environment, the financial resources of enterprises are becoming a decisive factor influencing the stability and economic security of a country. In the context of the growing dynamics of external conditions, including the political, economic and social challenges facing Ukraine, the relevance of ensuring the financial sustainability of industrial enterprises increases significantly. The aggravation of the military situation in the country requires not only an immediate response to current needs, but also long-term planning to minimize risks that may threaten economic security at the macro- and microeconomic levels.

When any management decision is made, or measures are implemented to improve one or another indicator, not necessarily a qualitative one, a certain amount of resources is attracted. The resources of open socio-economic systems are different and are classified differently. Economic security is a special state that constantly, so to speak, "eats" the resources of an enterprise. The formation and implementation of a mechanism for ensuring economic security is, first of all, resource costs in order to be as competitive as possible in the market and achieve a high level of security.

The issue of organizing a competitive industrial management policy, both theoretically and at the level of practical implementation, is a pressing issue in all countries. Given the existence of the global crisis, the industrial sector has also experienced significant negative consequences, which forced the world's leading countries to look for ways to overcome these crisis phenomena. The governments of most countries have long realized the fact that the scope and specificity of the functioning of industrial enterprises has undergone fundamental changes under the influence of the phenomena of globalization, the manifestation of the influence of Industry 4.0, the internationalization of sales markets, and local crisis phenomena that have arisen in one way or another in any economy in the world in these years. Industrial enterprises could no longer effectively realize their production potential and develop competitive advantages in an outdated and static environment of directive management and the unified power of the state regulator. In this regard, in the vast majority of countries the need arose of analyzing and creating a new paradigm for cooperation and management of the activities of industrial enterprises.

In general, the problem of unprofitability of industrial enterprises in Ukraine is not new and constantly draws the scientific attention of many studies. There are enough solutions proposed, but not all of them may be effective in practice or are not needed in the new conditions of development. Recent years have been very fast-moving, and therefore some solutions to this problem have not taken into account new developments. For example, if we are talking about events before 2019, then no one could have thought about the pandemic and ways to ensure physical security on a massive scale for Ukrainian enterprises. Today, any manifestations of unprofitability directly or indirectly indicate security problems and ineffective use of the security mechanism. A separate issue is the fact that low profitability and negative financial results do not in any way contribute to a high level of economic security (Figure 1).

By the end of 2022, we could talk about an increase in the number of unprofitable industrial enterprises in the total share. 2022 is the year of war in Ukraine, when there was an urgent need to ensure our own economic security. The resource costs for this process are highly dependent on the scaling of the environment. If we are talking about the domestic market, there are only resources, but when there is access to the international market, this is a completely different volume of resources. No competition is possible without resources.

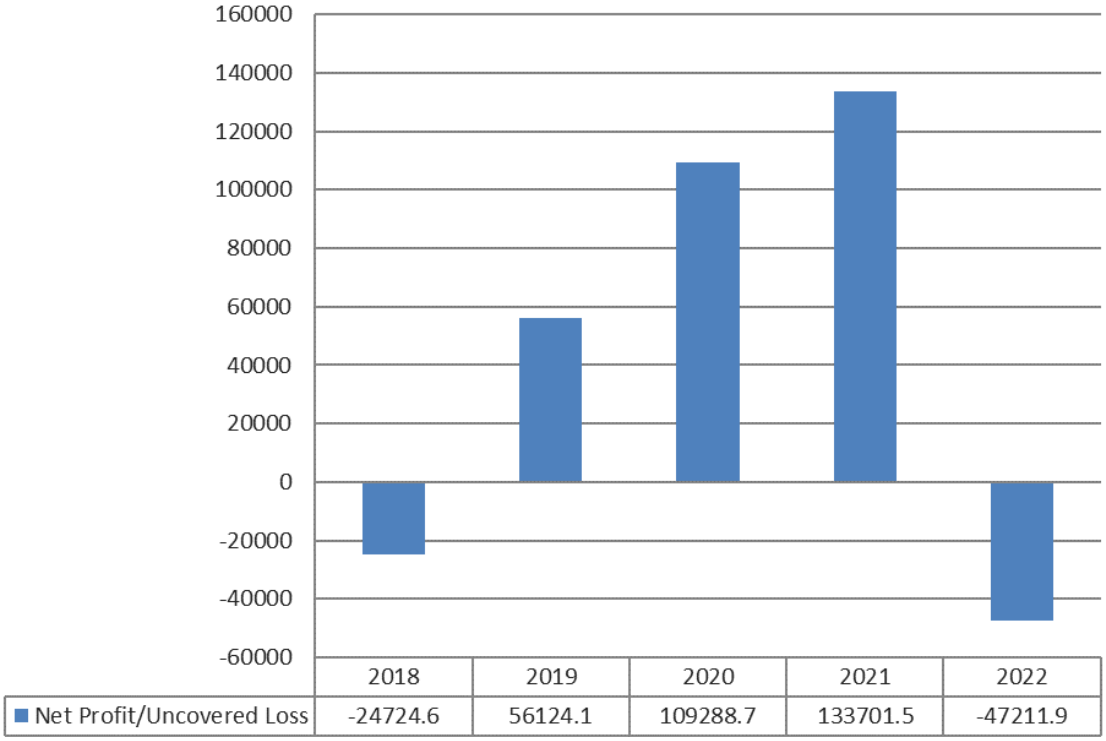
The martial law conditions in which all Ukrainian industrial enterprises found themselves changed their operating environment. Under martial law, resources are limited. It is extremely important to structurize them and select the optimal ones, with the aim of their further use to increase the level of economic security of an industrial enterprise.

The key scientific focus of the study is on industrial enterprises and their activities. In this context, the key goal of the article is to present a new approach to the optimal selection of financial resources to increase the level of economic security in a dynamic external environment.

Literature review

A review of the literature shows the problems of resource provision and the improvement of the economic security of the enterprise plays a significant role in the formation of theoretical and practical principles of enterprise management. In connection with dynamic changes in the global economic space, regular analysis of current scientific developments makes it possible to identify the latest trends and develop effective strategies in response to modern challenges. Studying the literature also contributes to the identification of new opportunities for innovation and technological development, which is necessary for maintaining the competitiveness and long-term growth of the enterprise. This allows the entity not only to improve internal processes, but also to define strategies for entering new markets or expanding activities.

Figure 1: Dynamics of the volume of net profit (loss) of industrial enterprises of Ukraine for 2018-2022, million UAH



Source: Author's own work.

Today, research is mostly related to issues of financial activity, which as a result contributes to the economic security of the enterprise (Lahiri et al., 2022; Lezgovko, 2007). At the same time, the literature raises the question of how increasing the level of economic security of the enterprise depends on management principles (Patsula et al., 2022) or how threats were effectively countered (Kelman et al., 2020). But it should be noted here that it all works when there are financial resources. In the literature, you can find research devoted to the issue of resource provision (Pratolo et al., 2022; Kartuzov, 2012) and how it is possible to ensure security through effective resource management (Veresklia et al., 2021; Parubets et al., 2023). It is often mentioned in the literature that the financial condition can significantly increase the level of economic security of the enterprise, since finance is the most significant component of this type of security (Valkauskas, 2010; Treus, 2023).

The key gaps in the literature today are the lack of a clear understanding of how financial resources can affect an increase in the level of economic security of an enterprise; and the approach to choosing the optimal resource provision. However, while paying tribute to the scientific achievements of leading scientists, a number of issues and problems still remain relevant and unsolved. In particular, this concerns Ukrainian industrial enterprises that are in a problematic external environment caused by the war. Under such conditions, the choice of resources to ensure economic security is limited. Only two or three options are possible. That is why the scientific question arises as to which of the possible options is optimal, taking into account the dynamism of the external environment and security needs.

Methodology

The basis of the study was the methods of system analysis, multicriteria evaluation and paired comparison. The multi-criteria evaluation method (multi-criteria analysis) is a complex system for analyzing choices based on various and often conflicting criteria. This method allows you to take into account the versatility and complexity of decisions in the process of management, planning and optimization. The paired comparison method is an evaluation technique used to determine the relative importance of various alternatives or criteria in the decision-making process. This method is especially useful when you need to prioritize a series of options based on subjective assessments. The essence of the method is that the evaluator is asked to compare a pair of objects (for example, opportunities, projects, solutions, resources) according to one criterion at a time, determining which of the objects is better or more important. This process is then repeated for each pair of objects in the set. The results of paired

comparisons can be used to create a ranked list of objects or to determine the relative weights of each. This method helps to systematize and quantify subjective judgments, make their comparison and objectify the choice between various resource options, taking into account the unique set of conditions and restrictions faced by an industrial enterprise in Ukraine.

Taking into account the specifics of the external environment in Ukraine, through the method of analysis and expert analysis of the opinions of industry experts, we will highlight the financial resources that the vast majority of industrial enterprises have. Under conditions of war, Ukrainian industrial enterprises do not have much choice. Therefore, almost all industrial enterprises in Ukraine have only three main directions to increase competitiveness in conditions of martial law.

1) through our own means, created separately for this purpose, to increase the level of competitiveness,
2) through raising funds from other funds, accounts and reserves of the enterprise,
3) through obtaining favorable credit conditions or financial assistance as a result of military operations.

The resource supply system should be one that allows the use of several options with combinations according to needs in order to increase the level of economic security of an industrial enterprise.

It should be noted that according to the majority of mathematicians (Bosak et al., 2021; Musfi, 2022), for a methodological approach through the system analysis method, the scale for assessing the provision of resources should occur in three levels:

1) Low level of financial resources and the process of increasing the level of economic security of an industrial enterprise. This level does not allow for increasing the economic security of an industrial enterprise. It stops.
2) The average level of provision of financial resources to the process of increasing the level of economic security of an industrial enterprise. The level at which there is a likelihood of achieving success and realizing the enterprise security goals set.
3) A high level of provision of financial resources to the process of increasing the level of economic security of an industrial enterprise. This is not just a level with a greater likelihood of achieving success and achieving goals. At this level, we can talk about accelerating this process as a whole.

Each level of financial resource support for the process of increasing the level of economic security of an industrial enterprise in a dynamic external environment must be mathematically designated (Table 1).

Table 1: Mathematical identification of levels of financial resource support

Level name	Financial resources (f_j)
Low level of financial resources	f_1
Average level of financial resources	f_2
High level of financial resources	f_3

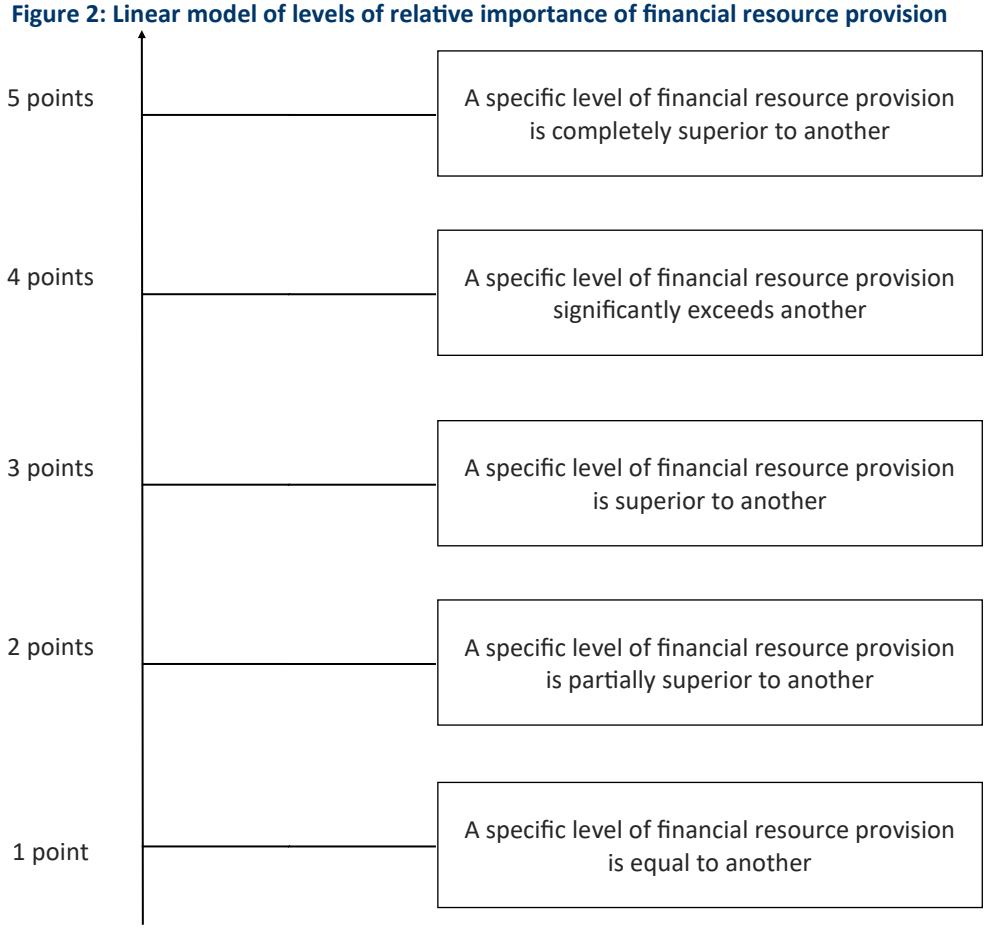
Source: Authors own work.

In order to summarize the opinion of experts (experts on industry and security of Ukrainian enterprises were involved through the expert survey method) regarding the relative importance of the level of financial resource support for the process of increasing the level of economic security of an industrial enterprise, a special linear model was used (Figure 2).

The methodology section of our study combines various analytical methods, including the Delphi expert survey, multi-criteria evaluation, and paired comparison, to assess financial resource management strategies for Ukrainian industrial enterprises during martial law in Ukraine. The Delphi method was crucial in gathering nuanced insights from experts in industrial finance, economic security, and crisis management. This method involved multiple rounds of surveys, starting with broad questions about the three main strategies for enhancing competitiveness and gradually focusing on more specific aspects based on expert consensus. The expert opinions obtained were then systematically analyzed using multi-criteria evaluation and paired comparison methods. This integration allowed for a comprehensive and structured comparison of various financial strategies, ensuring a balanced consideration of expert insights and analytical rigor. This approach provided a robust decision-making framework, crucial for understanding the feasibility and impact of each strategy on the economic security of the enterprises in the challenging context of Ukraine.

Regarding the selection of the linear model, as detailed, this choice was driven by the need for simplicity and clarity in modeling complex systems under uncertain conditions. The linear model serves as an effective starting point, offering a clear framework for initial analysis and facilitating the understanding of the impact of different financial strategies. The simplicity of the linear model provides a structured way to begin dissecting the problem and identifying key variables, despite the dynamic and complex nature of the situation in Ukraine.

Figure 2: Linear model of levels of relative importance of financial resource provision



Source: Author's own work.

It should be noted that these two levels of financial resource support for increasing the level of economic security of an industrial enterprise, compared with each other, depending on the impact they have on this process, form an assessment of importance, which will include the corresponding element of the paired comparison matrix itself. Thanks to the choice of the system analysis method, the entire diagonal of the matrix will be 1, and the lower part will include the inverse values.

Results

Resource support for increasing the level of economic security of an industrial enterprise can be interpreted as a comprehensive strategy and tactics for managing all types of resources that the enterprise has: material, financial, information, labor and others, in order to minimize risks and ensure stable operation in a dynamic external environment.

In accordance with the dynamics of the external environment, an enterprise is faced with a number of variable factors, such as changes in prices for raw materials, exchange rate fluctuations, changes in legislation, technological innovations, changes in supply and demand in markets, political risks, etc. Effective resourcing takes these aspects into account and strives to optimize them. From a financial perspective, this means managing cash flow, credit and investment resources in a manner that ensures liquidity, debt reduction, tax liability optimization and asset growth. The enterprise must have the ability to withstand financial shocks, have access to reserve and stabilization funds, and also respond appropriately to crisis events.

So, let us present the basic calculations for comparing the levels of financial resource support we have determined for the process of increasing the level of economic security of an industrial enterprise. Table 2 presents the results of calculating the normalized priority vector of the established matrix, which we denote mathematically as Mn. The matrix values (λ_{max}), the consistency ratio (WY) and the consistency index itself (IY) were also calculated.

Table 2: The main results of calculating a comparison of the levels of resource support for the process and matrix consistency

Financial support for the process of implementing a mechanism for increasing the level of competitiveness of an industrial enterprise			
f_{ij}	f_1	f_2	f_3
f_1	1.00	4.00	5.00
f_2	0.25	1.00	2.00
f_3	0.20	0.50	1.00
M_n	0.68	0.19	0.11
	λ_{max}	IY	WY
Result	3.02	0.01	0.02

Source: Author's own work.

It should be noted that a positive result in this case is a situation where the level of convergence of the comparison process and the consistency of expert opinion is satisfactory. This is only if the requirement WY ≤ 0.1 is met. For financial resources to ensure the process of increasing the level of economic security of an industrial enterprise, calculations of paired comparisons are positive, since the consistency ratio is less than 0.1.

But not only the system analysis method was used. The method of paired comparisons based on the preference of options also took an active part in the calculations. This method is effective for identifying opportunities for optimal provision of resources to a specific process. In our case, this was increasing the level of economic security of an industrial enterprise. The method involves assessing alternative possibilities for financial resource support for increasing the level of economic security of an industrial enterprise.

So, let's evaluate the alternatives in financial resource support for increasing the level of economic security at the appropriate levels: low, medium or high. This is necessary to find indicators of the utility function for each resource supply option at different levels.

Let us compare the financial resources for increasing the level of economic security, taking into account the corresponding levels of support (Table 3). Overall, the comparison results showed that the level of agreement was acceptable (WY ≤ 0.1).

Table 3: Main results of calculating the comparison of financial resources by level of support

Comparison of financial resources based on the low level of support for the process of increasing the level of economic security of an industrial enterprise			
min	**f_1**	**f_2**	**f_3**
f_1	1.00	0.500	0.250
f_2	2.00	1.000	0.330
f_3	4.00	3.000	1.000
M_n	0.13	0.230	0.620
	λ_{max}	IY	WY
Result	3.01	0.009	0.010
Comparison of financial resources by the average level of support for the process of increasing the level of economic security of an industrial enterprise			
mid	**f_1**	**f_2**	**f_3**
f_1	1.00	0.500	0.333
f_2	2.00	1.000	0.500
f_3	3.00	2.000	1.000
M_n	0.16	0.290	0.530
	λ_{max}	IY	WY
Result	3.01	0.005	0.008

Comparison of financial resources with a high level of support for the process of increasing the level of economic security of an industrial enterprise			
max	f_1	f_2	f_3
f_1	1.00	0.500	0.500
f_2	2.00	1.000	0.500
f_3	2.00	2.000	1.000
M_n	0.19	0.310	0.490
	λ_{max}	IY	WY
Result	3.05	0.020	0.040

Source: Author's own work.

Thus, we have every opportunity to calculate the utility function for each type of financial resource support (YR_{ij}) of the process of increasing the level of economic security of an industrial enterprise at different levels (Table 4).

Table 4: Indicators of the usefulness of the main types of financial resource support for the process of increasing the level of economic security of an industrial enterprise at different levels

The usefulness of basic financial security options			
Y_{Rij}	Y_{Ri1}	Y_{Ri2}	Y_{Ri3}
Y_{R1j}	0.13	0.23	0.62
Y_{R2j}	0.16	0.29	0.53
Y_{R3j}	0.19	0.31	0.49

Source: Author's own work.

In order to simplify the presentation of calculations, we will create a summary matrix. The elements of the normalized vector of priorities make it possible to establish a certain significance of the types of certain resources according to the levels of their provision of the process of increasing the level of economic security of an industrial enterprise (D_i). The value of the utility of certain resources (Y_{Ri}) in our situation for our enterprise under martial law has three options.

The matrix of utility function values and evaluation of options for monetary resource support for the process of increasing the level of economic security of an industrial company is presented in Table 5.

Table 5: Summary matrix of utility function values and assessment of options for financial resource support for the process of increasing the economic security of an industrial enterprise

Utility function value	
$Y_{R1} = D_{R1}Y_{R11} + D_{R2}Y_{R21} + D_{R3}Y_{R31}$	$Y_{R1} = 0.14$
$Y_{R2} = D_{R1}Y_{R12} + D_{R2}Y_{R22} + D_{R3}Y_{R32}$	$Y_{R2} = 0.25$
$Y_{R3} = D_{R1}Y_{R13} + D_{R2}Y_{R23} + D_{R3}Y_{R33}$	$Y_{R3} = 0.59$

Source: Author's own work.

Having calculated according to the system of equations presented in Table 5, we will obtain the necessary data on the weight of each type of resource to increase the level of economic security of an industrial enterprise. As for financial support, according to the results of calculations and taking into account the need for them, the best option would be funds through obtaining favorable credit conditions or financial assistance due to military operations (Y_{R3}). Of course, under martial law there is strong international support for Ukraine, and such funds can be obtained more easily and faster than in peacetime. However, not all businesses may be so lucky. In the case of an average industrial enterprise choosing such a rational option, and due to unpredictable events that it will not work out, you should pay attention to the alternative Y_{R2} - raising funds from other funds, accounts and reserves of the enterprise.

Discussion

When discussing our results, we should compare them with similar ones in this area. However, in order to simplify and not expand the material of this article with a large amount of other people's research, we will present a generalized vision of where the scientific community is moving on the issue of financial support for increasing the level of economic security. For example, the most popular topic for consideration is the topic of solving the problem of assessing the level of economic security of an enterprise as such (Lychenko

et al., 2021; Karaim et al., 2021). However, in our opinion, resource support should first be assessed, without which it is impossible to carry out any actions to increase the level of economic security for any enterprise. As for the financial aspect, some research results demonstrate this by considering financial security as a component of economic security (Krasko et al., 2019; Nikonenko et al., 2021). Note that there is a significant difference in the results of the study of financial resources and financial security. The third type of such research concerns the assessment of financial activities and financial risks and threats (Sudzius, 2010; Pisarenko, 2016; Hossain, 2018), through which one can approach the issue of ensuring the economic security of an enterprise in a new way. But, in our opinion, all components depend on resource support. However, it should not be said that our research is completely different; we also agree with the opinions of other scientists and practitioners. When discussing our results, we should highlight the similarities and differences compared to others (Table 6).

Table 6: Differences and similarities of our results

No.	Similarities	Differences
1	Agreement with the opinion and ideas that financial results are key to ensuring economic security	Our model includes the development of a new methodological approach that allows for a systematic approach to assessing financial security
2	A joint opinion on the priority of resource provision when it comes to increasing the level of economic security	Our assessment model is highly adaptive, allowing the integration of new data and changes in economic and political contexts, ensuring real-time relevance of decisions
3	Agreement with opinions that financial resources should be considered in the context of the specifics of the enterprise	Focus on real practice and can be used to formulate constructive solutions that allow enterprises not only to survive, but also to develop in difficult conditions

Source: Author's own work.

A scientific and practical approach to assessing the resource support for the implementation of a security mechanism is proposed, which, based on the actual limitations of human, organizational and financial resources at the disposal of security subjects of most Ukrainian enterprises, can significantly improve the efficiency of their use without reducing the effectiveness of actions that are aimed at increasing competitiveness.

Conclusions

To summarize, we should briefly but clearly outline what exactly we determined as a result of our research. We have presented a methodological approach to providing resources for increasing the level of economic security of an industrial enterprise in a dynamic external environment, which involves the use of modern technologies to calculate optimal options. Based on the methods of system analysis, multicriteria evaluation and pairwise comparison used, all possible options for financial resource support for implementing an increase in the level of economic security of an industrial enterprise in a dynamic external environment were structured. The calculation results made it possible to form a summary matrix of utility function values and evaluate options for resource support for the process of implementing an increase in the level of economic security of an industrial enterprise in a dynamic external environment were structured. The calculation results made it possible to form a summary matrix of utility function values and evaluate options for resource support for the process of implementing an increase in the level of economic security of an industrial enterprise in a dynamic external environment. The choice of rationale from possible options for financial resources is substantiated to ensure an increase in the level of economic security of an industrial enterprise in a dynamic external environment.

The study presents a new approach for optimally selecting financial resources to enhance the economic security of industrial companies in a dynamic external environment. However, it is important to clearly state the limitations and prerequisites of this approach for it to effectively support decision-making processes in improving economic security.

The approach is specifically tailored to the industrial sector, which inherently limits its applicability to other sectors that might have different dynamics and resource availability. Suitable for enterprises operating in fluctuating market conditions and external threats, like those in Ukraine, it presumes that these enterprises already possess a certain level of organizational, human, and financial resources. The methodology is designed to optimize the use of these existing resources rather than building them from the ground up. Therefore, enterprises looking to implement this approach

should already have the capacity for system analysis, multi-criteria evaluation, and paired comparisons. Additionally, a culture open to innovative approaches and change is crucial for the effective application of this methodology.

However, the study also has a number of limitations. First of all, this concerns taking into account the specifics of exclusively enterprises in the industrial sector of the economy, therefore the options for financial resources are adjusted to this. Additionally, we take into account the external environment of Ukraine, and not the whole world. Prospects for further research should be noted. Scientific works could study the issues of building economic resilience to external shocks, in particular, by developing adaptive financial mechanisms that can ensure the resilience of the industrial sector and the entire country's economy. Considerable attention in such studies should be paid to the analysis of external and internal financial instruments, policies and practices aimed at attracting investments, increasing competitiveness and developing innovative potential in the context of active globalization and technological changes. It is important that such studies take into account the specifics of post-war reform and the need to restore critical infrastructure, in particular in the industrial sector, which is key to the country's economic recovery.

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HOW THE COVID-19 SHOCK INFLUENCED COMPANIES LISTED ON THE WSE AND HOW THEY MANAGED THEIR LIQUIDITY

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Abstract

The aim of the article is to analyze the liquidity of non-financial companies listed on the Warsaw Stock Exchange. The article addresses the liquidity of the examined group against the background of the entire market and its relationship with debt, profitability, growth and the risk of bankruptcy, including in the context of the COVID-19 pandemic. The article examines the assertion that COVID-19 influenced the practice of aggressive liquidity management in terms of indebtedness, profitability, value creation, and risk of bankruptcy. The research revealed that public companies behaved differently than the entire sector by pursuing an aggressive management policy and that the pandemic caused an even greater decrease in the static liquidity ratios while cash conversion cycle (CCC) increased. In addition, the decline in EPS growth and the increase in Z-Score during the pandemic could mean that enterprises focused on reducing the risk of bankruptcy rather than maximizing value during the pandemic shock. Before the pandemic, CCC influenced DER, and during the pandemic, static indicators began to play a more important role in the financial strategies of the surveyed companies. The research results add to liquidity theory and its impact on shaping financial strategy, especially during a financial crisis. In addition, an analysis of the impact of liquidity on earnings per share (EPS) growth and Z-Score was conducted. They represent the creation of value and the assessment of the risk of bankruptcy, making this paper particularly insightful. The results obtained provide valuable guidance to decision-makers managing liquidity and debt in corporate finance.

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Introduction

The COVID-19 pandemic influenced financial markets and companies' management strategies. Liquidity management is one of the most important factors that make up companies' strategies. Liquidity can be understood in a static way, represented by key ratios such as the current ratio (CR), quick ratio (QR) and the acid-test (AT) ratio, which measures increased liquidity. The dynamic approach is represented by the cash conversion cycle (CCC), although cash flow measures are often considered. Liquidity's relationship with debt and profitability is widely discussed in the literature, although the correlation with earnings per share (EPS) growth and Z-Score is less frequently analyzed. EPS growth determines the increase in a company's value (Danbolt et al., 2011), and the Z-Score, apart from the risk of bankruptcy, can be interpreted as an assessment of its financial condition (Altman & Hotchkiss, 2010).

A company's primary objective may be to maximize value. It can be achieved by optimizing the capital structure and maximizing earnings per share and profitability growth while limiting the risk of bankruptcy. Therefore, financial indicators such as liquidity and debt ratios, EPS growth, Z-Score, and profitability ratios were selected for the study. Liquidity, which is determined by internal and external factors, goes beyond the scope of managers' decisions alone. It also depends on the surrounding business environment, which, therefore, may affect the possibility of implementing a value-maximization strategy.

The level of liquidity is determined by several factors, including precautionary considerations, making managers maintain a higher-than-optimal level of cash. This approach can also influence value management strategies. COVID-19-related market changes should have affected managers and their approach to liquidity. Thus, the research allows us to compare companies listed on the stock exchange with the entire sector of non-financial business units operating in Poland.

At the beginning of 2020, Polish companies' liquidity remained at a good, stable level, and the sector's ability to service its liabilities remained at a safe level. However, with a weakening of the domestic and international economy in 2020, including the early effects of the COVID-19 pandemic, the financial situation of the corporate sector deteriorated. Despite the increase in sales revenue dynamics, financial results and profitability dropped significantly. Companies' liquidity ratings and ability to service debt on time worsened while the bankruptcy risk index increased. In the subsequent pandemic period, the magnitude of liquidity deterioration depended in part on the development of demand for goods and services provided by the corporate sector, the pace of unfreezing the economy and companies' 'recovery' of revenues, and the effective use of available financial assistance under the 'anti-crisis shields'.

Average corporate sector liquidity ratios increased strongly until mid-2020. The increase in the accumulation of liquid financial assets might have been the result of a decrease in spending on implementing investment projects and the inflow of cash from large-scale liquidity support programs launched for businesses in Poland. After several quarters of dynamic growth, in the third quarter of 2020, the liquidity ratios of the non-financial corporate sector (NFCS) stopped at very high levels, and the percentage of liquid companies reached a historically high level. The liquidity of the NFCS improved, remaining at a high, stable level until the end of 2020. The risk of bankruptcy increased slightly, while corporate debt decreased between April and December 2020.

When assessing liquidity in 2021, it can be concluded that the NFCS was characterized by a high degree of flexibility and resilience to the shocks associated with COVID-19. Government aid allowed business owners to maintain a high level of liquidity, and the cash liquidity ratio reached a historical peak. Companies adapted to the effects of COVID-19 faster than during the global financial crisis, which also meant that the negative consequences were relatively smaller. Many companies benefited from the pandemic, global supply chains were replaced by local ones, and businesses showed unexpected flexibility.

Good financial results in the NFCS led to average liquidity ratios reaching new historical highs in Q2 of 2021. Short-term investments grew dynamically for another quarter, although this was accompanied by an increasing rate of growth of short-term liabilities. Cash liquidity remained strong, and in Q3 of 2021, the synthetic current situation index rose to its highest level in ten years. The rapid recovery of the index after the shock of COVID-19 and the restrictions was mainly due to the very good liquidity situation of the corporate sector (supported by the Polish Government).

After analyzing the non-financial company market in Poland, public enterprises listed on the Warsaw Stock Exchange (WSE) were investigated to verify whether they are characterized by high levels of liquidity and how this liquidity changed and affected indebtedness, profitability, EPS growth, and the Z-Score.

The article aims to examine the liquidity of Polish public companies and how it impacts financial management in the light of COVID-19 and the entire market. The paper tests the hypothesis that COVID-19 influenced the practice of aggressive liquidity management in terms of the indebtedness, profitability, value creation and risk of bankruptcy of companies listed on the WSE. The hypothesis is tested through statistical analy-

sis, tests for differences of means, and the Spearman correlation and Granger causality methods. The article is structured as follows: first, the literature review is presented, followed by the data, methods and results. It ends with a summary and conclusions.

Literature review

Liquidity is a key factor in the functioning of enterprises. Its characteristic feature is that it can be measured using static and dynamic ratios. Liquidity can also be analyzed in many dimensions, including payment capacity, solvency, or dynamics of operation. All of these dimensions are interrelated and make financial management not only interesting but also difficult. Liquidity's influence on company debt and profitability is widely discussed in the literature.

Zimon (2020a, 2020b) found the Polish market to be over-liquid. He demonstrated that some state-owned energy companies had conservative liquidity strategies while others were aggressive. On the other hand Trippner (2013) analyzed public companies in the long term and found that they were not over-liquid, as measured by the current ratio.

Empirical research in Poland showed the negative impact of liquidity on the capital structure (Campbell & Jarzemowska, 2001; Mazur, 2007). By contrast, Nejad and Wasiuzzaman (2013), Sibilkov (2009), as well as Shleifer and Vishny (1992) identified a positive influence of liquidity on debt and capital structure in other markets. They found that leverage is positively related to liquid assets. Analysis of liquidity is often conducted in sectors characterized by particular dependencies. The influence of liquidity on debt ratio was also analyzed by Serghiescu and Vaidean (2014), who surveyed Romanian listed construction companies. They found a negative influence of liquidity on the total debt ratio, as did Jędrzejczak-Gas (2018) for the TFL sector in Poland.

High liquidity may reduce the propensity to borrow (due to the problem of free cash flows), which was confirmed by Kuhnhausen and Stieber (2014), among others. In Croatia, the relationship between liquidity ratios and short-term leverage was stronger than between liquidity ratios and long-term leverage. The more liquid assets companies have, the less they are leveraged. Long-term leveraged companies were more liquid. Increasing inventory led to increased leverage, although increasing the cash in current assets was related to a reduction in short-term and long-term leverage (Šarlija & Harc, 2012).

Myers and Rajan (1998) indicated that greater asset liquidity made it less costly for managers, and they could expropriate value from investors. Greater asset liquidity also makes it less costly for investors to exercise control over managers. Lipson and Mortal (2009) showed that US firms that were more liquid were financed by internal resources to a higher degree and were, therefore, less leveraged.

D'Amato (2020) analyzed Italian small and medium-sized enterprises in response to the global financial crisis and capital structure decisions and their determinants. The results showed that credit supply shocks negatively impacted the leverage. During and after the crisis, companies significantly decreased their leverage, particularly their short-term debt, compared to the pre-crisis period. The findings revealed that riskier and more profitable firms reduced their leverage more during the crisis than during the pre-crisis period.

The comparison with the COVID-19 pandemic can help in understanding companies' behavior during the turmoil, which was related to internal decisions and market conditions. Demmou et al. (2021) analyzed how different policies affected the market during COVID-19 in 14 European countries. They showed that government support to relieve wage bills was the most effective tool to reduce liquidity shortages, followed by debt moratorium policies.

Zygmunt (2013) researched liquidity and profitability in Poland, confirming the positive impact of liquidity on profitability in Polish listed IT companies. Bolek and Wilinski (2012) found a negative impact of static and dynamic liquidity measures on profitability when analyzing the construction sector in Poland. According to Łojek (2020), who analyzed car importers, in most cases, there was a positive and strong relationship between profitability and liquidity in the automotive industry.

Pepur et al. (2021) analyzed companies listed on the Zagreb Stock Exchange and compared the second and third quarters of 2020 with the second and third quarters of 2019. They showed that an increase in the net debt-to-EBITDA ratio negatively and statistically significantly affected the current liquidity ratio. In contrast, an increase in infections had a positive impact on the current liquidity ratio. Stanic et al. (2022) analyzed medium and small companies in the Croatian market. They confirmed a statistically significant and positive impact of liquidity on profitability during the COVID-19 crisis, which means that the increase in liquidity increased profitability.

Demiraj et al. (2022) stated that to ensure much-needed liquidity to run their operations, effective working capital management is fundamental for firms to refrain from overinvesting in short-term resources for the most extreme benefit. The results show that the receivables collection period, inventory conversion period, accounts payable period, and cash conversion cycle had a significant negative impact on ROA for both the pre-pandemic and pandemic periods. Moreover, excessive inventory impairs profitability by locking up valuable cash reserves, which are vital, especially in periods of crisis.

Oliveira and Fortunato (2006) revealed that smaller and younger firms had higher growth-cash flow sensitivities than larger and more mature firms. This is consistent with the statement that financial constraints on firm growth may be relatively more severe for small and young firms. Ali et al. (2019) found that liquidity had a strong, positive relationship with profitability in terms of ROA but no impact on profitability in terms of the quick ratio. They also showed that sales growth had a negative relationship with profitability. Lestari and Khafid (2021) analyzed the Indonesian market before COVID-19 and showed that leverage and liquidity had a positive effect on earnings quality, while profitability and earnings growth had no effect. The quality of earnings increases if a company can maintain the level of leverage and liquidity. However, the quality of company earnings will decrease when the company is large, affecting its leverage and liquidity. Fajaria and Isnalita (2018) found that profitability and high growth increase value, but liquidity and high leverage reduce it.

Looking at Indian Telecom companies, Khan and Raj (2020) found that liquidity significantly impacts the Z-Score, but the impact of profitability on the Z-Score was not significant. Susanti and Samara (2021) found that profitability, liquidity and activity can simultaneously affect financial distress, with profitability having the most dominant influence. Moch et al. (2019) found that liquidity and profitability had a significant and negative effect on the financial distress of manufacturing companies listed on the Indonesia Stock Exchange, while solvency and debt level had a significant and positive effect.

Liquidity depends on a company's internal decisions and its relationship with the business environment. Our research shows that the relationships between liquidity and debt, profitability, EPS growth, and the risk of bankruptcy measured by the Z-Score differ, depending on the paper. The theory of internal strategic dependencies in finance during market turbulence changed due to a shift in the objective of companies from maximizing value to surviving. The results below add to the literature on financial management and COVID-19's impact on liquidity strategies.

Data and methods

The financial data of non-financial companies listed on the WSE was used. The data come from 2019–2021 and cover three quarters before the outbreak of COVID -19 and three quarters in which the pandemic shock could be observed.

To compare the means for these two sub-periods, the null hypothesis about the equality of the means in both sub-periods was tested:

$$\begin{cases} H_0 : m_1 = m_2, \\ H_1 : m_1 \neq m_2 \end{cases}$$

Where: m_1 and m_2 are the means for the first and second sub-periods, respectively.

The data distribution across the subperiods was tested for normality with the Kolmogorov-Smirnov and the Shapiro-Wilk tests. The hypothesis of equality of means can be tested for normally distributed data using the Student's t-test. For different distributions of data, the non-parametric Mann-Whitney and Kolmogorov-Smirnov tests are applied. The non-parametric tests take the following form:

$$\begin{cases} H_0 : F_1(x) = F_2(x), \\ H_1 : F_1(x) \neq F_2(x) \end{cases}$$

Where: F_1 and F_2 is the distribution of variables x_1 and x_2, respectively.

The statistical significance of the differences between the Spearman correlations before and during the COVID-19 pandemic was analyzed using the Z-statistic (e.g. De Bruin & Steyn, 2020), given by the following formula:

$$Z\ observed = \frac{z_1 - z_2}{\sqrt[2]{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}} \quad (1)$$

Granger causality was verified for pairs of analyzed variables. A two-lag VAR model was estimated for both variables, and the joint significance test of the lags of a given variable was used in the equation explaining the other variable in the pair. This can be represented by the following equations:

$$y_t = \alpha_0 + \sum_{j=1}^{k} \alpha_1 y_{t-j} + \sum_{j=1}^{k} \beta_1 x_{t-j} + \varepsilon_{1t} \quad (2)$$

$$y_t = \alpha_0 + \sum_{j=1}^{k} \alpha_j x_{t-j} + \sum_{j=1}^{k} \beta_j y_{t-j} + \varepsilon_t \quad (3)$$

In this case, the null hypothesis is as follows:

$$H_0 : \beta_1 = \beta_2 = \ldots =: \beta_k = 0$$

The above statement means that there is no causality from the explaining variable to the explanatory variable.

The following hypotheses considering companies listed on WSE are verified:

H_0: COVID-19 influenced the practice of aggressive liquidity management concerning factors such as indebtedness, profitability, value creation, and risk of bankruptcy.

The main hypothesis is verified using specific hypotheses:

H_1: Liquidity decreased significantly during the pandemic period.

H_2: There was a significant difference between the DER and DE debt ratios, ROE and ROA profitability, EPS growth, and the Altman Z-Score before and during the pandemic.

H_3: The relationship between liquidity and: profitability, debt level, EPS growth, bankruptcy risk during the pandemic compared to the period before the health crisis.

H_4: The influence of liquidity on strategy variables changed during the pandemic and was weaker.

The following strategy variables are analyzed in detail:

CR (Current liquidity ratio) = current assets / current liabilities;

QR (Quick liquidity ratio) = (current assets – inventories) / current liabilities;

AT (Increased liquidity ratio) = (current assets – inventories and receivables) / current liabilities;

CCC (Cash conversion cycle) = inventory cycle + receivables cycle – cycle of short – term liabilities;

DER (Debt ratio) = Total debt / assets;

DE (Capital structure ratio) = long-term debt / equity;

gEPS (EPS growth) = $(EPS_t – EPS_{t-1})/Assets_{t-1}$; where EPS is Earnings Per Share;

Z-Score = Altman Z-Score.

Table 1: Descriptive statistics for the analyzed debt ratios with differences in the period before and during the pandemic

Variable	Measure	Before the pandemic	During the pandemic	Difference	% Difference
DER	Mean	1.5179	1.3900	-0.1274	8.40%
	Standard deviation	18.6272	14.0060		
	Minimum	0.0000	-0.9700		
	Maximum	415.2435	359.9660		
DE	Mean	27.5659	32.6859	5.1200	18.57%
	Standard deviation	617.3940	639.9410		
	Minimum	-62.0746	-25.6915		
	Maximum	14501.1069	13189.4489		
CR	Mean	0.0890	0.0660	-0.0230	25.53%
	Standard deviation	0.8840	0.4070		
	Minimum	0.0000	0.0000		
	Maximum	18.1540	9.0430		
QR	Mean	0.0830	0.0610	-0.0220	26.41%
	Standard deviation	0.8850	0.4070		
	Minimum	0.0000	0.0000		
	Maximum	18.1540	9.0430		
AT	Mean	0.0420	0.0230	-0.0180	44.02%
	Standard deviation	0.6760	0.2230		
	Minimum	0.0000	0.0000		
	Maximum	17.0260	6.7930		
CCC	Mean	36.5310	43.5220	6.9910	19.14%
	Standard deviation	908.2530	1038.3070		
	Minimum	-49.6370	-18.2500		
	Maximum	27500.0000	27500.0000		
gEPS	Mean	0.0010	0.0000	-0.0010	93.31%
	Standard deviation	0.1560	0.0020		
	Minimum	-3.6680	-0.0030		
	Maximum	3.6650	0.0730		
Z- Score	Mean	4.9520	5.1530	0.2010	4.07%
	Standard deviation	2.8290	2.8520		
	Minimum	0.3210	0.3210		
	Maximum	9.7840	9.7840		
ROA	Mean	1.2600%	4.0100%	2.7500%	217.47%
	Standard deviation	26.0200%	23.0800%		
	Minimum	-420.8200%	-143.6300%		
	Maximum	157.7900%	304.1700%		

Variable	Measure	Before the pandemic	During the pandemic	Difference	% Difference
ROE	Mean	3.1400%	5.6300%	2.4900%	79.14%
	Standard deviation	39.9500%	42.7100%		
	Minimum	-466.1800%	-351.3100%		
	Maximum	267.2200%	432.8900%		

Source: Own study using PS Imago based on data from Notoria.

As the descriptive statistics show, during the pandemic period, the following variables decreased compared to the period before the pandemic: DER, CR, QR, AT and EPS growth. The following indicators increased: DE, CCC, Z-Score, ROA, and ROE.

Referring to the first hypothesis, public enterprises listed on the WSE are not characterized by excessive liquidity. This problem concerns enterprises from the SME (small and medium enterprises) sector, which are not managed from the perspective of maximizing value.

In this part of the article, the hypotheses are verified, and the research results are presented.

In the first step, the hypothesis that liquidity decreased significantly during the pandemic period is verified. The Mann-Whitney and Kolmogorov-Smirnov test was performed to determine the distribution for the following variables: CR, QR, increased liquidity ratio (AT) and CCC.

Table 2: The results of the normal distribution tests for the variables describing the liquidity

Specification		Kolmogorov-Smirnov test			Shapiro-Wilk test		
		Statistics	df	Relevance	Statistics	df	Relevance
CR	0	0.4600	1553	0.0000	0.0590	1553	0.0000
	1	0.4360	1583	0.0000	0.1140	1583	0.0000
QR	0	0.4630	1553	0.0000	0.0570	1553	0.0000
	1	0.4400	1583	0.0000	0.1090	1583	0.0000
AT	0	0.4750	1553	0.0000	0.0320	1553	0.0000
	1	0.4580	1583	0.0000	0.0660	1583	0.0000
CCC	0	0.4890	1401	0.0000	0.0180	1401	0.0000
	1	0.4880	1404	0.0000	0.0180	1404	0.0000

Where: 0 - represents the period before the pandemic; 1 - indicates the period of the pandemic

Source: Own study using PS Imago based on data from Notoria.

Based on the results in Table 2, it can be stated that the distribution of these variables is different than normal in both sub-periods. The analysed indicators indeed had different values in the sub-periods analysed, which also indicates that the pandemic significantly changed the values of the liquidity indicators.

The statistically significant differences between the mean values of the variables in both sub-periods were verified in the next step with the Mann-Whitney U test and the Kolmogorov-Smirnov Z-test, as presented in Table 3.

Table 3: Tests verifying the statistical significance of differences between means

Specification	CR	QR	AT	CCC
U Mann-Whitney test				
U Mann-Whitney	1206950.5000	1208229.5000	1096175.0000	964158.0000
Asymptotic significance (two-sided)	0.0789	0.0723	0.0000	0.3670
Kolmogorov-Smirnov test				
Z Kolmogorov-Smirnov	1.1228	1.1293	2.9969	1.0630
Asymptotic significance (two-sided)	0.1606	0.1560	0.0000	0.2080

Source: Own study using PS Imago based on data from Notoria.

The results of the Mann-Whitney U test and the Kolmogorov-Smirnov Z test in Table 3 show that, according to the Mann-Whitney U test, the static liquidity ratios CR, QR and AT were significantly different in the sub-periods, while the difference between CCC values was statistically insignificant. The first research hypothesis was positively verified.

The next step verifies the second hypothesis, i.e., there was a significant difference between the DER and DE debt ratios, ROE and ROA profitability, EPS growth and the Altman Z-Score before and during the pandemic due to a change in management goals. The Mann-Whitney and Kolmogorov-Smirnov tests were performed to investigate the type of distributions for the following variables: Z-Score, EPS increase, ROA, ROE, DER and DE.

Table 4: The results of the normal distribution tests for variables describing profitability

Specification		Kolmogorov-Smirnov test			Kolmogorov-Smirnov test		
		Statistics	df		Statistics	df	
gEPS	0	0.4960	1157	0.0000	0.0261	1157	0.0000
	1	0.4874	1550	0.0000	0.0159	1550	0.0000
Z-Score	0	0.0617	1586	0.0000	0.9550	1586	0.0000
	1	0.0655	1590	0.0000	0.9543	1590	0.0000
ROA	0	0.2420	1419	0.0000	0.4920	1419	0.0000
	1	0.2100	1411	0.0000	0.6540	1411	0.0000
ROE	0	0.2115	1419	0.0000	0.6440	1419	0.0000
	1	0.1900	1411	0.0000	0.7090	1411	0.0000
DER	0	0.4730	1578	0.0000	0.0350	1578	0.0000
	1	0.4660	1596	0.0000	0.0480	1596	0.0000
DE	0	0.5050	1578	0.0000	0.0210	1578	0.0000
	1	0.5050	1596	0.0000	0.0250	1596	0.0000

Where: 0 - represents the period before the pandemic; 1 - indicates the period of the pandemic

Source: Own study using PS Imago based on data from Notoria.

Table 4 shows that the distribution of these variables is different than normal in both sub-periods. The indicators analysed in Table 4 significantly changed their values during the pandemic period, confirming the strong impact of the pandemic on corporate finances. In the next step, the differences between the mean values of the variables in both sub-periods were verified for statistical significance. The results of the Mann-Whitney U test and the Kolmogorov-Smirnov Z test show significant differences between the averages for EPS growth and the Z-Score in the sub-periods.

Table 5: Tests verifying the statistical significance of differences between means

Specification	gEPS	Z-core	ROA
U Mann-Whitney test			
U Mann-Whitney	906280.0000	1208926.0000	1143951.0000
Asymptotic significance (two-sided)	0.0599	0.0444	0.9290
Kolmogorov-Smirnov test			
Z Kolmogorov-Smirnov	1.4772	1.3686	1.0630
Asymptotic significance (two-sided)	0.0255	0.0472	0.2080
Specification	**ROE**	**DER**	**DE**
U Mann-Whitney test			
U Mann-Whitney	986612.0000	1232697.5000	1258503.5000
Asymptotic significance (two-sided)	0.5050	0.2897	0.9279
Kolmogorov-Smirnov test			
Z Kolmogorov-Smirnov	0.9980	1.0424	0.5885
Asymptotic significance (two-sided)	0.2720	0.2273	0.8792

Source: Own study using PS Imago based on data from Notoria.

Based on Table 5, it can be concluded that the decrease in EPS growth and the increase in Z-score were statistically significant. EPS growth decreased by as much as 93.31%, while the Z-Score increased by only 4.07%. No statistically significant difference can be found between the averages for ROA, ROE, DER and DE. The second research hypothesis was partially confirmed; only the change in EPS and Z-Score were significant.

Table 6 presents Spearman's rho correlation coefficients for the variables in the periods before and during the COVID-19 pandemic, together with a comparison of the significance of these changes.

Table 6: The correlation coefficients and the difference in significance between the coefficients

The correlation coefficient before the COVID-19 pandemic						
Specification	**DER**	**DE**	**gEPS**	**Z Score**	**ROA**	**ROE**
CR	-0.571**	-0.204**	0.041	0.634**	0.250**	0.121**
QR	-0.557**	-0.208**	0.034	0.535**	0.194**	0.068*
AT	-0.363**	-0.090**	0.025	0.392**	0.204**	0.137**
CCC	-0.295**	-0.072**	0.007	0.320**	0.000	-0.077**
The correlation coefficient during the COVID-19 pandemic						
Specification	**DER**	**DE**	**gEPS**	**Z Score**	**ROA**	**ROE**
CR	-0.620**	-0.217**	0.065*	0.706**	0.397**	0.254**
QR	-0.599**	-0.220**	0.079**	0.600**	0.335**	0.196**
AT	-0.427**	-0.103**	0.069**	0.507**	0.329**	0.235**
CCC	-0.319**	-0.121**	0.003	0.293**	0.033	-0.065*
Z-statistic for differences between correlations before and during the COVID-19 pandemic						
Specification	**DER**	**DE**	**gEPS**	**Z Score**	**ROA**	**ROE**
CR	**-1.377**	-0.365	-0.616	**-2.016**	**-4.040**	**-3.534**
QR	-1.181	-0.337	-1.150	**-1.821**	**-3.876**	**-3.401**
AT	**-1.790**	-0.364	-1.115	**-3.207**	**-3.421**	**-2.594**
CCC	-0.635	**-1.296**	0.092	0.711	-0.874	0.308

Significance levels for the parameters are given in the table: *** – p < 0.01, ** – p < 0.05, * – p < 0.1.
The statistical significance of differences between correlations is shown in bold (alpha = 0.10)

Source: Own study using PS Imago based on data from Notoria.

Comparing the correlation between the indicators for the two sub-periods shows that the changes in the correlation are small, as they do not exceed 0.150. The largest difference in the correlation index between the pre-pandemic period and the pandemic period was demonstrated for the ROA and CR pair of indicators. Their correlation increased during the COVID-19 pandemic. Comparing the change in the correlation between the debt and liquidity ratios in the two sub-periods, the largest difference for the DER and AT ratios was equal to 0.064. The analysis of the Z statistics allows us to demonstrate a significant change in the correlation in the two analyzed periods for the DER, CR, and AT indices. In the case of the DE ratio, no significant change in the correlation with statistical liquidity ratios was found, although the correlation with CCC changed significantly. Research hypothesis 3 was confirmed based on the correlation analysis, as a significant difference between the correlation of liquidity and profitability ratios, debt level, EPS growth, and the Z-Score changed during the pandemic.

Granger causality tests were performed for the two subgroups, and the p-values are presented in Table 7.

Table 7: Granger test results

Variable	P-value	
	Before the COVID-19 pandemic	During the COVID-19 pandemic
CR ⇏ DER	0.9994	0.9939
CR ⇏ DE	0.9968	0.9941
CR ⇏ ROA	0.9762	0.8838
CR ⇏ ROE	0.7711	0.6545
CR ⇏ qEPS	0.3124	0.9876
CR ⇏ Z-Score	0.4104	0.0663

Variable	P-value	
	Before the COVID-19 pandemic	During the COVID-19 pandemic
QR ⇏ DER	0.9994	0.9942
QR ⇏ DE	0.9972	0.9944
QR ⇏ ROA	0.9738	0.8822
QR ⇏ ROE	0.7404	0.6786
QR ⇏ qEPS	0.2978	0.9879
QR ⇏ Z-Score	0.4148	0.0675
AT ⇏ DER	0.9959	0.9892
AT ⇏ DE	0.9154	0.0000
AT ⇏ ROA	0.9963	0.9899
AT ⇏ ROE	0.9034	0.9899
AT ⇏ qEPS	0.9318	0.9997
AT ⇏ Z-Score	0.5608	0.5290
CCC ⇏ DER	0.0091	0.9946
CCC ⇏ DE	0.9920	0.9949
CCC ⇏ ROA	0.9650	0.6082
CCC ⇏ ROE	0.9778	0.8221
CCC ⇏ qEPS	0.9793	0.5273
CCC ⇏ Z-Score	0.9740	0.4842

Source: Own study using EViews based on data from Notoria.

Based on the Granger test results in Table 7, it can be concluded that only one causality of CCC influencing DER was demonstrated before the pandemic. However, Granger causality was demonstrated during the pandemic, showing the influence of CR on the Z-Score, QR on the Z-Score, and AT on DE. Therefore, research hypothesis 4 was positively verified.

Conclusions

The results of earlier research on the Polish market were confirmed, and it was found that both before and during the pandemic, liquidity had a negative impact on the capital structure. Comparing non-financial companies listed on the WSE with the sector as a whole, it can be concluded that their average DER decreased during the pandemic, but DE increased even though the debt of the entire sector decreased. The static liquidity of public companies decreased, but the dynamic measure of CCC increased in light of sector liquidity deterioration. Public companies increased their profitability, while in the sector, it fell, and the risk of bankruptcy in WSE-listed companies decreased, while it increased in the sector. It can therefore be concluded that public companies behaved differently during the pandemic shock than the entire sector of non-financial enterprises in Poland. Public enterprises listed on the WSE were not characterized by excessive liquidity. This problem mainly concerns enterprises from the SME sector, which are not managed from the perspective of value maximization.

The results of the analysis allow us to refer to the sub-hypothesis. The non-financial companies listed on the WSE demonstrated aggressive liquidity management policies. The static liquidity ratios decreased during the pandemic shock, and it was a statistically significant change. The decrease in current assets may have been caused by a decrease in receivables due to a decrease in sales, a decrease in inventories because of their consumption as a result of the interruption of supply chains, and the use of cash. On the other hand, the CCC value increased, but this increase was not statistically significant. However, there was a slowdown in operating activities during the pandemic. Only the decrease in EPS growth and the increase in Z-Score were statistically significant, indicating a change in management goals during the COVID-19 pandemic shock. Before the pandemic, the impact of CCC on DER was significant, but after the outbreak, CR and QR influenced the Z-Score, and AT influenced DER. Summing up, the shock in the first months after the outbreak of COVID-19 had an impact on liquidity and its relationships with other areas of financial management.

It can be concluded that companies listed on the WSE are well-managed and relatively resistant to economic crises. On the other hand, various companies, including SMEs, are not effectively managed. The most important conclusions are that Polish public companies pursue an aggressive liquidity management policy, which is negatively related to debt, positively related to profitability for static liquidity ratios, and negatively

related to CCC in the case of ROE. In addition, there is a positive relationship with the EPS growth and Z-Score, which changed during the pandemic, indicating a change in the main goal of enterprises from maximizing value to decreasing bankruptcy risk.

The study's limitations are related to the research period. The introduction of the vaccine in 2021 influenced market behavior, which can provide avenues for future research on liquidity and capital structure. The ideal capital structure may depend not on maximizing value but on minimizing the risk associated with the lack of liquidity. The results obtained provide valuable guidance to decision-makers managing liquidity and debt in corporate finance.

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THE INTERRELATIONSHIP OF WORKING CAPITAL: THE ROLE OF FINANCIAL BOOTSTRAPPING AND GOVERNMENT SUPPORT

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Abstract

This study aims to investigate the effects of financial bootstrapping and government support on working capital, as well as the moderating role of entrepreneurial orientation towards the impact of working capital on financial performance. The study was conducted on 260 MSME owners in the food and beverage sector in Semarang, Surakarta, and Salatiga, in Central Java Province, Indonesia. By using a Partial Least Squares-Structural Equation Modeling (PLS-SEM) analysis, the determinant effects and consequences of working capital were determined. The findings of this study indicate that financial bootstrapping and government support are proven to have a significant positive effect on working capital. Working capital has a significant positive effect on financial performance, but entrepreneurial orientation is not confirmed to moderate the effect of working capital on financial performance.

JEL classification: G32, G51, L26

Keywords: Financial Performance, Working Capital, Entrepreneurial Orientation, Financial Bootstrapping, Government Support

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Introduction

The massive number of micro, small, and medium enterprises (MSMEs) is one of the reasons why MSMEs are the backbone that supports the formation of a high gross domestic product and acts as a substantial employment provider (Gherghina et al., 2020). Therefore, when MSMEs do not grow and develop, as a result of the COVID-19 pandemic, it has the potential to have a negative impact on the economy (Taiwo et al., 2022; Tambunan, 2011). However, it is an interesting fact that MSMEs in the food and beverage sector continue to exist and have even been able to create jobs quickly during the COVID-19 pandemic. The existence and growth of MSMEs in the food and beverage sector is inseparable from the support of external and internal factors. The external factors include shifts in people's lifestyles that are more practical, the availability of raw materials, the presence of technology such as social media and shipping services, as well as the provision of various forms of attractive packaging. Meanwhile, from the support of internal factors other than the availability of human resources, having sufficient working capital is equally important.

Working capital is needed to ensure the smooth running of business operations, such as having adequate inventory and meeting short-term obligations (Deloof, 2003; Nastiti et al., 2020), to improve company performance (De França & Sandoval, 2019). However, in general, MSMEs experience difficulties in providing sufficient working capital considering that one of the characteristics of MSMEs is having limited capital (Morgan et al., 2020), especially during a crisis due to a pandemic (Gupta & Rajesh, 2022).

The ability to access external funding is often an obstacle to having adequate working capital (Athaide & Pradhan, 2020; Moro et al., 2015). Therefore, MSME entrepreneurs have to create an internal funding strategy that is non-conventional, known as financial bootstrapping (Al Issa, 2021; Lam, 2010). Financial bootstrapping prioritizes personal assets and funds (Waleczek et al., 2018), down payments from customers and joint fixed asset utilization (Leach & Melicher, 2011), and interest-free family loans and a portion of business profits (Nyide, 2016) as a source of funding to support business operations. In addition, financial bootstrapping does not incur fixed capital costs as occurs when MSME entrepreneurs use external funding, so that it is expected to generate low or no cost (Winborg, 2009). Thus, it is interesting to examine the relationship between financial bootstrapping and sufficient working capital. Meanwhile, external factors also play a role in providing working capital, including sources from government support (Le, 2019; Ren et al., 2019). During the COVID-19 pandemic, many countries launched various fiscal and monetary stimulus policies for the business world, including MSMEs. There are savings or delays in paying taxes from the government (Fu & Chang, 2021) coupled with liquidity support through cheap, easy, and fast credit schemes from the government (Adhikary et al., 2021; Wardhono et al., 2019), which can contribute to having adequate working capital for MSMEs.

Having sufficient MSME working capital in the food and beverage sector is expected to have a positive effect on financial performance. However, it turns out that previous studies have found that adequate working capital does not always positively impact financial performance. This condition can occur for example, because firms hold too much cash and therefore bear high opportunity costs (Aktas et al., 2015), which results in suboptimal financial performance. In another study (Tsuruta, 2019), there was a negative relationship between excess working capital and business performance during the global financial crisis. This is related to the existence of low receivables and inventory turnover, causing firms to bear higher investment costs in working capital.

The pros and cons of the relationship between working capital and financial performance are possibly due to the role of other variables such as entrepreneurial orientation, which is characterized by the ability of MSME entrepreneurs to be innovative, proactive, and willing to take risks (Marus et al., 2017). Possessing capable working capital funding for MSMEs in the food and beverage sector does not necessarily positively impact financial performance since it needs to be balanced with the ability of MSME actors to produce new products and services based on market needs. Previous studies have found that entrepreneurial orientation supports higher financial performance (Bilal et al., 2022). Therefore, this study places entrepreneurial orientation as a moderator of the effect of working capital on financial performance.

This study strives to investigate the effect of financial bootstrapping and government support on sufficient working capital and the moderating role of entrepreneurial orientation in the relationship between adequate working capital and financial performance. The analysis is focused on MSMEs in Indonesia, which is a developing country where MSMEs are the main pillar of the economy. This research contributes to the development of knowledge regarding the determinants of sufficient working capital adequacy and the relationship between sufficient working capital and financial performance, which is moderated by entrepreneurial orientation that has not been significantly addressed in previous research. In addition, this study is expected to be able to provide policy recommendations to improve the financial performance of MSMEs.

This research begins with an introduction and is followed by a literature review to develop the hypotheses. Then the third part summarizes the research methodology. At the same time, the fourth section is the analysis and discussion, and the last part is the conclusion that summarizes the findings and offers practical implications and future research agendas.

Literature Review

Financial Bootstrapping and Working Capital

Adequate working capital not only supports operational activities and maintains business continuity (Padachi et al., 2012), but it also positively affects profitability (Nastiti et al., 2019). Therefore, it is necessary to manage efficient working capital so that a firm has a sufficient amount. However, MSMEs sometimes need help providing adequate working capital (Altaf & Shah, 2017; Zimon & Tarighi, 2021). In observing the constraints of acquiring adequate working capital, MSME actors need alternative funding, including financial bootstrapping. This funding is the creativity of business actors to explore internal funding sources to support their day-to-day operations without relying on conventional financing sources such as debt, venture capital, or injections of funding from outside the company (Alvarado & Mora-Esquivel, 2020; Mittal & Raman, 2021). Financial bootstrapping can not only overcome the scarcity of company resources (Löfqvist, 2017; Singh et al., 2022), but it is also alternative funding with a low cost of capital (Mabonga, 2020). In order to do financial bootstrapping, MSME entrepreneurs can adapt various methods, including customer-related bootstrapping, supplier-related bootstrapping, the joint utilization of assets, and owner-related bootstrapping (Leach & Melicher, 2011).

Customer-related bootstrapping is carried out by utilizing funding sources originating from customers in the form of down payments. Supplier-related bootstrapping relies more on funding from debt repayment grace periods and discounts. At the same time, joint utilization is carried out by applying fixed assets simultaneously, for example, using the same place of business, equipment, and furnishings. Another alternative in financial bootstrapping is using funding sources from owners in the form of family loans, prioritizing using personal assets and funds, and utilizing business profits (Daniel et al., 2015; Zwane & Nyide, 2016), known as owner financing methods. Owner financing methods are the most dominant alternative (Rita et al., 2022; Rita et al., 2021). Through financial bootstrapping, MSMEs are expected to have sufficient capital and be able to overcome liquidity problems so that they are able to operate on an ongoing basis (Block et al., 2022). Based on the above reasoning, the hypothesis to be tested is:

H_1: Financial bootstrapping has a significant positive effect on working capital.

Government support and working capital

Government support is a government incentive program that provides facilities related to business funding and tax relief for businesses (Nakku et al., 2020; Sahoo & Ashwani, 2020). This support is expected to contribute to fulfilling sufficient working capital (Kalaš et al., 2018). This can be explained through three arguments. First, it can reduce cash flow pressure because it offers a tax relaxation program (Amah et al., 2021). Second, it helps in credit restructuring and direct cash assistance (Kurniawan et al., 2023). Third, there is the MSME working capital credit scheme. The tax and credit policy instruments taken by the government will lead to an increase in sufficient working capital. Previous studies on times of crisis, tax abolition policies, cheap and easy credit assistance, cash assistance, and other government support programs have been shown to increase the working capital adequacy of MSMEs (Beca & Nişulescu-Ashrafzadeh, 2014; Wang et al., 2021). Thus, the hypothesis to be put forth is:

H_2: Government support has a significant positive effect on working capital.

Working capital and financial performance

Possessing adequate working capital can help MSME entrepreneurs to procure raw materials, pay employee salaries, and manage other short-term financial obligations. It can also minimize the risk of stock-out (Bibeth & Bool, 2021). Thus, sufficient working capital will ensure the smooth operation of the business so that it can meet its sales expectations (Abuzayed, 2012), which in turn will have a positive effect on the financial performance (Braimah et al., 2021; Laghari & Chengang, 2019). Thus, the hypothesis to be established is:

H_3: Working capital has a significant positive impact on financial performance.

Working Capital, Financial Performance, and Moderation of Entrepreneurial Orientation

In general, business actors who have a high entrepreneurial orientation will reflect it through their behavior which tends to be innovative, proactive, and willing to take risks (Covin et al., 2006; García-Villaverde et al., 2018). Entrepreneurs with a high entrepreneurial orientation tend to have creative ideas in developing products or services that are in demand by consumers (Chen & Huang, 2009; Eisenmann, 2013) and dare to take risks to access external funding (Kozubíková et al., 2017; Rajković et al., 2021). A high entrepreneurial orientation is

inclined to produce better financial performance (Lekmat et al., 2018; Mielcarz et al., 2018; Telagawathi et al., 2022; Zimon, 2020). Thus, it is hoped that an entrepreneurial orientation will strengthen the ability of MSME actors to utilize sufficient working capital to improve the financial performance of the businesses they manage. Therefore, the hypothesis to be examined is:

H_4: The positive influence of working capital on financial performance is strengthened by entrepreneurial orientation.

Research methodology

This study utilized a sample of 260 MSME actors in the food and beverage sector in several cities in Central Java, Indonesia, including Semarang, Surakarta, and Salatiga. Semarang and Surakarta were chosen because they were designated by the Ministry of Tourism and Creative Economy of the Republic of Indonesia as culinary tourism destinations. Meanwhile, the city of Salatiga was designated as a city of gastronomy in Central Java Province by UNICEF. The sample size met the minimum sample requirements of the research model, which consisted of ≤ 5 constructs, each of which was measured by more than 3 indicators (Hair et al., 2014). Each city had relatively the same sample size. The characteristics of the 260 respondents are presented in Table 1.

Table 1: Sample Description

Socio-demographic Characteristics	N (%)
Gender	
Female	48.1
Male	51.9
∑	100.0
Age	
Less than 30 years old	25.0
From 30 - 50 years old	51.2
Over 50 years old	23.8
∑	100.0
Last Education	
Elementary school	10.0
Middle school	11.9
High school/ vocational high school	52.3
Higher education	25.8
∑	100.0
Entrepreneurial Experience	
Up to 5 years	35.5
From 5 – 10 years	31.5
More than 10 years	33.5
∑	100.0
Firm Age	
Up to 5 years	36.9
From 5 – 10 years	29.3
More than 10 years	33.8
∑	100.0
Number of Employees (Besides the Owner)	
Up to 3 individuals	83.8
From 3 - 7 individuals	13.1
More than 7 individuals	3.1
∑	100.0
Asset Value	
Up to Rp 50 million	91.5
More than Rp 50 million	8.5
∑	100.0

Average Turnover/Day	
Before the COVID-19 pandemic	Rp 1,289,771.0
During the COVID-19 pandemic	Rp 552,059.0
At this time	Rp 1,140,711.0

* Rp - Indonesian Rupiah

Source: Own elaboration.

Table 1 shows the profile of respondents based on socio-demographic characteristics, where the percentage of male and female MSME entrepreneurs is almost equal. Most respondents tend to be in the productive age group and have a good educational background. Meanwhile, in terms of entrepreneurial experience, the respondents varied, from beginners to very experienced entrepreneurs. In addition, the majority of the respondents run their businesses on a micro scale. The daily turnover during the pandemic revealed a decline of more than 50%.

Data collection was carried out by a field survey. For the survey, research instruments were prepared to measure the research variables. The financial bootstrapping variable was a modified result of the Winborg and Landström (2001) study, while the government support variable was adopted from the measurement conducted by Jeong et al. (2021). The working capital variable was self-developed which refers to the limit of adequate cash for operational purposes and the fulfillment of short-term obligations. The financial performance measurement was adopted from Lähtinen and Toppinen (2008) as well as Bhadu et al. (2022). Then the entrepreneurial orientation variable was modified from Meekaewkunchorn et al. (2021). The complete measurements of the variables studied can be observed in Table 2 below. They were measured using a 7-point Likert scale, with 1 being 'strongly disagree' and 7 being 'strongly agree'. Before using it for field surveys, it was necessary to ensure the quality of the measurements, so a pre-test was carried out involving 45 respondents. The pre-test results revealed that all indicators are valid and reliable because the loading and Cronbach's Alpha (CA) values are both greater than 0.70.

Table 2: Variable and Statements

Variable	Source	Statement
Financial bootstrapping	Winborg and Landström (2001)	It prioritizes personal assets for the benefit of business operations rather than buying new assets.
		It uses profit to increase business capital.
		If additional funding is needed, it prioritizes personal funds or family funds.
		It optimizes current funds for operational interests.
Government support	Jeong et al. (2021)	Government banks offer low-interest credit (such as community business credit). The government provides policies that favor the development of MSMEs (for example, by providing cash assistance and facilitating licensing). The government often provides information about market opportunities and funding. The government often provides training or mentoring. The government is often involved in assisting firm development.
Working capital	-	It has sufficient cash to do daily operational activities.
		It possesses adequate cash to purchase raw materials.
		It has sufficient cash for firm development.
		It has adequate cash to pay off debt that is due.
Financial performance	Lähtinen and Toppinen (2008); Bhadu et al. (2022)	At this time, there is an increase in sales.
		Currently, there is an increase in profit.
		At present, there is an increase in cash.
		Now, there is an increase in assets (whether private or business assets).
Entrepreneurial orientation	Meekaewkunchorn et al. (2021)	I often innovate in the business operation process.
		I often try to make new products or services in my business.
		I always attempt to anticipate trends in market needs.
		I often have ideas for business development.
		I am willing to make high-risk investments.

Source: Own elaboration.

The model testing was carried out using the variance-based partial least squares technique (PLS-SEM), based on an iterative approach to maximize the variance that explains endogenous constructs (Fornell & Bookstein, 1982). The interrelation tests between variables are based on the following estimation models:

$$WC = \beta 1FB + \beta 2GS + \delta 1 \quad (1)$$

$$FP = \beta 3WC + \beta 4EO + \beta 5WC * EO + \delta 2 \quad (2)$$

Where:
WC = Working Capital,
FB = Financial Bootstrapping,
GS = Government Support,
EO = Entrepreneurial Orientation,
FP = Financial Performance.

Before testing the estimation models above, it was preceded by testing the validity and reliability of the research instruments. The results of the validity and reliability assessments will be presented in the next section.

Results and discussion

To ensure the validity and reliability of the instruments, a test was first carried out in Table 3. Based on the factor loading values, financial bootstrapping, financial performance, and entrepreneurial orientation can be considered valid because they have a loading factor value above 0.70 (Hair et al., 2017). For information, one item of government support (DP1) has been excluded because it has a loading factor of less than 0.70.

Table 3: Validity and Reliability Assessment

Latent Construct	Items	Loading	AVE	CR	VIF
Financial bootstrapping	FB1	0.714	0.553	0.832	1.456
	FB2	0.799			1.450
	FB3	0.708			1.480
	FB4	0.751			1.444
Government support	DP2	0.823	0.717	0.910	3.618
	DP3	0.793			3.321
	DP4	0.876			2.056
	DP5	0.891			1.639
Working capital	WC1	0.830	0.598	0.856	2.135
	WC2	0.806			2.048
	WC3	0.711			1.327
	WC4	0.741			1.456
Financial performance	FP1	0.897	0.768	0.930	4.522
	FP2	0.924			5.329
	FP3	0.852			2.245
	FP4	0.829			1.891
Entrepreneurial orientation	OK1	0.885	0.755	0.939	4.242
	OK2	0.880			3.898
	OK3	0.811			2.671
	OK4	0.918			3.861
	OK5	0.847			2.092

Source: Own elaboration.

Table 3 also displays the results of reliability testing using the average variance extracted (AVE), composite reliability coefficient (CR), and full collinearity VIF by referring to Hair et al. (2017). The composite reliability score > 0.70, so that it meets the internal consistency reliability; the average variance extracted score > 0.50, so that it meets the convergent validity criteria; and the VIF value < 10, so there is no collinearity problem in the model. This is supported by the correlation test results in Table 4, which also conveys no multicollinearity problem with a relatively low correlation value between the constructs, namely 0.034 - 0.587.

In looking at the average values, Table 4 depicts that the constructs of financial bootstrapping, working capital, and financial performance are in the high category, while the constructs of government support and entrepreneurial orientation are in the moderate category.

Table 4: Descriptive statistics

Construct	St. Dev	Mean	Correlations				
			FB	GS	WC	FP	EO
Financial bootstrapping (FB)	0.896	5.737	1.000	0.315	0.355	0.372	0.034
Government support (GS)	1.659	4.131	0.315	1.000	0.261	0.293	0.110
Working capital (WC)	0.724	5.850	0.355	0.261	1.000	0.587	0.173
Financial performance (FP)	1.175	5.449	0.372	0.293	0.587	1.000	0.130
Entrepreneurial orientation (EO)	1.683	4.591	0.034	0.110	0.173	0.130	1.000

Note: There are three category levels for every construct, namely: 1-3 = low; > 3-5 = moderate; and > 5-7 = high

Source: Own elaboration.

The average value of the financial bootstrapping variable is 5.737 in the high category. This may indicate that MSMEs in the food and beverage sector are already using financial bootstrapping as a source of funding. This is especially from profits and optimizing the existing funds for operational purposes. Next, government support is in the moderate category with an average value of 4.131. This means that MSME actors tend to think that the government is not yet optimal in providing support for MSME development. Thus, MSMEs in the food and beverage sector tend to use financial bootstrapping rather than government support. As additional information, the survey results also reveal that many MSME actors only exploit either bootstrapping or government funds, but some utilize both. Furthermore, the average value of the working capital variable of 5.850 is in the high category. Thus, MSMEs in the food and beverage sector, which are the objects of this research, tend to have sufficient cash to carry out operational activities and purchase raw materials. Then, financial performance has an average value of 5.449, which means that MSME actors have the perception that currently, the businesses they manage have experienced an increase in performance compared to during the COVID-19 pandemic. Meanwhile, entrepreneurial orientation is only in the moderate category with an average value of 4.591. This can be interpreted that MSME actors admit that so far they are not brave enough to make high-risk investments, do not like to innovate, and prefer not to experiment with new products or services.

Table 5: Goodness of fit test

Criteria	Parameters	Rule of Thumb
Standardized Root Mean Square Residual (SRMR)	0.093	SRMR < 0.1
R-Square	0.330	R^2 > 0.1
Q-Square	0.243	Q^2 > 0.0

Source: Own elaboration.

Next, Table 5 above contains the goodness of fit output to ensure that the model is feasible to use for estimating. The standardized root mean square residual (SRMR) value is < 0.1. This is also the case with the R-Square value > 0.1 and the Q-Square, so that the estimation model is considered feasible.

Table 6: Results of the hypothesis testing

Hypothesis	Path	Coefficient	P-value
H1	FB → WC	0.380	0.000***
H2	GS → WC	0.138	0.017**
H3	WC → FP	0.561	0.000***
H4	WC*EO → FP	-0.024	0.637

Note: **, *** significant at levels of α 5% and 1%.

Source: Own elaboration.

The final stage of testing is the inner model test to show the causality specifications between constructs. Table 6 indicates that H_1 (FB → WC, β = 0.380, p = 0.000) is accepted, H_2 (GS → WC, β = 0.138, p = 0.017) is also accepted, and H_3 (WC → FP, β = 0.561, p = 0.000) is accepted as well, but H_4 (WC*EO → FP, β = -0.024, p = 0.637) is rejected.

Discussion

This study analyzed the effects of financial bootstrapping and government support on the adequacy of working capital of MSMEs in the food and beverage sector on financial performance by incorporating the moderation variable of entrepreneurial orientation. In terms of determinants, this study revealed that the internal aspect of financial bootstrapping was demonstrated to have a positive effect on sufficient working capital. MSME entrepreneurs who implement creative funding strategies through the use of profits, assets, and personal funds owned or from their relatives and can manage the funds properly will be able to strengthen their working capital adequacy. These results are in line with the studies of Löfqvist (2017) and Singh et al. (2022), who discovered that financial bootstrapping has a positive effect on sufficient working capital.

The results of this study also prove that the determinant of sufficient working capital is also influenced by government support. However, most MSME actors say that the government has not optimally provided support for capital procurement purposes. MSMEs believe that so far the government has issued policies that are more temporary in nature; for example, it has launched a policy program that favors the development of MSMEs, especially those affected by the pandemic, rather than permanent ones providing cheap and easily accessible credit schemes for MSMEs. However, financial incentives, including those in the form of credit schemes, are imperative for sufficient MSME working capital. Apart from phenomena related to perceptions of not having optimal government support for MSMEs, the results of this study indicate that government support in the form of low-interest rates, MSME development policies, information on market opportunities and funding, as well as training and mentoring can increase the adequacy of MSME working capital. The results of these findings are in line with Beca and Nişulescu-Ashrafzadeh (2014) and Wang et al. (2021), which also verifies that financial incentives from the government are able to strengthen MSMEs' liquidity to carry out their operations.

Other findings show a positive effect of sufficient working capital on financial performance. Working capital is considered to boost smooth operations, especially in the culinary field, as conveyed by Prajawati et al. (2022). MSMEs that have sufficient working capital, including from financial bootstrapping activities and government incentive programs, will have sufficient cash and can operate smoothly. Then there will be continuity of sales which in turn will be able to create profitability and business continuity. Thus, the results of this study confirm the results of research by Braimah et al. (2021) and Laghari and Chengang (2019), which prove that adequate working capital can affect aspects of financial performance, one of which is business profitability.

This study failed to validate the moderating role of entrepreneurial orientation. There is no effect of strengthening entrepreneurial orientation on the effect of sufficient working capital on financial performance as predicted. Looking at the sample data, it turns out that almost 80% of MSMEs perceive that their entrepreneurial orientation is already high, so it can be understood that entrepreneurial orientation does not play a role as a differentiating factor that can strengthen the effect of working capital on financial performance. Furthermore, the correlation test results between entrepreneurial orientation and working capital have low results. This is likewise the case with the correlation between entrepreneurial orientation and financial performance.

Conclusion

Based on the findings of the study in observing MSMEs in the food and beverage sector, evidence was found that financial bootstrapping and government support have a positive effect on working capital adequacy. In other words, the ability of entrepreneurs to utilize personal funds and creatively seek short-term funds and support from government policies related to aspects of taxation and credit schemes have demonstrated their ability to strengthen the working capital position of MSMEs. Then, the adequacy of working capital owned by MSMEs has a positive effect on financial performance. However, entrepreneurial orientation is not able to play a role in strengthening the positive effect of working capital on financial performance.

The results of the study contribute to broadening insights into the strategic role of bootstrapping funding and government support for adequate working capital for MSMEs, especially when the economy is experiencing a crisis, one of which is caused by the COVID-19 pandemic and also the relationship between sufficient working capital and financial performance. A practical implication is that when taking into account that many MSME actors still face many obstacles to access funding from financial institutions and the importance of cheap funding sources, entrepreneurs should continue to utilize bootstrapping funding not only when the economic conditions are in a crisis but also in normal conditions. In addition to personal funds, MSME actors can

carry financial bootstrapping through efficient working capital management, such as by accelerating the rotation of merchandise. For this purpose, digital transformation is needed to support the expansion of marketing reach and the acceleration of delivery. In addition, MSMEs also need to establish good relations with suppliers to maintain supply continuity and obtain accounts payable and raw materials. Meanwhile, the policy implications that can be proposed are that they should continue to encourage financial institutions to offer funding schemes that are cheap and easily accessible to MSMEs for sufficient working capital.

This study has several limitations. By only investigating the performance of MSMEs operating in the culinary sector after the COVID-19 pandemic and only one country, there are problems related to generalization. In addition, this study also has the potential for a subjectivity bias from respondents when filling out the questionnaire. Therefore, to minimize a subjectivity bias, future studies need to add open-ended questions and supporting secondary data.

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THE IMPACT OF THE ENTERPRISE FINANCIAL RISK MANAGEMENT FUNCTION ON FINANCIAL PERFORMANCE IN BOSNIA AND HERZEGOVINA

Adem Abdić [1], Adnan Rovčanin [2], Ademir Abdić [3]

Abstract

Adequate enterprise financial risk management (EFRM) represents a leading competitive advantage of enterprises that determines market survival and business success in an uncertain global environment. Over time, EFRM has become a constituent part of integral business dealings of enterprises and one of the strategic functions of enterprise management. The main purpose of the paper is to explore the effects of the EFRM function/system on the financial performance of enterprises in Bosnia and Herzegovina (BiH). The basic source of data in the research was collected by means of a structured questionnaire. The target population in the research consists of large enterprises that have continuously operated in the territory of BiH (2013-2017). The selection of enterprises was made applying a random sampling method and contains 72 enterprises. Appropriate descriptive and inferential statistical methods were used in the data analysis and panel data analysis was used to assess effects of EFRM function on financial performance. The scientific contribution of the paper is reflected in the fact that the research is pioneering for Bosnia and Herzegovina with the analysis of effects of the EFRM function on enterprise financial performance (EFP). The results show that there are no systematic, statistically significant differences between large enterprises that engage in risk management ('hedgers') and enterprises that do not engage in risk management ('non-hedgers') in BiH.

JEL classification: G3, G32, C4, C5, C83

Keywords: Enterprise Financial Risk Management; (Non)hedgers; Financial Performance; Panel Data Analysis; Bosnia and Herzegovina

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Introduction

Over the past fifty years, there has been a significant rise in global concerns regarding financial risks faced by both financial institutions and non-financial companies. In this environment, enterprises of various types and sizes are seeking robust EFRM frameworks that not only meet compliance requirements but also contribute to better decision making and ultimately enhance overall enterprise performance. Risk management is a fundamental concern in today's dynamic global environment (Gordon et al., 2009). Thus, risk management in the environment of global-oriented economies and internationalization of enterprises is a difficult and complicated task due to the multitude of risk sources, their intensity and their mutual permeation and strengthening (Jonek-Kowalska, 2019).

The role, position and importance of the EFRM significantly changed according to (Beder & Marshall, 2011; Moles, 2013; Abdić, 2019) after the collapse of the Bretton-Woods Agreement (1971); the oil shocks (1973, 1979, and 1990); a major stock market crash (1987); and the dramatic currency moves (1990s) which increased the volatility of market risk factors such as exchange rates, interest rates, energy prices and/or prices of key inputs/outputs. Increased volatility in the business world has exposed the inadequacy of traditional but fragmented approaches to risk management and this has led to an integrated approach to measuring and managing risks known as enterprise risk management (ERM) (Quon et al., 2012).

The theoretical concept of EFRM emerged in the late 1970s, based on both economic and financial literature derived on Fisher's separation theorem and the Modigliani-Miller theorem of capital structure irrelevance. Economists who have advocated for the justification of EFRM (Smith & Stulz, 1985; Rawals & Smithson, 1990; Froot et al., 1993; Nance et al., 1993) based their views on the existence of imperfections in the financial markets. However, it is necessary to emphasize that in the real world, apart from the imperfections in the financial markets, there are also different and sometimes even conflicting interests between owners, managers, creditors, employees and other stakeholders.

An active approach to EFRM has led to better understanding of the positive effects of risk management on sustainable business operations, while, on the other hand, it has evolved financial instruments and reduced the cost of risk hedging instruments. Over time, EFRM has become a constituent part of integral business dealings of enterprises and one of the strategic functions of enterprise management. According to Quon et al. (2012) a series of enterprise failures, enterprise scandals, and frauds are among the reasons for an enterprise to effectively implement risk management programs, and thus these enterprises' failures are caused by poor risk management and corporate governance. Also, it is important to stress that different types of professional bodies such as institutional investors, rating agencies, public authorities, regulators, and stock exchanges have recognized the need for risk management and have imposed several requirements in order to enhance risk management practices within public enterprises (Sax & Andersen, 2019).

The enterprises are subject to risks in many forms and the ultimate goal of ERM is to model, measure, analyze, and respond to these risks in a holistic manner, treating each risk exposure not in isolation, but rather in a portfolio context (Gordon et al., 2009). It can be concluded that, in recent days, a paradigm shift has occurred regarding the way enterprises view risk management.

The primary objective of this paper is to explore and analyse effects of EFRM function/system on the EFPs in the context of BiH markets. The secondary objective is to examine the practice of EFRM in large enterprises in BiH. The scientific contribution of the paper is reflected in the fact that the research is pioneering for BiH in covering the analysis of effects of the EFRM function/system on profitability, liquidity and indebtedness of enterprises in BiH. Due to the lack of EFRM information disclosure officially required in financial reports of enterprises this paper is designed to fill this gap in the context of the BiH market.

The literature review section provides an overview of the empirical and academic literature, followed by the research design and methodology section that describes the methodology and data used. The third section presents the results and discussion, and the last part lists some conclusion, limitations, and provides directions for future research.

Literature review

By exploring and analyzing both the theoretical arguments justifying the establishment of the EFRM function and the empirical research proving their impact on the enterprise cash flows and value, the rationales for establishing the ERM function can be divided into two basic groups (Judge, 2006; Aretz, Bartram & Dufey, 2007; Miloš et al., 2008):

1) a shareholder value maximization;
2) a managers' utility maximization.

Most empirical studies, to date, have focused on determinants of establishing FRM and on the use of risk management strategies through financial derivatives i.e. financial strategies (Bodnar et al., 2011; Délèze & Korkeamäki, 2018) or explored effects of enterprise

management and found that hedging stabilizes expected earnings and cash flows (Smith & Stulz, 1985; Géczy et al., 1997), increases the growth potential of the enterprise (Smith & Stulz, 1985; Nance et al., 1993) and consequently increases the enterprise's value.

Similarly, the analysis of EFP is a research area which has attracted various attention and interest from not only financial analysts, researchers, the general public and enterprise managers. There is a great variety of EFP measures in the extant literature (Naseem et al., 2019). In the narrower sense, business performance is focused on the use of simple financial indicators which are supposed to indicate the performance of the enterprise's economic goals (Saeidi et al., 2014). The narrower concept is known as "financial performance" which are the most frequently used measures of enterprise performance in empirical research (Carton & Hofer 2010). For Pham, Tran and Nguyen (2018) the financial performance of a business entity is measured and evaluated in terms of profitability, liquidity, solvency, dividend growth, sales turnover, asset base, capital employed, etc. However, Quon et al. (2012) have focused on enterprise value by examining operational, accounting and financial market performance. More specifically, they looked at changes in sales, changes in EBIT margins, and changes in Tobin's Q, respectively. Among others (Gordon et al., 2009; Baxter et al., 2013; Farrell & Gallagher, 2014; Sekreci, 2015; Lechner & Gatzert, 2017; Anton, 2018; Bohnert et al., 2019; Malik et al., 2020; Jia & Bradbury, 2020) analysed effect of ERM implementation on the financial and non-financial enterprise's market value measured by Tobin's Q. Among others (Karunaratne, 2017; Callahan & Soileau, 2017; Florio & Leoni, 2017; Yang et al., 2018; Naseem et al., 2019; Sax & Andersen, 2019; Otero González et al., 2020) analysed the effect of ERM implementation on the EFP measured by ROA and/or ROE or similar indicators. Therefore, we can conclude, there are no unique methods or models in order to assess EFP.

Simultaneously, empirical studies that explore how managing risks (primarily financial) really affects EFP and creates value are scarce and mixed, especially, in emerging countries. According to (Miloš Sprčić et al., 2016; Callahan & Soileau, 2017; Marc et al. 2018; Anton, 2018) most studies explore ERM's influence on the performance and market value of financial companies (mostly insurance companies and banks) and there are just a few studies addressing ERM's effects on non-financial companies. However, due to high industry concentration and their inherent risks, each of these financial companies have been traditionally heavily regulated thereby being associated with more mature risk management processes compared to most other non-financial companies. Thus, the results of the aforementioned studies have limited generalizability. Similarly, Bromily et al. (2015) notice that, while many ERM articles have appeared in the business press, academic research on ERM is still in its infancy and they believe the results of ERM studies are inconclusive because the scholars did not use the same, or at least similar, measure of ERM.

By exploring and analyzing the available literature it has been revealed that, nevertheless, there have been several empirical studies that have considered the effects of FRM on various enterprise features such as financial performances, market value and/or cost of capital. According to authors Gates et al. (2012) in USA; Bertinetti et al. (2013) in Europe; Farrell & Gallagher (2014) simultaneously in Australia, Canada, UK and USA; Miloš Sprčić et al. (2016) in USA; Callahan & Soileau (2017) in USA; Lechner & Gatzert (2017) in Germany; Marc et al. (2018) in USA; Florio & Leoni (2017) in Italy; Sax & Andersen (2019) in Denmark; Malik et al. (2020) in UK; and Jia & Bradbury (2020) in Australia]. In developed countries ERM has a positive impact on EFP. Similarly, according to authors [Silva De Souza et al. (2012) in Brazil; Zou & Hassan (2017) in China; Khan & Ali (2017) in Pakistan; Anton (2018) in Romania; Zou et al. (2019) in China; Hanggraeni et al. (2019) in Indonesia; Yang et al. (2018) in Pakistan; Suttipun et al. (2018) in Southern Thailand; Naseem et al. (2019) in Asia Pacific; Bin Shahrin & Ibrahim (2021) in Malaysia]. In emerging countries ERM has a positive impact on EFP.

According to authors [Beasley et al. (2010) in USA; Quon, et al. (2012) in Canada] in developed countries EFRM has a mixed impact on EFP. Similarly, according to authors [Soltanizadeh et al. (2016) in Malaysia; Tudose & Rusu (2018) in Romania; Khalil-Oliwa (2019) in Poland; Jonek-Kowalska (2019) in Poland] in emerging countries FRM has a mixed impact on EFP. But, in some empirical studies the effects of ERM on enterprise performance were not determined/significant [Tahir & Razali (2011) in Malaysia; Sekerci (2015) in Nordian countries; Karunaratne (2017) in Sri Lanka; Şenol & Karaca (2017) in Turkey; Anton (2018) in Romania; Danisman & Demirel (2019) in Turkey; Sofia & Augustine (2019) in Indonesia; Otero González et al. (2020) in Spain; Khan et al. (2016) in France; Huang et al. (2020) in China]. However, it is important to notice that to the best knowledge of the authors of this paper there are no available papers in developed and/or developing countries in which engagement of EFRM solely diminishes (has a negative impact on) EFP. As it is evident, various researchers have been interested in examining the impact of EFRM on financial performance, but their findings have been varied and mixed. This research paper aims to explore the impact of EFRM on several dependent variables that represent indicators of profitability, liquidity and indebtedness. Therefore, based on the arguments outlined above the following hypotheses were tested:

H_{01}: EFRM has no significant impact on enterprise financial performance in BiH.

H_{02}: There are no significant differences between financial performance of enterprises marked as hedgers and enterprises marked as non-hedgers in BiH.

While previous studies have focused on enterprise value, we have taken a more balanced and comprehensive look at EFPs by examining liquidity, profitability and indebtedness, respectively. Thus, this paper investigates effects of EFRM function on liquidity, profitability and indebtedness of large enterprises in BiH.

Methodological approach

Data

Primary data for all target enterprises in the survey was collected through a structured survey questionnaire[4] completed by authorized personnel in the risk management, finance or internal audit departments of enterprises. Secondary data was collected from the financial statements of the enterprises submitted by the entities to the entity agencies for the collection of financial data of legal entities. The target population in the survey is represented by large enterprises that have continuously operated in BiH in the period 2013-2017.[5] The selection of a sample of companies from BiH for the research is based on the country's specific constitutional structure, post-war and transitional period in the Bosnian economy, and the non-uniform economic space and structure of companies. The population framework of the large enterprise was drawn up on the basis of the Statistical Business Register Data of BiH as of June 30, 2017. According to this register, there are a total of 335 large enterprises measured by the number of employees "'KD BiH 2010 - Class 7 (250 and more employees)". 129 enterprises were excluded from the population framework whose main activity according to the classification of economic activities of the Agency for Statistics of BiH - KD BiH 2010 was: K, M, N, O, P, Q and R.[6] Furthermore, large enterprises from the Brčko District are not included in the population framework because these enterprises are not obliged to submit financial reports to entity agencies for collecting financial data of business entities. Following the exclusion of enterprises from these activities and enterprises from the Brčko District, 206 large enterprises remained within the population framework. With a confidence level of 95% and a margin of error of 5%, 135 enterprises were selected in a random sample from different groups of activity, different forms of organization and ownership structure, and market orientation. The survey was conducted electronically using a structural questionnaire. Of the enterprises surveyed, 85 returned a completed survey, yielding a response rate of 62.96%.[7] In six survey questionnaires, more than 2/3 of the responses were left unanswered and were thus excluded from the analysis.

According to Hoyt and Liebenberg (2011) as well as Miloš Sprčić et al. (2016), during the preliminary data analysis, two enterprises were excluded from the sample because they had a zero value in the capital position during the analyzed period. Additionally, three more enterprises were excluded from further analysis: the first one due to a takeover (purchase from the bankruptcy process), the second because it was a majority state-owned enterprise and held a monopoly status in the market, and the third one because it was majority state-owned, organized as a holding company and had extremely large values in almost all the analyzed numerical variables of interest, exceeding 10 standard deviations in absolute value. Similarly, two more enterprises from the sample were founded at the beginning of the analyzed period and were subsequently recapitalized with multimillion amounts. These two enterprises were also excluded from the sample. After the aforementioned exclusions, 72 companies remained in the sample. In order to detect individual outliers in the data, a box plot and standardized values of numerical variables were used. The data that deviated more than 1.5xIQR are considered as mild outliers, while the data that deviated more than 3xIQR are considered as severe outliers. The data collected contained 0.3% of data that deviated more than 3xIQR, while there was approximately 1% of data that had deviations greater than 1.5xIQR. For variables of interest in which were identified univariate outliers according to Lievenbrück and Schmid (2014) and Florio and Leoni (2017) winsorizing was performed with 1% (or 5%).[8]

Methods and models

In line with the methodology applied in previous research (Bohnert et al., 2019; Bertinetti et al., 2013; Callahan & Soileau, 2017; Anton, 2018; Naseem et al., 2019; Danisman & Demirel, 2019; Sofia & Augustine, 2019; Abdić, 2019; Otero González et al., 2020; Jia & Bradbury, 2020) a panel data regression was con-

[4] The structured questionnaire used in this paper is a component of the structured questionnaire from the doctoral dissertation authored by one of the co-authors of this paper.

[5] Financial institutions were not included in target population because it is belived that financial and non-financial companies should not be taken together in one sample as most of financial companies are also market makers for risk management instruments and their motivation and strategies in managing risks may be different in comparison to non-financial companies.

[6] K - Financial, insurance activities; M - Professional, scientific, technical activities; N - Administrative and support service activities; O - Public administration and defence; P - Education; Q - Human health and social work activities and R - Arts, entertainment, recreation.

[7] It is important to note that, in general, the response rate to survey questionnaires sent electronically is lower. See more in: Graham & Harvey, 2001; Sučić et al., 2011; Nance et al., 1993; Judge, 2006.

[8] According to Adams et al. (2019) the most commonly used techniques and methods of treating outliers in finance are: winsorizing, trimming and dropping.

ducted. The relationship between EFPs and the EFRM function/system and other controlling variables/ determinants can be expressed, in general, as follows:

$$EFP = f(EFRM, DIV, GA, MO, AC, ASI, OS, lnTA, FL, GO) + \mu_i + \lambda_t + \nu_{it} \quad (1)$$

where is:
EFP - an enterprise financial performance measured by the indicators liquidity, profitability and indebtedness as dependent variables;
EFRM - enterprise financial risk management;
DIV - dividends;
GA - group of activities;
MO - market orientation;
AC - agency costs;
ASI - asymmetric information;
OS - ownership structure;
lnTA - size of the enterprise;
FL - costs of financial difficulties or costs of bankruptcy of an enterprise;
GO - growth options / opportunities;
μ_i - specific effects of enterprise i that do not change over time;
λ_t - time effects that are the same for all enterprises (do not vary across enterprises);
v_{it} - error term.

In accordance with the analyzed empirical studies (Bartram et al., 2009; Baxter et al., 2013; Miloš Sprčić et al., 2016; Callahan & Soileau, 2017; Florio & Leoni, 2017; Pham et al., 2018; Naseem et al., 2019; Jia & Bradbury, 2020; Otero González et al., 2020) individual financial performance indicators were used as dependent variables in models, such as profitability performance, liquidity performance and leverage performance As independent variables were considered dividends, enterprise size, financial leverage, growth options, accounts receivable turnover ratio, agency costs, ownership structure, risk exposure, total revenues, operating cash flow, cash and cash equivalents, and EFRM as a dummy variable. Additionally, besides the dummy variables that capture the difference between enterprises that engage in risk management and enterprises that do not engage in risk management, it is necessary to control for other potentially relevant variables. However, there is no substantial theoretical and/ or empirical research on the unequivocal selection of determinants of financial, organizational, and/or ownership characteristics that affect EFPs. Therefore, based on the previously analyzed empirical studies, were included, among others, market orientation, group of activities, asymmetric information, and time (year) dummy variables for the years 2014, 2015, 2016, and 2017 as additional control variables. Further, the most commonly used dependent variables in panel models that were also used in this paper as proxy variables for EFPs are given in Table 1.

Table 1: The most commonly used dependent variables in panel models as proxy variables for EFPs

Performance	Variable	Abbreviation	Short description
Profitability performances	Return on Equity	ROE	= EAT / book value of total equity
	Return on Assets	ROA	= EAT / book value of total assets
	Return on Capital Employed	ROCE	= EAT / (book value of total equity + long term liabilities)
Liquidity performance	Current Liquidity	CL	= current assets / current liabilities
	The average accounts receivable collection period	AARCP	= (average value of accounts receivable and sales revenue / business performance) * number of days in a year
Indebtedness performance	Debt ratio	DR	= total debt / total assets (book value)

Source: Author's own work.

Furthermore, it is important to emphasize that there is no clear boundary in the literature between enterprises that engage in risk management ('hedgers') and enterprises that do not engage in risk management ('non-hedgers'). Different methods, analyses, and proxy variables can be used to determine and measure the degree of utilization of ERM systems/functions. The enterprises that explicitly stated in the questionnaire that they manage financial risks and/or have an established EFRM system/function in this study were classified as 'hedgers', while the others were classified as 'non-hedgers'.

The most commonly used variables of interest and their assumed relationship are given in Table 2.

Table 2: An overview of independent variables used in the empirical research

Variable	Abbreviation	Category	Expected results
Enterprise financial risk management	EFRM	0 = the enterprise does not manage financial risks 1 = the enterprise manages financial risks	positive
Dividends (substitute for ERM)	DIV	0 = the enterprise did not pay a dividend in the current year 1 = the enterprise paid a dividend in the current year	positive
Group of activities	GA	0 = The enterprise is not classified as a service industry 1 = The enterprise is classified as a service industry	positive
Market orientation	MO	0 = The enterprise is not equally oriented towards domestic and foreign markets 1 = The enterprise is equally oriented towards domestic and foreign markets	positive
Agency costs	AC	0 = The enterprise does not have institutional investors with ownership stakes in the share capital exceeding 20% 1 = The enterprise has institutional investors with ownership stakes in the share capital exceeding 20%	positive
Asymmetric information	ASI	0 = The enterprise is organized as a limited liability company 1 = The enterprise is organized as a joint-stock company	positive
Ownership structure	OS	0 = The enterprise is not majority privately owned 1 = The enterprise is majority privately owned	positive
Enterprise size	lnTA	= log (Total assets)	positive
Financial leverage	FL1	= total debt / total equity (book value)	negative
Financial leverage	FL2	= EBIT / Interest Expenses	negative
Growth opportunities 1	GO1	= Purchase fixed assets / Total sales	positive
Growth opportunities 2	GO2	= Purchase fixed assets / Total assets	positive
Growth opportunities 3	GO3	= Costs of production services / Total sales	positive

Source: Author's own work.

Results

2/3 of the sampled companies (66.67%) belong to the manufacturing sector[9], while 1/3 belongs to the service sector (33.33%). In terms of ownership structure, 80.56% of the analyzed sample of enterprises are in majority private ownership, while 19.44% of the enterprises are in majority public ownership. Regarding market orientation, 55.56% of the enterprises are predominantly focused on the domestic market, followed by 29.17% with a dominant orientation towards foreign markets, and 15.28% of the companies are equally oriented towards both markets (Abdić et al., 2019).

Furthermore, the research results indicate that almost 2/3 of the analyzed enterprises, which stated that they manage some of the financial risks have written policies and procedures for managing those risks, and the FRM strategy is an integral part of the overall enterprise strategy in as many as 86.36% of the enterprises, while it is positioned at the operational level in 37.78% of the enterprises (Abdić et al., 2019).

Table 3 (Appendix) (Panel A and Panel B) provides the summary statistics for the 'hedgers' and 'non-hedgers' enterprises for the year 2017. The last column of the table presents the results of statistical tests used to compare the financial positions and indicators of enterprises in Subsample A and Subsample B. The test results indicate that, at a significance level of 10%, there are statistically significant differences between 'hedgers' and 'non-hedgers' enterprises in terms of the following financial positions and indicators: [ROCE, FL2, GO2, SFERE, SLRE, SDRE, group of activities, and market orientation]. The test results did not show statistically significant differences in the remaining financial positions and indicators from Table 3.

The effects of EFRM on the EFPs in BiH were assessed using multiple estimators, such as the pooled OLS estimator, fixed effects estimators (LSDV estima-

[9] Classification of enterprises by main activity of the Agency for Statistics of BiH - KD BiH 2010 (EU NACE Rev. 2) is quite detailed (21 main activities) and therefore all the enterprises were grouped into two groups of activities: manufacturing group and service activities group.

tor), and random effects estimator.[10] A comparative analysis of the estimated models is provided in Table 4.

Compared to the pooled OLS model, the LSDV model[11] provided a better fit to the data, significantly improved all measures of model representativeness such as SSR, root MSE, and (adjusted) R^2, but it lost 70 degrees of freedom. However, based on the previous considerations, it is not possible to unequivocally determine whether the LSDV model is superior to the pooled OLS model. The existence of statistically significant fixed effects were tested using an F-test. Based on the conducted test, the null hypothesis is rejected, and it is concluded that there is at least one significant fixed individual effect [F(67; 282) = 5.63; p-value < 0.001]. Therefore, the LSDV model with fixed effects is superior to the pooled OLS model.

In the subsequent analysis, the random effects model (FGLS estimator) was used to investigate whether the random errors vary across enterprises and/or years. The presence of statistically significant random effects were tested using the Breusch-Pagan Lagrange multiplier (LM) test. Based on this test, the null hypothesis is rejected, and it is concluded that there is at least one significant individual-specific (or time-specific) component of variance of the random errors that is different from zero [$\chi2(1) = 123.27$; p-value < 0.001]. Therefore, the random effects model is superior to the pooled OLS model. The ratio of the variance of individual-specific errors to the variance of composite errors, or the rho coefficient, is 0.4614. A large value of the rho coefficient indicates that individual-specific errors contribute significantly to the variance of the composite error.

Based on the conducted Hausman test, [$\chi2(4) = 178.22$; p-value < 0.001] the null hypothesis was rejected, and it was concluded that the FE model (LSDV estimator) is favoured over the RE model (GLS estimator). In the fixed effects model, individual effects are parts of the intercept, and the correlation between the intercept and the regressor variables does not violate any Gauss-Markov assumption, making the fixed effects model the best linear unbiased estimator (BLUE). Therefore, Panel Model (LSDV estimator) was chosen to estimate the impact of the analyzed variables of interest on profitability performance (ROA).

Table 4: Comparative analysis of estimated models (ROA)[12]

Coefficient	Model		
	'Pooled' OLS	FE (LSDV)	RE
EFRM	0.00727150 (0.00536860)	0.00280800 (0.02021640)	0.00818460 (0.00904750)
lnTA	-0.00705060** (0.00215600)	0.00213630 (0.00899730)	-0.00593360* (0.00340690)
FL2	0.00000005*** (0.00000003)	0.00000002 (0.00000002)	0.00000003 (0.00000002)
GO1	-0.13486050*** (0.04729180)	-0.09845640* (0.05299480)	-0.11486400** (0.04802950)
GO3	0.32062820*** (0.08492410)	0.05980960 (0.09151440)	0.14933730* (0.08395720)
ARTR	0.00000209*** (0.00000002)	-0.00000001 (0.00000184)	0.00000061 (0.00000165)
DIV	0.04273280*** (0.00538510)	0.02353190*** (0.00825530)	0.03367900*** (0.00651280)
MO	0.01538020 (0.00720640)	0.02486240 (0.01740560)	0.01803100 (0.01217950)

[10] Due to spatial constraints in the paper is only presented the estimates of all the mentioned regression panel models using the example of assessing the effects of EFRM on the profitability performance (ROA) of enterprises in BiH. An overview of the estimated regression panel models, where the effects of EFRM on other profitability performance measures (ROE and ROCE), liquidity performance measures (CL and AARCP), and debt performance measure (debt ratio) of enterprises in BiH were assessed, is available upon request to the authors.

[11] There is a fundamental drawback of the "within" fixed effects model, which is that time-invariant variables, such as EFRM, are dropped from the model (due to transformation). As a result, it is not possible to estimate how the time-invariant variable affects ROA. Therefore, if one wants to control for fixed effects of enterprises and retain the time-invariant variable of interest (EFRM), the "within" estimator cannot be used, and a priori preference is given to the LSDV estimator of fixed effects.

[12] By integrating specific control variables into the mentioned models such as financial leverage (FP1), growth options (GO2), agent costs (AC dummy), exposure to risks (ER), total revenue (TR), operating cash flow (OCF), cash and cash equivalents (CCE), the obtained results remain unchanged both in terms of statistical significance and the magnitude of estimated coefficients of the variables of interest. For easier comparison and due to spatial constraints, the table summary does not include the parameters of the 71 dummy variables in the LSDV model. A complete overview of the LSDV model is available upon request to the authors.

Coefficient	Model		
	'Pooled' OLS	FE (LSDV)	RE
GA	-0.0035850 (0.0057374)	0.0590099** (0.0299603)	-0.0084275 (0.0095216)
ASI	-0.0009319 (0.0055331)	0.0191070 (0.0178614)	-0.0016683 (0.0092917)
Const.	0.1419804** (0.0397311)	-0.0863005** (0.0457982)	0.1336632** (0.0628553)
SSR	0.7960000	0.3410000	-
Standard errors	0.0480000	0.0350000	0.0350000
R2	0.2690000	0.6870000	0.2480000
F test	F = 25.0400000 p-value < 0.0010000	F = 8.0500000 p-value = 0.0010000	-
Ramsey Reset test	F(3; 346) = 3.9300000 p-value = 0.0090000	F(3; 279) = 0.3000000 p-value = 0.8270000	-
Breusch-Pagan and Cook-Weisberg tests	-	χ2(1) = 3.5100000 p-value = 0.0610000	-

***, **, * significant at 1%, 5% and 10% levels, respectively, standard errors are in parentheses

Source: Author's own work.

At the 1% significance level, the variable dividend (DIV) is statistically significant, and at the 10% significance level, the variable growth opportunities (GO1) is also statistically significant. Specifically, dividend payout (DIV) has a positive impact on ROA, while growth opportunities 1 (GO1) has a negative impact on ROA. Other variables are not statistically significant. Additional control variables, such as market orientation (MO), group of activities (GA), and asymmetric information (ASI) are not statistically significant at standard levels of significance. Furthermore, the time (year) dummy variables are not statistically significant at standard levels of significance, except for the time dummy variable for the year 2016 at a significance level of 10% which indicates that the mentioned effect is a result of the introduction of the new Law on Financial Operations in FBiH in 2016, rather than being a result of effect of ERM. Following the same methodology in the analysis of the effects of variables of interest on profitability performance (ROA), were estimated panel models to analyze the effects of variables of interest on other financial performance measures of enterprises.

Table 5 (appendix) presents the results of the estimated models examining the influence of variables of interest on the financial performance of profitability, liquidity, and indebtedness of enterprises, with a particular focus on the effect of the variable EFRM. The results of the estimated panel models: Panel Model 1 (ROA), Panel Model 2 (ROCE), and Panel Model 3 (ROE) indicate that EFRM does not have a statistically significant effect on profitability performance at any standard level of significance (ROA: t = 0.47; p-value = 0.637; ROCE: t = 0.29; p-value = 0.772; ROE: z = -0.46; p-value = 0.644). Similarly, the results of the estimated panel models: Panel Model 4 (CL) and Panel Model 5 (ARTR) suggest that EFRM does not have a statistically significant effect on liquidity performance at any standard level of significance (CL: z = 1.55; p-value = 0.121; ARTR: z = 0.94; p-value = 0.348). Lastly, the results of the estimated panel model: Panel Model 6 (DR) indicate that EFRM does not have a statistically significant effect on indebtedness performance at any standard level of significance (DR: z = -1.36; p-value = 0.174).

The results of the conducted panel analysis on the effects of EFRM from 2013 to 2017 on the EFPs did not show systematic differences between enterprises classified as 'hedgers' and enterprises classified as 'non-hedgers'. Given the highly heterogeneous profile of the enterprises in the analyzed sample (using the control variable of dividing enterprises into manufacturing and service industry groups) and the potential issue of endogeneity arising from the diverse nature/types of financial risks specific to each enterprise/industry (i.e. omitted variables), the lack of significance in the estimated effects of specific financial risk management methods / techniques for enterprises in BiH can be attributed to these factors.

Furthermore, taking into consideration the results of the conducted univariate statistical tests in 2017 (Table 3), it can be concluded that there are no statistically significant differences in terms of profitability, liquidity, and indebtedness between enterprises classified as 'hedgers' and enterprises classified as 'non-hedgers' in BiH. Additionally, considering the results of the estimated panel models (Table 5), it can be inferred that there are no statistically significant effects of EFRM on the performance of profitability, liquidity, and indebtedness of enterprises in BiH.

The control variables of market orientation (MO) and asymmetric information (ASI) are not statistically significant at standard levels of significance in any ana-

lyzed model (except the ASI dummy variable in Panel model 4 - CL at a significance level of 10%). The control variable of group of activities (GA) is statistically significant in three analyzed models, specifically: Panel model 2 - ROCE, Panel model 4 - CL, and Panel model 5 - ARTR at significance levels of 5%, 10%, and 1%, respectively. Additionally, the time (year) dummy variables are not statistically significant at standard levels of significance (except the time dummy variable in the model: Panel model 1 - ROA for the year 2016 at a significance level of 10%; Panel model 3 - ROE for the year 2016 at a significance level of 10%; Panel model 5 - ARTR for the years 2015, 2016, and 2017 at significance levels of 10%, 1%, and 1%, respectively; Panel model 6 - DR for the year 2017 at a significance level of 10%), indicating that the mentioned time effect in the year 2016 is a result of the introduction of the new Law on Financial Operations in FBiH in 2016.

Discussion

The research results showed that enterprises that explicitly stated that they manage financial risks and/or have an established EFRM system/function do not have better financial performance measured by profitability, liquidity and indebtedness of the enterprise. Based on the above, it can be concluded that EFRM has no influence on EFPs in BiH. These findings are broadly in line with those reported by other studies on samples of enterprises from developed as well as emerging countries like [Tahir & Razali (2011) in Malaysia; Sekerci (2015) in Nordian countries; Karunaratne (2017) in Sri Lanka; Şenol & Karaca (2017) in Turkey; Anton (2018) in Romania; Danisman & Demirel (2019) in Turkey; Sofia & Augustine (2019) in Indonesia; Khan et al. (2016) in France; Huang et al. (2020) in China; Otero González et al. (2020) in Spain]. By integrating specific control variables into the mentioned models such as financial leverage, growth options, agent costs, exposure to risks total revenue, operating cash flow, cash and cash equivalents, the obtained results remain unchanged both in terms of statistical significance and the magnitude of estimated coefficients of the variables of interest.

The first explanation for the obtained results is that the quality of the established EFRM system in the analyzed enterprises is low because EFRM is more prevalent at the strategic level (62.22%) compared to the operational level (37.78%) of the enterprises in the sample. The 'silo approach' dominates EFRM in BiH, indicating that risk management in practice is not an integral part of strategic management and planning within the enterprises, and it lacks essential support from top management.

The second explanation for the obtained results is that the surveyed key individuals responsible for risk management in the analyzed enterprises did not provide accurate and reliable information regarding the level of development of the EFRM function / system and/or did not realistically assess the enterprise's exposure to the risks they face.

The third explanation for the obtained results is that due to the war in the 1990s, BiH still does not have a unified economic space, the financial markets in BiH are thin and underdeveloped which is resulting in a limited number of hedging instruments. Additionally, there is likely a low professional education level and skills of chief risk officers or similar functions, and enterprises predominantly rely on internal hedging instruments such as natural hedging.

Therefore, it can be concluded that establishing EFRM systems/functions in BiH does not contribute to increasing the value of enterprises or improving their financial performance, nor does it create additional value for the enterprise owners. Instead, it appears that these risk management efforts mainly serve to fulfil formal requirements or meet the expectations of certain stakeholder groups such as regulatory bodies and/or creditors.

The regulators and policymakers will identify the shortcomings of ERM practices in BiH and can impose guidelines for managing risks as best practices, similar to those in developed countries. Hence, in order to ascertain whether ERM represents a value-added activity and for whom it brings value, it becomes essential to take into account the diverse goals and risk appetites established by the enterprises that adopt ERM.

Conclusions, limitations and recommendations

In recent years, EFRM has gained meaningful relevance, primarily driven by the rising complexity of financial risks and the continuous advancement of regulatory frameworks like laws, standards and code of practices. Similarly, the relationship between EFRM and EFPs has drawn the attention of academics and practitioners for a long time, especially due to how the relationship between risk and financial performance is not verified in imperfect financial markets. Due to a lack of consensus in the literature, the specific motivation for writing the paper was the lack of empirical research on the interrelation between EFRM and the EFPs in emerging countries like BiH. The research results have revealed low levels of EFRM development in large enterprises in BiH. From the perspective of the organizational approach to EFRM, the most popular approach is 'Risk management activities are primarily centralized' followed by the approach 'Risk management decisions are primarily decentralized with centralized coordination', while the approaches 'Risk management activities are primarily decentralized' and 'Risks are not managed using financial derivatives' are rarely used.

Although the majority of empirical studies of the role and importance of ERM analyzed the impact of ERM on enterprise value where enterprise value is

proxied by Tobin's Q, in this study we decided to use accounting measures of financial performance due to thin financial markets and the existence of a large amount of non-tradable shares of BiH enterprises. Thus, the market value cannot be directly evaluated by the equity market of BiH, which could impair the function of Tobin's Q for analysis in the context of BiH. But there are also some limitations of accounting financial performance such as of their inability to make future predictions, or meet all stakeholders' needs, and also they do not take sustainable development into consideration.

The results of this paper reveal the difficulties of analyzing the effects of the quality of the ERM system based on the information disclosed by the enterprises. For this reason, this study emphasizes the need for enterprises to provide more detailed information on the process, structure, management, and risk governance. As noted in the paper, other studies have used in most cases a dummy variable created from the questionnaire survey as an indicator of adoption and the level of development of the ERM function / system, but in some studies authors have also used an ERM index, an appointment of a CRO or similar function in enterprise; an ERM level of sophistication. Furthermore, the questionnaire survey represents some kind of limitation of this study because it did not establish details of why and when large enterprises in BiH approached adoption of EFRM. The generalization of empirical results from previous studies is limited due to geographic and industrial restrictions, different stages of development of financial markets and hedging instruments, government and law legislation, knowledge and skills of financial managers as well as the stage of development of ERM function/systems.

As theoretical and empirical research focusing on ERM in emerging markets like BiH is scarce, this study expanded the knowledge about ERM by providing further insight regarding the impact of different kinds of determinants on ERM adoption and the mediating effect of ERM on financial performance. Although there is a shift towards ERM adoption, evidence showed there is none widely practiced among enterprises in BiH. EFPs used in this paper are historical accounting performance measures. Thus, taking into account that the benefits of EFRM adoption are not expected to be immediately realized, in some future papers after the accession of BiH to the European Union and the establishment of a single economic space, it will be valuable to analyse the effect of EFRM on the EFPs using a prospective market-based value measure like Tobin's Q because its reflects future expectations of investors.

Finally, for further research it will be useful to consider and analyze the impact of ERM on enterprise value proxied by the Balance Scored Card because it covers not only aspects of traditional financial performance, but also includes aspects of non-financial performance like internal processes, customers and learning.

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Appendix

Table 3: Descriptive statistics in the year 2017 ('Hedgers')

	Panel A: Subsample 'Hedgers'				
Variable (Features of enterprise)	**N**	**Mean**	**St. Dev.**	**Min.**	**Max.**
Total revenue (TR)	23	1.05e+08	1.36e+08	6112,809.000	6.15e+08
Total assets (TA)	23	2.10e+08	3.75e+08	1.03e+07	1.79e+09
Cash and cash equivalents (CCE)	23	4253,988.000	7955,497.000	33,167.000	3.40e+07
Return on Capital Employed (ROCE)	23	0.043	0.089	-0.266	0.239
Return on Assets (ROA)	23	0.028	0.048	-0.117	0.107
Return on Equity (ROE)	23	0.069	0.108	-0.170	0.320
Current Liquidity (CL)	23	2.121	3.986	0.100	19.960
Average accounts receivable, collection period (AARCP)	23	59.595	61.099	1.911	280.587
Debt ratio (DR)	23	0.459	0.289	0.061	0.999
Enterprise size (lnTA)	23	18.287	1.323	16.152	21.307
Financial leverage (FL1)	23	1.713	1.773	0.083	6.339
Financial leverage (FL2)	23	960.748	3,109.526	0.000	10,813.940
Growth opportunities 1 (GO1)	23	0.051	0.081	0.000	0.274
Growth opportunities 2 (GO2)	23	0.096	0.119	0.008	0.548
Growth opportunities 3 (GO3)	23	0.032	0.044	0.000	0.121
Assessment of fx risk exposure size (SFERE)	23	2.783	1.126	1.000	5.000
Assessment of liquidity risk exposure size (SLRE)	23	3.696	1.428	1.000	5.000
Assessment of commodity risk exposure size (SCRE)	23	3.261	1.137	1.000	5.000
Assessment of debt risk exposure size (SDRE)	23	2.913	1.164	1.000	4.000
DIV dummy - Dividends (substitute for ERM)	23	0.348	-	0.000	1.000
GA dummy - Group of activities	23	0.696	-	0.000	1.000
MO dummy - Market orientation	23	0.261	-	0.000	1.000
AC dummy - Agency costs	23	0.043	-	0.000	1.000
ASI dummy - Asymmetric information	23	0.304	-	0.000	1.000
OS dummy - Ownership structure	23	0.739	-	0.000	1.000
TI dummy - Tax incentives	23	0.174	-	0.000	1.000

Source: Author's own work.

Table 3: Descriptive statistics in the year 2017 ('Non-hedgers')

	Panel B: Subsample 'Non-hedgers'					A vs. B
Variable (Features of enterprise)	N	Mean	St. Dev.	Min.	Max.	Test statistic (p-value)
Total revenue (TR)	49	1.49e+08	2.00e+08	8885,367.000	1.04e+09	Z = 1.359 (0.1742) 2)
Total assets (TA)	49	1.64e+08	2.52e+08	8276,829.000	1.37e+09	Z = -0.139 (0.8895) 2)
Cash and cash equivalents (CCE)	49	1.16e+07	3.26e+07	6,680.000	2.20e+08	Z = 1.395 (0.1630) 2)
Return on Capital Employed (ROCE)	49	0.081	0.076	-0.123	0.316	Z = 1.793* (0.0729) 2)
Return on Assets (ROA)	49	0.049	0.051	-0.033	0.188	Z = 1.105 (0.2691) 2)
Return on Equity (ROE)	49	0.106	0.103	-0.163	0.508	Z = 1.407 (0.1594) 2)
Current Liquidity (CL)	49	3.226	4.325	0.330	21.180	Z = 1.528 (0.1266) 2)
Average accounts receivable. Collection period (AARCP)	49	53.630	52.560	0.299	266.527	Z = -0.380 (0.7036) 2)
Debt ratio (DR)	49	0.398	0.276	0.014	0.999	Z = -0.936 (0.3493) 2)
Enterprise size (lnTA)	49	18.225	1.155	15.929	21.041	t = -0.2032 (0.8396) 1)
Financial leverage (FL1)	49	2.039	4.586	0.015	28.232	Z = -1.045 (0.2962) 2)
Financial leverage (FL2)	49	5,752.251	24,243.710	-1.495	169,275.300	Z = 2.871*** (0.0041) 2)
Growth opportunities 1 (GO1)	49	0.035	0.051	0.000	0.199	Z =0.031 (0.9751) 2)
Growth opportunities 2 (GO2)	49	0.104	0.135	0.005	0.573	Z = 0.079* (0.0937) 2)
Growth opportunities 3 (GO3)	49	0.028	0.036	0.000	0.151	Z = 0.269 (0.7883) 2)
Assessment of fx risk exposure size (SFERE)	49	2.061	1.180	1.000	5.000	z= -2.795*** (0.0052) 2)
Assessment of liquidity risk exposure size (SLRE)	49	3.102	1.327	1.000	5.000	z= -1.838** (0.0661) 2)
Assessment of commodity risk exposure size (SCRE)	49	3.184	1.318	1.000	5.000	t= -0.2417 (0.8097) 1)
Assessment of debt risk exposure size (SDRE)	49	2.531	1.157	1.000	5.000	t= -1.3055** (0.0196) 1)
DIV dummy - Dividends (substitute for ERM)	49	0.429	-	0.000	1.000	c2 = 0.4243 (0.5150) 3)
GA dummy - Group of activities	49	0.653	-	0.000	1.000	c2 = 0.1278* (0.0721) 3)
MO dummy - Market orientation	49	0.102	-	0.000	1.000	c2 = 3.0506* (0.0810) 3)
AC dummy - Agency costs	49	0.122	-	0.000	1.000	c2 = 1.1122 (0.2920) 3)
ASI dummy - Asymmetric information	49	0.367	-	0.000	1.000	c2 = 0.2741 (0.6010) 3)
OS dummy - Ownership structure	49	0.837	-	0.000	1.000	c2 = 0.9520 (0.3290) 3)
TI dummy - Tax incentives	49	0.061	-	0.000	1.000	c2 = 2.2647 (0.1320) 3)

The last column represents the results of statistical tests comparing the values of subsample A and subsample B
Notice: 1) t-test, 2) Mann Whitney U-test, 3) c2 – test
***,**,* significant at 1%, 5% and 10% levels, respectively. Standard errors are in parentheses

Source: Author's own work.

Table 5a: Enterprise financial risk management (EFRM) and enterprise financial performance (EFP)

Coefficient	Performance of profitability		
	Panel Model 1 - ROA (LSDV estimator)	Panel Model 2 - ROCE (LSDV estimator)	Panel Model 3 - ROE (GLS estimator)
EFRM	0.00972230 (0.02058300)	0.00850080 (0.02926440)	-0.00798310 (0.01726750)
lnTA	-0.00305450 (0.00953600)	-0.01176220 (0.01355800)	-0.02293840*** (0.00665230)
FL2	0.00000002 (0.00000002)	0.00000003 (0.00000003)	0.00000004 (0.00000005)
GO1	-0.09933200* (0.05339480)	-0.08363330 (0.07591550)	-0.26318260*** (0.10157580)
GO3	0.06709220 (0.09186320)	0.12708420 (0.13060890)	0.57045300*** (0.17754440)
ARTR	0.00000019 (0.00000184)	-0.00000050 (0.00000260)	-0.00000198 (0.00000348)
DIV	0.02370250*** (0.00828340)	0.03608180*** (0.01177720)	0.06577750*** (0.01337760)
MO	0.02056220 (0.01763800)	-0.03417720 (0.02507720)	0.02366540 (0.02323090)
GA	0.04409110 (0.03122250)	0.09155220** (0.04439150)	-0.00993570 (0.01820990)
ASI	0.02498790 (0.01818100)	-0.00589490 (0.02584930)	-0.01225160 (0.01773980)
Ig_2014	0.00541890 (0.00583100)	0.00715210 (0.00829040)	0.00327140 (0.01279750)
Ig_2015	0.00215450 (0.00590050)	0.00111820 (0.00838920)	-0.00149420 (0.01284120)
Ig_2016	0.01057750* (0.00598410)	0.01031200 (0.00850800)	0.02411960* (0.01283330)
Ig_2017	0.00867200 (0.00609640)	0.00732510 (0.00866780)	0.01459910 (0.01289470)
Intercept	0.07213990 (0.17670360)	0.28679290 (0.25123300)	0.47288240*** (0.12224830)

Source: Author's own work.

Table 5b: Enterprise financial risk management (EFRM) and enterprise financial performance (EFP)

Coefficient	Performance of liquidity		Performance of indebtedness
	Panel Model 4 - CL (GLS estimator)	Panel Model 5 - ARTR (GLS estimator)	Panel Model 6 - DR (GLS estimator)
EFRM	0.321910700 (0.207847300)	0.18829380 (0.20063690)	-0.08400100 (0.06176940)
lnTA	-0.085202200 (0.063307700)	0.06286020 (0.06218480)	-0.08883000 (0.01691990)
FL2	0.000000005 (0.000000216)	-0.00000016 (0.00000022)	0.00000006 (0.00000005)
GO1	-0.176481100 (0.522883400)	0.11220190 (0.52470150)	0.15741950 (0.12623720)
GO3	-0.294252400 (0.901476900)	-0.21011460 (0.90480340)	0.01078220 (0.21745360)
ARTR	0.000009060 (0.000018000)	-0.00000595 (0.00001810)	-0.00000359 (0.00000435)
DIV	0.004539900 (0.078297100)	-0.00484440 (0.07836000)	0.00435760 (0.01912120)
MO	0.079756300 (0.280690700)	0.05449950 (0.27093170)	-0.02929660 (0.08344450)
GA	-0.393014300* (0.216885600)	0.58950810*** (0.20943570)	0.02697810 (0.06433980)
ASI	0.560424000*** (0.213005300)	0.29215570 (0.20564870)	-0.09285610 (0.06324490)
Ig_2014	0.049446500 (0.058356500)	-0.05793080 (0.05866930)	0.00901950 (0.01398000)
Ig_2015	0.033019800 (0.058751800)	-0.12080030* (0.05905580)	0.01052710 (0.01408860)
Ig_2016	0.073101300 (0.059020300)	-0.20943260*** (0.05930560)	0.00054600 (0.01417890)
Ig_2017	0.036923100 (0.059645600)	-0.21325250*** (0.05991580)	0.02550080* (0.01435230)
Intercept	1.887395000* (1.167421000)	2.19768900 (1.14618700)	2.05301000 (0.31302590)

***,**,* significant at 1%, 5% and 10% levels, respectively. Standard errors are in parentheses

Source: Author's own work.

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THE IMPACT OF WEBSITE PERFORMANCE ON BUSINESS SALES

Tereza Ikášová [1], Martin Klepek [2]

Abstract

In this study, we aimed to investigate the financial implications of website performance on restaurant visitor traffic. It is crucial to address the current challenges faced by the restaurant industry, such as decreasing diner numbers due to rising prices, which can have a negative impact on the financial results of companies. Recognizing the significance of maximizing profitability, especially for small businesses operating in a highly competitive industry, we sought to explore the potential of website performance as a driver of increased visitor traffic and daily menu sales. We conducted a two-month field experiment in which we measured morning website visits and daily lunch menu sales for a restaurant with a slower website and one with a quicker website. However, we did not find any statistically significant increase in visits to the restaurant as a result of improving the website's speed. We conclude that there may be other ways to improve daily menu sales beyond website speed. The restaurant industry is highly competitive, and small businesses in particular need to carefully consider how to allocate their resources in order to maximize profitability. The results of our study suggest that investing in website redesign as a means of increasing visitor traffic may not be the most effective tactic for small restaurants. Our research highlights the importance of conducting experiments and gathering data to inform decision making, as it can help small businesses in the restaurant industry to make more informed choices about how to allocate their resources. By understanding the factors that do and do not impact sales, small restaurants can make more informed decisions and achieve their business goals.

JEL classification: M21, G30, M31

Keywords: Decision Making, Experiment, Restaurant Industry, Sales, Website Performance

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Introduction

The issue of page load speed holds significant financial implications for businesses and web designers alike. Ensuring a fast website is crucial for any business owner, as it is widely known that users have little patience for slow-loading sites. This article will explore the financial aspects of page load speed by highlighting research that illustrates its impact on conversions. Notably, a majority of these studies focus on the e-commerce sector, further underscoring the financial significance of optimizing website performance. However, the question is: What impact can site speed have in a traditional business like the restaurant industry? Today, it is standard for almost every business to have a website or, at the very least, a presence on social media networks. Similarly, restaurants post their current lunch menus on the aforementioned channels. In the following study, we focused on websites. The investigation aims to analyze the financial implications of website performance on restaurant visitor traffic. It is crucial to investigate the current challenges faced by the restaurant industry, such as decreasing diner numbers due to rising prices, which can have a negative impact on the financial results of companies. Recognizing the significance of maximizing profitability, especially for small businesses operating in a highly competitive industry, we aimed to explore the potential of website performance as a driver of increased visitor traffic and daily menu sales. This study will focus on a single restaurant and utilize internal financial and business data to explore the relationship between website performance and lunch menu sales. By examining how improvements in web loading speed can potentially influence customer behavior and purchasing decisions, valuable insights can be gained regarding the financial implications for the restaurant industry in the Czech Republic.

As part of the study, a two-month experiment will be conducted to measure morning visits to the restaurant website and daily lunch menu sales. Measurements will be taken during normal operation and again after a month, after the site has been sped up. The measurements will use Google Analytics to further explain visitor behavior on the website. Google Analytics is a service that provides insight into site visitors and provides tools to understand the user journey. The data collected will be compared to actual sales. The study will look at whether speeding up the website has an impact on the number of lunches sold in the restaurant.

Our motivation in this research is to find out whether restaurants' investments in speeding up and redesigning their websites will pay off, and whether their sales will increase. After all, the restaurant industry is highly competitive, and small businesses in particular must carefully consider how to allocate their resources to maximize profitability. If there is a correlation between site speed and the number of lunches sold, this would be a simple change that businesses could apply to generate more profit.

The rest of this paper is organized as follows: a review of the literature and theoretical background is available in the chapters Role of a Website in Restaurant Business and Website Speed. The methods used for the research are described in the Methods chapter. The results of the research are presented in the Results chapter. The Conclusions chapter summarizes the findings of the study and includes a discussion of its limitations.

Literature review

The restaurant industry is one of the most traditional and oldest industries. It has become an integral part of supporting the tourism industry, as travelers increasingly head to certain destinations specifically for food (Daries-Ramon et al., 2019; Miranda et al., 2015).

Internet innovations have influenced the development of the restaurant industry. Restaurants have become increasingly aware of the power of the web and are an ideal example of a web services market that benefits from the internet. Indeed, the Internet has become the fastest growing advertising mechanism in the restaurant industry and provides significant market potential (Kim et al., 2012). Simultaneously, it serves as an effective method for distributing goods and information services (Daries-Ramon et al., 2019). Indeed, information search plays an important role in the consumer's choice of restaurant, and in the decision of which restaurant to choose for their visit (Yilmaz & Gültekin, 2016).

Corporate websites are an important space for corporate self-presentation (Hacioglu, 2019). These websites normally include information about the products the company offers, contact information and job vacancies (Torrington et al., 2017). In the case of restaurants, offering menus or current lunch menus is also an essential part of the website (Brewer & Sebby, 2021).

Restaurant websites are considered one of the most important information sources (Yilmaz & Gültekin, 2016). The advantage of websites is that they are universally accessible and necessary information can be placed on them (Kim et al., 2012). The fundamental point of the prosperity of a website is its level of usability (Taimouri et al., 2019).

Visitors can form a positive or negative opinion about the restaurant by visiting the website. They can also induce the consumer to physically visit the restau-

rant. It is also for this reason that many restaurants have created websites to inform and attract consumers (Yilmaz & Gültekin, 2016). However, if a restaurant's website lacks the information consumers are seeking or is difficult to navigate, it's likely that consumers will overlook it. In such cases, they may turn to alternative sources or competitors for the information they need, potentially resulting in lost business opportunities for the restaurant (Rosalin et al., 2016). Therefore, investing in an effective website that meets consumer expectations and provides relevant information can yield financial benefits for restaurants by attracting and retaining customers.

The speed of data processing and loading has always been an important issue in the context of the Internet. Continuous advances in information and communication technologies (ICT) date back to the early 1980s. This has led to well-known transformations in how we acquire information and especially in terms of speed (Aldammagh et al., 2021).

Page load speed reflects the performance of a website and has a significant impact on user experience. At the same time, site speed is also one of the factors investigated by the authors in the context of web quality assessment (Boshoff, 2007; Buenadicha et al., 2001).

This topic is becoming increasingly important because with the increasing amount of online resources, web visitors are becoming less tolerant of slow loading times. This may result in the visitor preferring to choose a different, faster website, as they will not have patience (Nielsen, 2000; Kim & Lim, 2001; Yen et al., 2007). Slow websites arouse frustration in visitors, which can negatively affect conversions on more than just the corporate website (Bartuskova & Krejcar, 2015). The primary causes of slow websites are often pages that contain large images, utilize responsive design, and excessively employ JavaScript scripting language (Bartuskova & Krejcar, 2015).

The time it takes for a page to load can be crucial for user loyalty. If people access government websites, they will stay on them, as they have no competition. However, for nongovernment sites, visitors leave if they take longer than 3 seconds to load (Lanza et al., 2022).

Amazon has found that every 100 ms of latency is costing them up to 1% of sales. Google has found that 0.5 seconds extra in the time it takes to generate search results will reduce traffic by up to 20% (Gigaspaces, 2019). Furthermore, recognizing the impact of loading times on user loyalty is essential for businesses operating in competitive sectors, where user retention directly affects financial outcomes.

Latency (page load speed) depends on the speed of the Internet, the access device and software, and the computational needs of the website (Basalla et al., 2021). This implies that even if a web page is optimized to load quickly by the operator, it may still load slowly for the user. For example, because the user does not have a fast enough connection.

Basalla et al. (2021) argue that even small changes in latency can have a significant impact on website usage. This will also be the subject of the planned experiment, as only a small change will be made, and we will observe how it affects sales.

How familiar a visitor is with a website may also have an impact on the results of studies looking at website speed (Basalla et al., 2021). If a first-time visitor accesses a website, their reaction may be different from that of a visitor who accesses the website regularly and is already familiar with it.

The increased use of mobile devices is a significant technological development. Surprisingly, the differences between mobile and nonmobile users in terms of latency sensitivity have not yet been scientifically analysed. Especially since mobile users are known to behave differently and websites are commonly designed specifically for mobile devices (Basalla et al., 2021).

Another factor that can enter into the rating is whether the user is in a hurry. If a user is in a hurry, there will be a greater chance that they will leave the site when it is slow to load than if they have the time and space to browse the site (Basalla et al., 2021).

Waiting online is also associated with lack of trust and a negative attitude towards the brand. However, waiting does not always involve negative emotional reactions, especially when waiting is followed by successful completion of the task at hand. The reaction to delay may be resignation and acceptance of a certain delay (Ryan et al., 2015).

Data methods

The restaurant industry is highly competitive, and small businesses in particular need to carefully consider how to allocate their resources in order to maximize profitability. The restaurant industry in the Czech Republic is facing significant changes in consumer behavior due to rising food prices. Recent data from food voucher card payments reveals that Czechs are actively cutting down on lunch expenses in response to the rapid increase in food prices. The average spending on lunch during this period was CZK 160.20, marking a 10.1% increase compared to the previous year. However, this rise in spending does not match the pace of food price inflation, which has surged by 23.5% year-on-year.

Moreover, data from the Czech Statistical Office (CSO) and the Ticket Restaurant Card Index, indicates a growing trend of people opting for cheaper meals

and visiting more affordable restaurants. The proportion of restaurant diners has declined to the current level of 53%. This trend of cost-cutting in lunch expenditures is likely reinforced by the overall rising inflation and increasing cost of living. Despite the intentions of 60% of companies to raise wages, a survey by Edenred suggests that these wage increases are unlikely to fully offset the impact of inflation.

The data from Table 1 provides insights into the changing lunch prices in the Moravian-Silesian region and Czechia over a specific period. These data points highlight the substantial upward trend in lunch prices, signaling the challenges faced by consumers in managing their food expenses. The significant price increases imply a potential influence on consumer behavior, as individuals may start seeking cost-saving measures or making adjustments in their lunch choices.

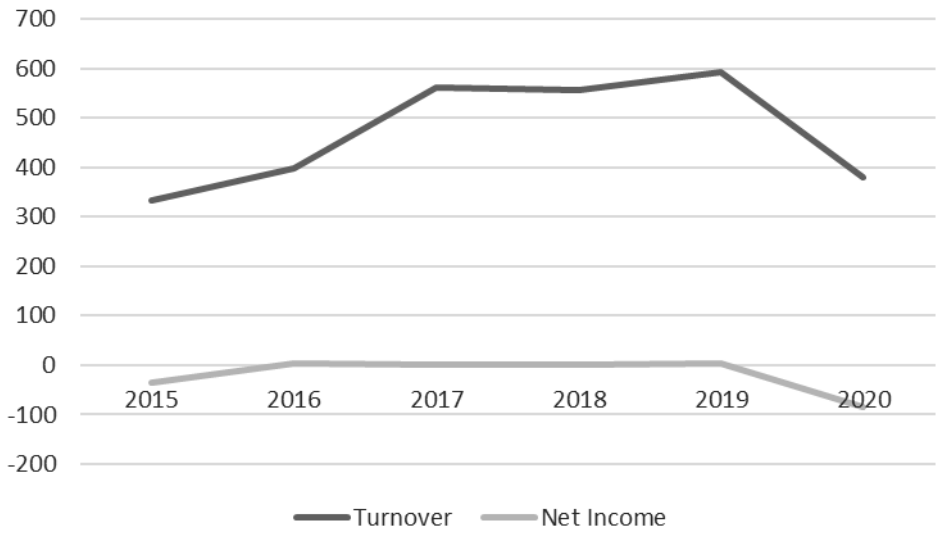
Table 1: Development of the average spending per lunch in restaurants (CZK)

	Dec. 2015	June 2020	June 2021	Jan. 2022	May 2022	June 2022	Price increase 2020/2022	Price increase 2021/2022
Moravian-Silesian region	94.6	125.6	134.9	146.2	153.1	157.4	25.3%	16.7%
Czechia	101.7	135.3	145.5	153.4	159.3	160.2	18.4%	10.1%

Source: Author's own work.

The data suggests that restaurants experienced varying performance over the six-year period from 2015 to 2020 (Figure 1). The company demonstrated growth in turnover, with figures increasing from 332 in 2015 to 593 in 2019, indicating a positive trend in revenue generation. However, the net income exhibited fluctuations, with losses recorded in 2015 and 2020, and minimal profitability in the remaining years. Therefore, the insights provided are based on the available data up until 2020. On the other hand, it is clear from the current data on food service sales that they fall short of the results from the pre-Covid period. In combination with the finding that the financial results of restaurants, including the restaurant under study, have been deteriorating in recent years, it is necessary to adequately adjust marketing tools such as web communication.

Figure 1: Development of financial results of the monitored restaurant in thous. CZK

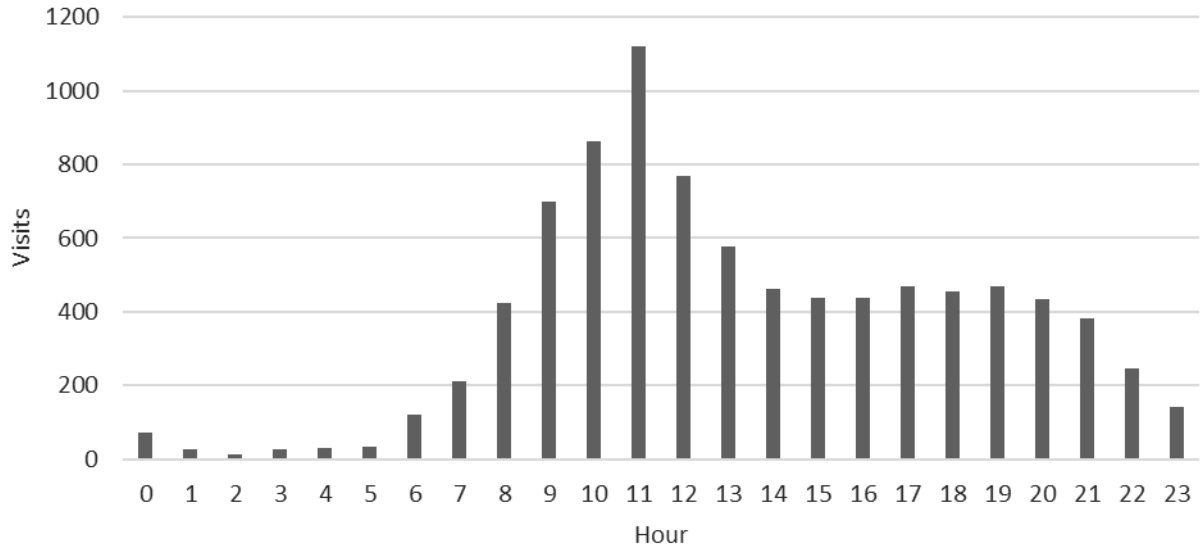


Source: Source: Internal data from restaurant.

In this study, we used real-world data observation instead of theory to form our hypothesis. For applied scientific disciplines (i.e. sciences that express statements about certain parts of reality, such as consumers) empirical observations are a key determinant in the scientific pursuit of truth (Schurz, 2013, p. 23). The theory first or observation first approach to research stimulates essential methodological debate. As Babin et al. (2016) discuss, the lack of robust marketing theories is a consequence of the tendency of academics in this field to primarily use hypo-deductive research. Researchers often believe that reviewers will be more comfortable with a strong theory, and therefore base their hypotheses on theories from related fields rather than attempting to create theories directly from their discipline. They sacrifice discovery for justification, although the scientific method clearly requires attention to both.

Figure 2 presents the frequency of restaurant daily website visits by hour for three months (June – August 2022). It demonstrates sharp increase from 6:00 with most visits occurring at 11:00, followed by a small drop and relatively stable traffic from 14:00 to 20:00. Based on this data, we conclude that visitors are likely accessing the website to view the daily lunch menu, which is served from 11:00 to 14:00 or until it is sold out.

Figure 2: Total website visits during the day by hours



Source: Author's own work.

From this spike in web traffic, we can logically deduce that the number of morning website visits influence also physical visits in the restaurant which will consequently influence the number of daily lunches sold. Therefore, we form the following hypothesis and test our idea empirically:

H_1: Number of morning visitors on the website influences daily lunch menu sales.

The number of visitors was collected via the website analytics tool Google Analytics (GA) and daily lunch menu sales were provided by the restaurant manager using an export from accounting software. We assume the website visits to be the independent variable and number of sales is dependent since these events are separated by time. Due to the temporal proximity in which website visits precede visits to the restaurant and only a small portion theoretically overlap, we do not expect the opposite direction of influence.

Furthermore, the restaurant's website had poor loading speed, with the loading time of all elements higher than the current standard (Lanza et al., 2022). On some devices it was more than 5 seconds to load the page. Therefore, the number of website visitors may be affected due to the inability to load all components and provide complete information about the daily menu. We observed that this measurement issue with Google Analytics often occurs when the script is placed in the <head> section or early in the <body> section of the website's HTML code. In our specific example, the GA script was located in the <head> section of the page. We therefore set up the field experiment and made the website load faster. We did that by optimizing the size of the images on the server that are displayed on the site and accelerated the loading of all elements of the site from seconds to milliseconds (depending on the device and operational system). We were then able to see the difference between a slow and fast website. Website speed is our independent variable and daily menu lunches sold the dependent variable. Based on these assumptions we form the second hypothesis.

H_2: When the page load time is reduced, the number of daily menu lunches sold increases.

Field experiment is a data collection strategy that employs manipulation and random assignment to investigate preferences and behaviors in naturally occurring contexts (Baldassarri & Abascal, 2017). To be specific, we used natural field experiment which is the same as a framed field experiment but where the environment is one where the subjects naturally undertake the tasks and where the subjects do not know that they are in an experiment (Harrison & List, 2004). The advantage of real behavior data over survey data is that it overcomes errors associated with customer memory and event recall (Lee et al., 2000; Nenycz-Thiel et al., 2013). Employing realistic experimental designs and measuring actual behavior are important and beneficial for consumer research (Morales et al., 2017). We have used pre-experimental design also known as the 'before and after' or 'pre- and post-test' design (Marsden & Torgerson, 2012). In this case it was impossible to run the control group since the website users cannot be tracked and paired with the consequential restaurant visit.

Our data covers the period from September 1st, 2022 to November 4th, 2022. The experiment with the website update was conducted in two phases: the page was slow from September 1st to September 30th, and then updated for improved loading speed from October 5th to November 4th. On some Mondays during both periods, the restaurant was closed for maintenance and cost-saving purposes due to high energy prices. However, both periods had the same number of days covered.

Before we move on to results, we provide more details about the experimental setting to allow comparison with future replications. The daily lunch menu consists of a soup and allows the selection of one main dish from three options. The restaurant's floor management team uploads the menu for the following week to a subpage called "Daily Menu" on the restaurant's website every Sunday. The weekly menu is also posted on the restaurant's social media accounts (Facebook and Instagram) on the first day of the week when the menu is served. No additional advertising is used to promote the menu nor additional content reposting. The restaurant is in the residential area on the outskirts of a 53 000 inhabitants city. No competition is in the radius of 2 kilometers. The main mode of transportation for accessing the daily menu at the restaurant is by car. The restaurant is visited primarily by people from the city center during lunchtime, but a small proportion is also local people who visit on foot. However, it is generally inconvenient for customers to leave the restaurant once they have entered, as the alternative dining options may be located too far away. This creates physical constraints on the customers' dining choices. The city center visitors likely include working inhabitants, possibly seeking convenience and efficiency during their limited lunch breaks, making them more sensitive to website loading times. In contrast, local visitors might be less affected by this factor due to their proximity and potentially different lunchtime constraints. This loyal customer base suggests that the local visitors in both experimental periods were probably very similar in demographics and dining habits, providing a consistent baseline for comparison. On the other hand, the day-to-day behavior of our primary clientele is checking the daily menu every morning, it means that the website's loading time is a critical factor. These clients have integrated the checking of the business's daily menu into their daily schedule, and any delay could disproportionately affect their decision to visit the restaurant. The analysis of relationships was solved by the Tukey test.

The Tukey test, also known as the Tukey's Honestly Significant Difference (HSD) test, is a statistical analysis method used to identify significant differences between multiple groups or treatments in an experiment. In this methodology, the Tukey test was conducted using MS Excel.

Using the formula, we compute the HSD statistic for the Tukey test.

$$T = q^* \sqrt{\frac{MSE}{n}} \quad (1)$$

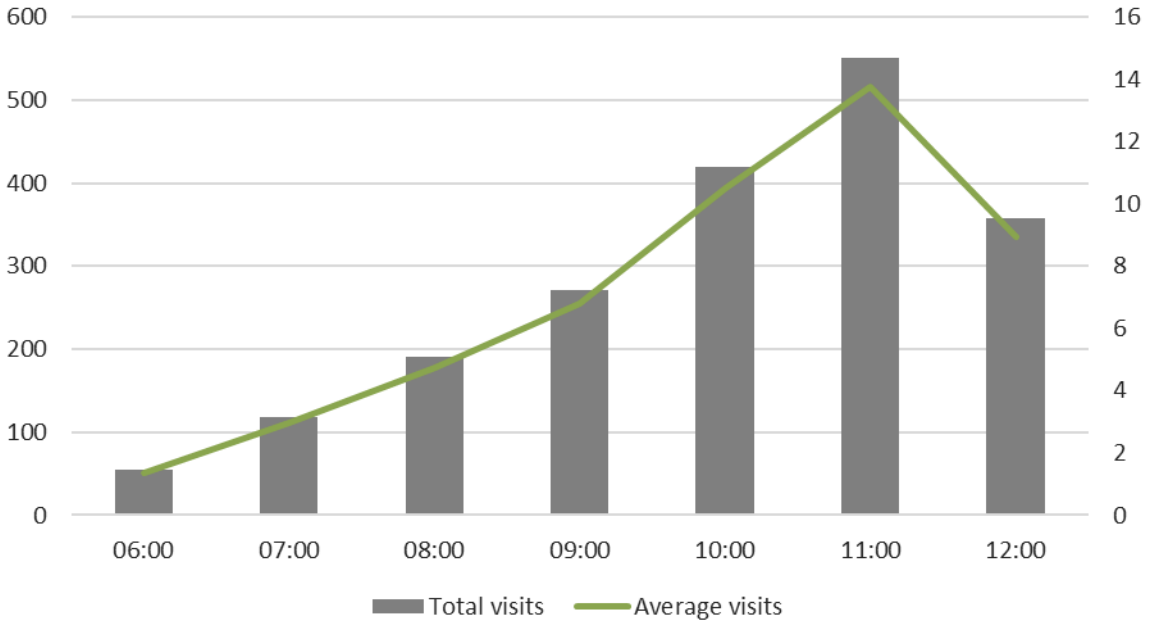
The mean squared error (MSE) can be obtained from the Anova output, specifically the MS error term. In this context, "n" represents the number of items in a single sample.

Research results

Since outliers can significantly impact the results of statistical analyses by skewing the data, we ran a Tukey test in MS Excel on both daily page visits and daily lunch menu sales to identify any outliers. We inserted the data and calculated the first and third quartiles, as well as the interquartile range and upper and lower bounds. We then created a function to highlight any outliers that were identified beyond these bounds. After performing these steps, we found that there were no outliers present in either the daily page visits or the daily lunch menu sales data for the whole period as well as for the two divided experimental periods. Thus, we can proceed with further analysis without outlier reduction. We then calculated data normality using MS MS Excel. The skewness of the data was 0.08 for menus and 0.15 for page visits, indicating a slight right skew. While the skewness is not particularly pronounced, this suggests that the distribution of the data is relatively

symmetrical but may contain a slightly higher number of values on the right side of the distribution compared to the left. In the case of a kurtosis value of -0.45 for menus and -0.37 for page visits, the data are flatter than a normal distribution. This means that the distribution has fewer and less extreme outliers compared to a normal distribution. It is generally accepted that skewness values of less than |0.5| are considered small (Field, 2013).

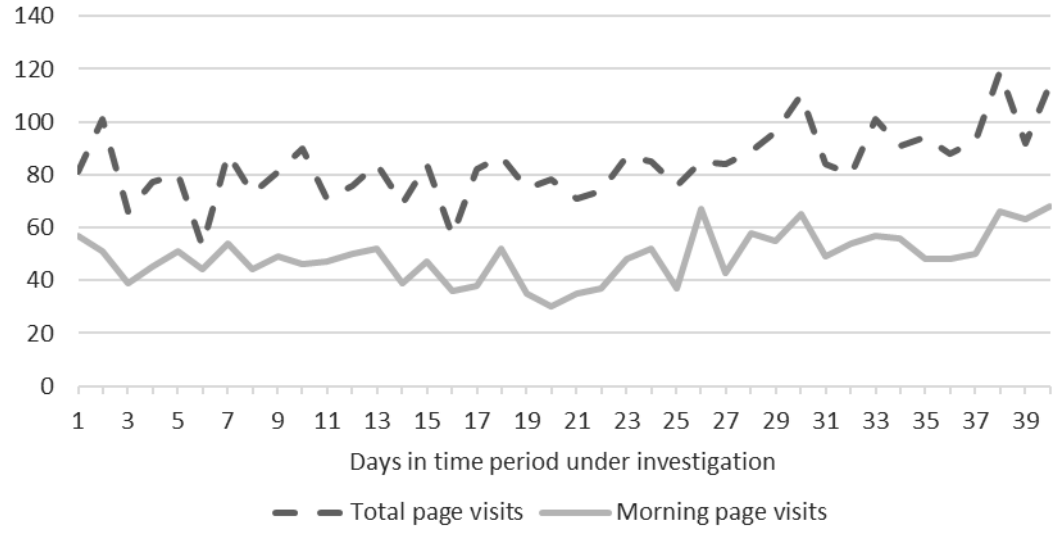
Figure 3: Total and average page visits in morning by hour



Source: Author's own work.

During the time period under investigation, we observed a spike in page visit data, similar to one which motivated our hypotheses (Figure 2). As shown in Figure 3, the most popular hour for page visits was 11:00 by both total and average page visits. We thus confirm the tendency to visit the restaurant page mostly in the morning hours. Figure 4 shows total and morning page visits in observed period. Both variables correlate at significance level 0.01.

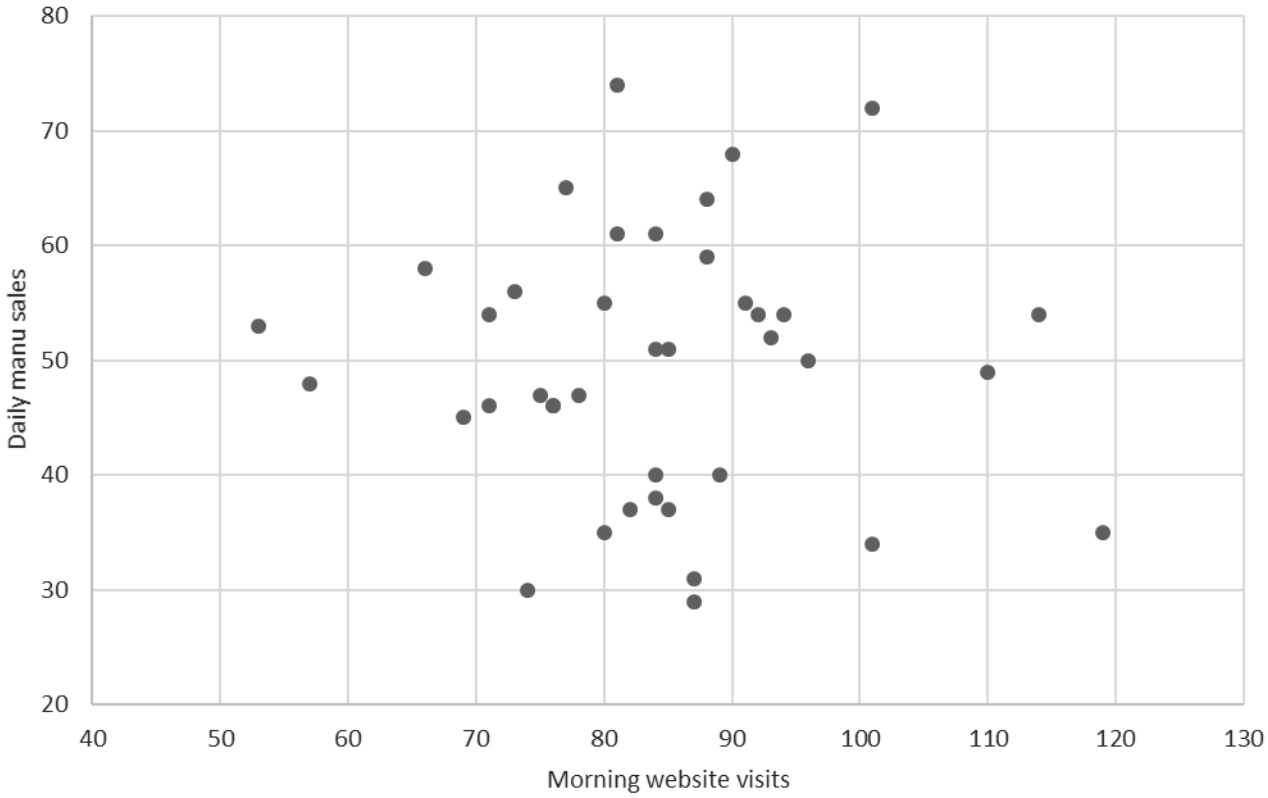
Figure 4: Total and morning page visits in period



Source: Author's own work.

From Figure 5 it possible to see with the naked eye that these variables are not related. Nevertheless, we perform a quick statistical evaluation of the hypothesis. For our first hypothesis: Number of morning visitors on the website influences daily lunch menu sales. The process is as follows. We set the null hypothesis, that there is no correlation (H_0: r = 0) and alternative hypothesis that there is correlation (H_1: r > 0). The correlation coefficient of r = 0.06 suggests slight correlation between the two variables. By calculating t-statistics (0.38) we can match the p-value (0.70) with significance level α and accept the null hypothesis. In conclusion, there is not sufficient evidence to confirm a relationship between daily lunch menu sales and morning website visits.

Figure 5: Daily lunch menu sales and page visits in morning hours

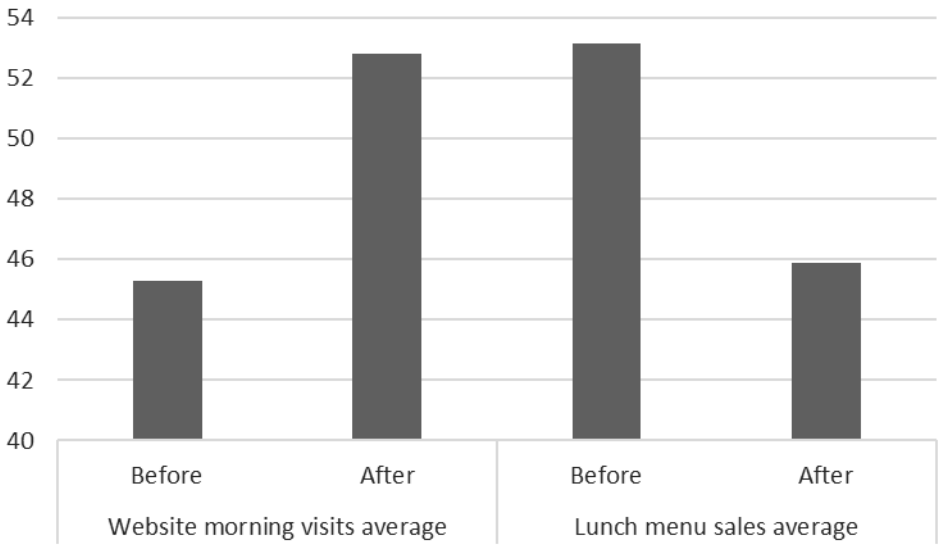


Source: Author's own work.

We can now proceed to our second hypothesis, which suggests that a decrease in page load time leads to an increase in the number of daily lunch menus sold. To determine whether this difference is causal, we conducted a t-test to compare the means of the before and after periods. The null hypothesis for this test was that there was no difference in means (H_0: $m_1 = m_2$), while the alternative hypothesis was that there was a difference (H_1: $m_1 \neq m_2$). The P-value (0.04) for the test was lower than alpha (0.05), indicating that there is a statistically significant difference between the two data sets. Therefore, we reject the null hypothesis and conclude that there is a statistically significant difference between the means of the before and after periods. Interestingly, the measured difference is in opposite directions. The higher the speed for the website, the lower the number of daily lunch menu sales.

Figure 6 visually presents the results. During the pre-intervention period, there were fewer morning visits to the website, a trend not attributable to changes in website loading speed but likely influenced by other factors. Additionally, prior to the intervention, lunch menu sales were higher compared to after we reduced the website loading time. These findings suggest a complex interplay of variables impacting website traffic and lunch menu sales.

Figure 6: Before and after period daily results



Source: Author's own work.

Conclusion

The data highlights the financial challenges faced by the restaurant industry, as consumers are actively seeking ways to save on lunch expenses in response to the steep rise in food prices. Restaurants need to adapt to this changing consumer behavior by offering more affordable meal options and ensuring competitiveness in the market. In this study, the aim was to investigate the financial implications of website performance on restaurant visitor traffic. Based on our findings, it appears that restaurant website traffic is not significantly related to daily lunch menu sales. This suggests that factors other than website traffic may be more important in driving restaurants visits. Additionally, we found that lunch menu sales during the first period of our observations (the before period) were not significantly different from those in the second period (the after period) during which we took steps to speed up the website. Overall, these results suggest that website performance may not be a major factor in driving lunch menu sales, at least in the context of this study.

In today's digital age, people rely more and more on online information when making dining choices, and it is therefore crucial for restaurants to consider their website design and speed in order to effectively reach and attract potential customers. On the other hand, it is important for small businesses, to carefully consider their limited resources when making financial decisions in this regard. While some business consultants may recommend investing in website design and speed to increase sales, it is important to recognize that what works for e-commerce businesses may not necessarily apply to the restaurant industry. While investing too much in website design and speed may not yield significant increases in sales, a poorly designed or slow website can also have negative effects on the long-term brand image and reputation of the business. Therefore, it is important for restaurants to find a balance in their investment in website design and speed.

The literature search found that many authors claimed that site speed matters and can even affect loyalty, user experience and other feelings that are connected to the subsequent sales (Nielsen, 2000; Kim & Lim, 2001; Yen et al., 2007). But the vast majority of these articles described the e-commerce environment. There is almost no detailed information available on the impact of web speed on consumer behaviour in the real physical world.

Every study has its own set of limitations and constraints, and this study is no different. One of the main limitations of this study is the limited time frame of the data collection, which was only two months long, with one month serving as the before period and the other serving as the after period. Habits play a role in the selection of a restaurant for lunch and those are formed over an extended period of time. Some effect of page speed improvement thus can be spotted beyond the observed period. However, there is also an immediate effect expected. As a result of habits, people have a repertoire of brands in almost all categories from which they buy. So being one of the restaurants in a customer's repertoire is a sign of loyalty and people habitually select the restaurant from time to time. But having a habit does not mean visiting the restaurant without knowing what is on the daily menu (see: Figure 2). Being in a repertoire means the restaurant is in the room when the decision is made. But in this repertoire, there will still be a decision and evaluation of the alternatives each day. If the restaurant has a slow website, this could lead many customers not to wait and check

other restaurants where they can find the daily menu quickly. If they are satisfied with the first offer, they select it and do not come back to the slower page.

Moreover, there has been no control group due to difficult access to sensitive commercial sales data. This problem could be solved by analyzing data from another local restaurant to control for any extraneous variables. The economic situation in central Europe at the time of the study was also a potential limitation, as fluctuations in gas and electricity prices may have affected consumers' willingness to visit restaurants. However, data from daily website visits showed higher interest in restaurant website content (Figure 2). Further, our assumption that users in the control month were not seeing the daily menu quickly enough to stay on the page until it loaded all the content cannot be fully supported by evidence. The final limitation of this study is that we may not have been able to sufficiently speed up the website. Even after the website update, some users may still perceive the speed as being slow and leave the website before seeing the content, which could potentially impact our findings. These limitations may impact the generalizability of our findings and should be taken into consideration when interpreting the results of the study.

Further research is needed to fully understand the factors that influence lunch menu sales and to identify potential strategies for increasing restaurant sales. Planned research will explore the more detailed relationship between web loading speed and restaurant daily menu sales. Results from other restaurant businesses will be included so that differences can be observed. Also, the research will be longitudinal to see how results change over a longer time scale. We will also include in future research the impact of social media and observation of web traffic when promoting special offers.

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