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Foreword

The world is changing. These words from the bestseller The Lord of the Rings now might be applicable to our new economic reality more than on the regular business days. Even though economy appears to be able to bounce back from any major disturbances for now, we face accelerated pace of crises breakouts – wars, rebellions, indebtedness, deterioration of skills, inflation, pandemics. The resilience of the system thus gradually becomes a good study area.

It is our great pleasure to present herewith the collection of papers presented at the 26th International Scientific Conference for Doctoral Students and Post-Doctoral Scholars EDAMBA conference that took place on 13th through 14th September at Matej Bel University in Banska Bystrica in Slovakia. The conference was a second edition of the collaboration of University of Economics in Bratislava with the Slovak Economic Association (SEA), a full member of the International Economic Association (IEA) as a world federation of national economic societies founded in 1950 for the development of economic science and economic policy.

The presented collection of papers responds to rather wide variety of economic problems arisen in these challenging times. It addresses the problems of unemployment, current geopolitics, impact of pandemics as well as various financial instruments launched to curb the rising financial destabilization of economies.

We can only hope that this collection of works can show to our interested readers the evidence they seek in this gradually puzzling world and make enjoyable and inspiring reading.

Paula Puškárová

Conference Chair
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Effects of Externality on Trade Dynamics and Sustainable Development in the European Economy

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Abstract. This research is concerned with the effects of externality on trade dynamics and sustainable development in the European Union Economy. The focus on trade dynamics as a measure of a country's degree of responsiveness to international trade is critical where relative changes in the socio-economic trend and sustainable growth and development are essential. This paper aims to compare the relative measure of each country's share of trade vis-à-vis the imports and exports to the gross domestic product (GDP) and to also ascertain the level of each country's response to externality concerning sustainable growth and development. 2009 to 2019, representing the period after the 2008 global recession and the covid-19 pandemic were used as the period under consideration. The ratio of trade to GDP was employed in the analysis to ascertain the level of trade in the European Union market. The findings showed that the relative comparison of the level of trade to the GDP in the European countries responded positively as an indicative measure of externality in assessing the sustainable economic development between countries in the European economy. This research is a significant contribution geared towards improving the economic realities of sustainability, leading to enhanced productivity within the context of international trade and externality in the European economy.

Keywords: Trade Dynamics, Sustainable Development, Externality.

JEL Classification: *F10, Q01, H23*

1   Introduction

The objective of this paper is to assess trade dynamics as a function of socio-economic reality on sustainable development, relative to externality within the European countries. This would ascertain the statistics of trade merchandise in the European Union vis-à-vis its imports and exports from 2009 to 2019. The author would be employing the World Economic Outlook database and the Eurostat database as the

desired metric for the analysis based on trade imports and exports of the 27 countries in the European Union. It is expected that the available resources of a particular country could stimulate the level of output of the economy considering its GDP, increase in investment, reduced cost, and adequate production of goods and services.

Table 1: Trade exchange across the European Union Countries 2009 – 2019

COUNTRY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	78.4	78	77.4	76.5	76.6	76.8	76.8	78	77.3	77.6	78
Belgium	70.4	69.1	67.7	67.6	66.4	65	62.8	63.8	64.5	64.6	64.2
Czech Republic	78.1	75	74.7	75.4	76.8	77.4	77.3	78.8	78	76.5	76.1
Denmark	69.9	69.9	70.5	70.3	70.3	69.5	69.5	71.3	69.7	70.1	70.3
Finland	65.1	64.2	61.5	62.8	66.3	68.1	73	73	71.7	70.2	71.4
France	69.5	68.5	67.4	67.1	67.8	68.3	69.1	69.9	69.5	68.5	68
Germany	64.7	63.3	63.5	63.6	64.7	65.5	65.6	66.3	66.3	66.4	66.8
Greece	57.1	55.3	52.6	47.6	48.4	49.9	54.7	57.1	55.3	52.6	53.3
Hungary	68.9	68	69.8	70.7	71.7	75.2	76.6	77.7	76.1	74.6	73.6
Ireland	65.5	65.9	66.4	64.3	67.4	67	66.1	65.5	65.6	63.8	65.6
Italy	57.9	55.2	54.1	53.3	55.4	57.1	58.7	60.8	60.2	58.8	59.4
Latvia	75.5	76.1	77.7	78.2	80	80.4	79.3	80.4	78.6	74.8	77.7
Lithuania	59.1	56.6	56.8	57.6	60.3	65.6	67.7	71.1	70.6	68.9	69.1
Netherlands	49.1	46.9	46.7	45.4	46.3	45.8	45.8	46.9	46	45.6	45.2
Poland	72.7	70.8	70	67.7	69	69.6	70.7	72.4	71.7	70	69
Portugal	78.6	76.4	73.3	71.5	72	74.8	76.5	77.8	76.3	75.9	76.4
Slovakia	75	72.6	73.3	73.6	74.1	76.3	78.6	80.1	80	79.7	80.8
Slovenia	75.3	72.5	72.2	72	70.1	69.1	70	70.9	69.4	67.2	63.3
Spain	62.4	59	56.9	54.2	55.3	57.3	60.7	61.9	59.7	58.8	58.4
Sweden	68	67.1	68.2	67.3	68.9	68.8	70	71.1	71.5	70	70.1

Source: Authors Calculation/ Eurostat Database
International Trade of all total products imports (%) and exports (%) in the EU

The relative share of trade exchange between these economies showed dwindling differences according to the Eurostat database report (Table 1.). These differences are cited first, in comparison to the highest figure as indicated in the Slovak Republic, and second, in contrast to the lowest figure as showed by the Netherlands in the European Union market. However, this peculiarity in trade differences may not be necessarily due to the prevailing economic realities before the pandemic, it could be further researched to ascertain these economic realities of trade during the pandemic.

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[1] Eurostat database Report
[2] IMF: World Economic Outlook Database

The World Economic Outlook database report showed the Real GDP growth rate within the European Union economies in 2009 (Table 2.). The Republic of Ireland had the highest Real GDP growth in percentage change in the European Union, while Italy suffered a setback in GDP without a total recovery from the 2008 crisis.

Table 2: GDP growth rate in percent change in the European Union 2009 – 2019

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	-3.8	1.8	2.9	0.7	0	0.7	1	2	2.4	2.6	1.4
Belgium	-2	2.9	1.7	0.7	0.5	1.6	2	1.3	1.6	1.8	1.8
Czech Republic	-4.7	2.4	1.8	-0.8	0	2.3	5.4	2.5	5.2	3.2	3
Denmark	-4.9	1.9	1.3	0.2	0.9	1.6	2.3	3.2	2.8	2	2.1
Finland	-8.1	3.2	2.5	-1.4	-0.9	-0.4	0.5	2.8	3.2	1.1	1.3
France	-2.8	1.8	2.2	0.4	0.6	1	1	1	2.4	1.8	1.8
Germany	-5.7	4.2	3.9	0.4	0.4	2.2	1.5	2.2	2.7	1.1	1.1
Greece	-4.3	-5.5	-10.1	-7.1	-2.7	0.7	-0.4	-0.5	1.3	1.6	1.9
Hungary	-6.7	1.1	1.9	-1.4	1.9	4.2	3.8	2.1	4.3	5.4	4.6
Ireland	-5.1	1.8	1.1	-0.1	1.3	8.7	25.2	2	8.9	9	4.9
Italy	-5.3	1.7	0.7	-3	-1.8	0	0.8	1.3	1.7	0.9	0.3
Latvia	-14.3	-4.4	6.5	4.3	2.3	1.1	4	2.4	3.3	4	2
Lithuania	-14.8	1.7	6	3.8	3.6	3.5	2	2.5	4.3	3.9	4.3
Netherlands	-3.7	1.3	1.5	-1	-0.1	1.4	2	2.2	2.9	2.4	2
Poland	2.8	3.7	4.8	1.3	1.1	3.4	4.2	3.1	4.8	5.4	4.7
Portugal	-3.1	1.7	-1.7	-4.1	-0.9	0.8	1.8	2	3.5	2.8	2.7
Slovak Republic	-5.5	5.9	2.8	1.9	0.7	2.6	4.8	2.1	3	3.6	2.5
Slovenia	-7.5	1.3	0.9	-2.6	-1	2.8	2.2	3.2	4.8	4.4	3.3
Spain	-3.8	0.2	-0.8	-3	-1.4	1.4	3.8	3	3	2.3	2.1
Sweden	-4.3	6	3.2	-0.6	1.2	2.7	4.5	2.1	2.6	2	2

Source: World Economic Outlook Database
International Monetary Fund

The underlying socio-economic indicator envisaged from externality in this analysis, may not be unconnected with the effects of externality on trade dynamics, which presumably could impact sustainable development in the European economy. The influence of this analytical trend on externality, whether negative or positive considering the overall cost and benefit is critical to this analysis. The objective of this paper is to analyze the effects of trade externality as a socio-economic indicator and its inherent relationship to sustainable development in the European Union economy from 2009 to 2019. In the next section, the theoretical framework of the research is treated with emphasis on the socio-economic effects of externality. The methodology and hypothesis tested are discussed in section three. The results section reveals the computed figures for countries and products with the likely effects on trade, and the economies in terms of the economic growth and development in the European Union.

2 Theoretical framework and review of literature

The socioeconomic implication of trade on externalities has been a controversial subject transcending the years of research with diverse recommendations surrounding both negative and positive externalities. The perceived implication had not necessarily

created an all-inclusive report that could determine a standard approach to its computation. The reason is that externality has become a subject of controversial debate over the years with diverse intuitions and professional speculations emanating from economic researchers concerning the costs and benefits. Although the concept of the reality of externality has been generally accepted, however, it had remained ambiguous irrespective of the in-depth study. This in-depth study of externality is not limited to economics in particular as viewed by notable scholars: Zhang (2016) in the banking sector, Zhou (2014) from the insurance perspective, and Lui (2014) in the Coal mining sector. William (2005), argued that "when the choices of economic agents indirectly impose a cost upon others, equilibrium behavior is inefficient". This is a likely insinuation of some schools of thought who saw externalities from the perspective that its indulgence could lead to market failure, as price equilibrium does not truly reflect the real cost and benefit of a product or service (Adigwe, 2022, p. 7). The conceptualization of externality in economics is a fundamental indication of the cost and benefit indirectly associated with a third party that is not involved with the activities initially performed by the original party.

This concept possibly denotes that externalities are majorly attributable to market failure. The emergence of this assertion is not unconnected with the availability of resource allocation where the production or consumption of a certain product or service is not in tandem with the true cost of the product or service in the economy. A negative externality is perceived as the external cost associated with economic activity that affects a third party who is unconnected with the activity. The most widely used sample is in the area of environmental pollution where it is a cost on those who are primarily external to the production and consumption of the products, causing the pollution. However, some renowned scholars on this subject such as Coarse, Pigou, and Marshall had viewed externality from different perspectives.

According to Jing et al. (2018), the studies on externality by Marshall, Pigou, Coarse, and other renowned scholars have greatly improved the understanding of externality issues and the insinuation that they have provided inconsistent discussions. Jing et al. further remarked that "Marshall's externality refers to the impact from activities incidence on other economies, with an example of this tragedy on the common man.

Pigou's perspective on externalities referred to the influence of the payers on society and the natural environment, which includes global warming and intergenerational equity in sustainable development theory. On the part of Coarse's externality, he advocates the influence of the players on direct participants, which are likely the effects of the sewage from the factories on fish farms." Arthur Pigou (1920) originally conceptualized externality where he argued that equality of tax to marginal external cost viewed from the perspective of negative externalities could reduce their incidence effectively. Although, there have been diverse views by economists on the need to tax or rather regulate negative externalities. Various economic groups and agents often characterize externalities through market prices whereby there is an inclusion of both costs and benefits. Although, some economists argue that the best achievable method

of guaranteeing this characterization is first; imposing taxes on those engaged with the externality, second: where there is no tax imposed, a minimal point of externality could trigger the imposition of tax automatically.

Kenneth Arrow (1970) further argued that creating a market for an externality is the solution to the issues of externality. However, Frank Knight (1924) thought that government in a differential tariff was used to either provide an incentive to cease negative practices or provide funds for improvement. Meanwhile, Wong (2000) asserted that "externalities imply misallocation of resources, and some corrective policies may have to be taken by the government." Wong emphasized that action creates an externality where some conditions are satisfied. He emphasized that intervention may not necessarily be the solution to externalities rather, it is better to privatize the market within the facets of the economy. However, externalities have been perceived by environmental analysts in the area of pollution with the emergence of its related cost implication. In his remark, Ha-Joon Chang stressed that "people 'over-produce' pollution because they are not paying for the costs of dealing with it".

[3] Adigwe E.O (2022) "A Comparative Analysis of Competitive Trade in a Cluster Market of the EU", p. 12

[4]. Arrow K. (1970) "Political and Economic Evaluation of Social Effects and Externalities", pp. 1-30

[5] JING, W. – SUN B. (2018): "Negative Externalities in the Sharing Economy", pp. 149-163

[6] Knight, F.H (1924): "Some Fallacies in the interpretation of Social Cost", pp. 582-606

According to Mark S. LeClair et al. (2006), "It is argued that products such as timber, minerals, and agricultural produce that produce large negative environmental externalities should be considered: First, where it affects the economic environment that are facing the other agents. Second, where it is fully penalized or compensated for. However, some ecological economists argued against externality since diverse critical reasoning and integration of science are lacking in the concept. They assume that the environmental and community costs and benefits are presumed to likely cancel each other reciprocally. However, the author thinks that trade externality in this regard is directed towards environmental degradation where it is operated, which may likely trigger the need for cost implication. The WTO in its report clearly stated that environmental degradation occurs as a result of the fact that producers and consumers are not penalized to pay for the cost of their actions.

The further emphasis is the view that adequate environmental policies are targeted towards environmental market failures and domestic policies. However, should the targeted policies be put in place, free trade would be the best trade policy. Hence, the fundamental question is: how do we value the effects of trade on a third party (externality)? And is the effects a cost or a benefit? The author assumes that where a cost arises, it is negatively geared but, where a benefit arises, then the effects is presumed to be positively geared towards enhancing sustainable development. However, it is noteworthy that some environmental economists have tried measuring the costs for the valuation of externality using "contingent valuation" techniques, which may not necessarily be useful in terms of their reliability and accuracy for measuring environmental cost.

3 Methodology

The desired metric for the analysis is the World Economic Outlook database on the trade imports and exports of 27 countries that make up the European Union. A method of determining the level of trade was considered from 2009 to 2019 to ascertain if the level of trade associated with externality is positive or negative and its significant effects on sustainable development. The author views the level of trade as the total trade of a country relative to each country's GDP.

In this study, a predictive statistical model was applied to define the mathematical computation. The study used data collated by the World Economic Outlook database and the Eurostat database report. The focus of the analysis is on the total trade of the 27 countries that make up the European Union and their GDP with a positive LOT index. The data of each country´s trade comprising exports and imports of the market products and services was compared relative to one another to arrive at their LOT. The author used the Level of Trade (LOT) computation to determine the extent of trade externality within the European Union economy through a mathematical computation formulated for obtaining theoretical results for each of the specific country's economies.

The total trade of the European Union countries from 2009 to 2019 was divided by the gross domestic product (GDP) within the same period to arrive at their level of

trade. The objective of the study is to compare the relative level of each country's trade to each country's GDP to ascertain if each country´s externality is worthwhile or otherwise. In other words, it is expected to ascertain the aggregate weight of the total trade in the economy. The author's viewpoint of choosing the trade-to-GDP ratio is due to its comparative importance as an economic indicator of the international trade of a country. The Level of trade formula is given as follows:

$$Lotji = (Jx\ \%) / (k)$$

For a secondary data analysis, data collected from the Eurostat and the World Economic Outlook database was used.

The following hypotheses were tested:

H 1: There is a positive level of trade between countries in the European Union indicating socio-economic development from 2009 to 2019.
H 2: Trade externality in the European Union economy is favorable irrespective of the world environmental report on sustainability.

4 Study Results

The computation of the Level of Trade (Lotji) was carried out on 20 countries in the European Union. The data analysis of each country was compared relative to one another to arrive at their Lotji (Table 3.).

H 1: There is a positive level of trade between countries in the European Union indicating socio-economic development from 2009 to 2019. This however confirms the hypothesis.

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8 Leclair, M.S. – FRANCESCHI, D. (2006): Externalities in International Trade, pp. 462-472

9 PIGOU, A.C (2017) Welfare and Economic Welfare, the Economics of Welfare, pp. 3-22

10 WILLIAM, H.S (2005): Negative Externalities and Evolutionary Implementation, pp. 885-915

11. Wong, K. (2000): Externality in the Theory of International Trade, pp. 2-3

Where Lotji is the Level of Trade of the specific country j's externality x; which is a function of the specific country's trade exchange Jx and the Real GDP (k). A level of trade with worthwhile externality is achieved where Lotji is positive. This invariably means where there is a positive level of trade in the calculation, there is a positive externality and vice versa.

It is indicative that almost all the 20 computed data on the level of trade externality in the European Union revealed a negative externality except for Poland in 2009 (Table 3.). But, by the end of 2019, all the computed European countries showed a positive trade externality, which indicates a positive level of trade between countries in the European economy translating to socio-economic development within the period under review.

Table 3: Level of Trade Externality of Countries in the European Union 2009 – 2019

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	-20.63	43.33	26.69	109.29	0.00	109.71	76.80	39.00	32.21	29.85	55.71
Belgium	-35.20	23.83	39.82	96.57	132.80	40.63	31.40	49.08	40.31	35.89	35.67
Czech Republic	-16.62	31.25	41.50	-94.25	0.00	33.65	14.31	31.52	15.00	23.91	25.37
Denmark	-14.27	36.79	54.23	351.50	78.11	43.44	30.22	22.28	24.89	35.05	33.48
Finland	-8.04	20.06	24.60	-44.86	-73.67	-170.25	146.00	26.07	22.41	63.82	54.92
France	-24.82	38.06	30.64	167.75	113.00	68.30	69.10	69.90	28.96	38.06	37.78
Germany	-11.35	15.07	16.28	159.00	161.75	29.77	43.73	30.14	24.56	60.36	60.73
Greece	-13.28	-10.05	-5.21	-6.70	-17.93	71.29	-136.75	-114.20	42.54	32.88	28.05
Hungary	-10.28	61.82	36.74	-50.50	37.74	17.90	20.16	37.00	17.70	13.81	16.00
Ireland	-12.84	36.61	60.36	-643.00	51.85	7.70	2.62	32.75	7.37	7.09	13.39
Italy	-10.92	32.47	77.29	-17.77	-30.78	0.00	73.38	46.77	35.41	65.33	198.00
Latvia	-5.28	-17.30	11.95	18.19	34.78	73.09	19.83	33.50	23.82	18.70	38.85
Lithuania	-3.99	33.29	9.47	15.16	16.75	18.74	33.85	28.44	16.42	17.67	16.07
Netherlands	-13.27	36.08	31.13	-45.40	-463.00	32.71	22.90	21.32	15.86	19.00	22.60
Poland	25.96	19.14	14.58	52.08	62.73	20.47	16.83	23.35	14.94	12.96	14.68
Portugal	-25.35	44.94	-43.12	-17.44	-80.00	93.50	42.50	38.90	21.80	27.11	28.30
Slovak Republic	-13.64	12.31	26.18	38.74	105.86	29.35	16.38	38.14	26.67	22.14	32.32
Slovenia	-10.04	55.77	80.22	-27.69	-70.10	24.68	31.82	22.16	14.46	15.27	19.18
Spain	-16.42	295.00	-71.13	-18.07	-39.50	40.93	15.97	20.63	19.90	25.57	27.81
Sweden	-15.81	11.18	21.31	-112.17	57.42	25.48	15.56	33.86	27.50	35.00	35.05

Source: Author's Calculation/ World Economic Outlook Database
International Monetary Fund

Irrespective of the author's presumption that the share of trade exchange in the European Union formed an integral part of this analysis, it is instructive that Greece showed a negative externality from 2009 to 2019 except the year 2014. Austria, Belgium, Denmark, France, Germany, Lithuania, Poland, and Slovakia were among the countries with positive externality in line with the author's calculation. The author assumes that the negative report indicated in 2009 was a result of the fallout of the 2008 global recession whose spillover negatively affected global economies.

The data for the other 7 European countries was not available at the time of this computation. However, since the result showed about 74 percent of the research analysis, the H 1 hypothesis is validated.

    H 2: Trade externality in the European Union economy is favorable irrespective of the world environmental report on sustainability

This analysis validates that the level of trade externality in the European economy is worthwhile since it indicates a positive externality given the above statistics (Table 3.). The Lotji proves H 2 to be true.

This invariably means that trade externality is beneficial since the hazardous contingencies must have been compensated for, where cost implication is critical and health hazards are considered in the European economy. However, the environmental health implication and the extent of the hazardous contingencies are not within the scope of this paper.

5   Discussion

Several researchers who are environmentalists saw the need for environmental assessment, cataloged as a suggestion to mitigate negative effects and maximize positive ones. These researchers suggested the use of Environmental Impact Assessment (EIA). In his report, Kominkova (2016) explained that EIA was developed as a tool to minimize the negative effects of human activities on the environment. El-Haggar et al. (2003) concluded that solutions to any given environmental pollution problem should be developed, analyzed, and compared through environmental effects and economic assessments.

The term 'externality' in economics is a major concern directed to the effects it reflects on others, which could either be a benefit or a cost, invariably estimated to be external to the market economy. A negative externality is regarded as an indirect cost to an entity. Since air pollution is detrimental to human health, it is adduced a negative externality, especially where the current campaign on sustainability is on market trade. In addition, a positive externality is perceived as an indirect benefit to an entity. Although, while many research scholars view positive externalities as a benefit, it is argued that they signify market failures since the likely production of good and services are not optimized in the market. This is due to the assumption that the goods and services are not distributed efficiently.

6   Conclusion

Externalities tend to arise when there is a comparable competitive equilibrium between its socio-economic effects on the market. The socio-economic effects is however a consideration of the direct factors that necessitated it. The author assumes that the level of trade externality in the European market is a function of each country's inherent disposition to trade. In the author´s opinion, where there is a provision for compensation irrespective of the cost imposed due to externality, then trade externality is beneficial. However, the computation of trade externality is a function of the relationship existing between the country's export and the value of the GDP.

The results showed that trade dynamics have positively geared sustainable development in the European economy irrespective of the existence of trade externality. This, however, suggests that the effects of externality is insignificant in the analytical computation since there is no scientific valuation of determining the costs of environmental degradation, which is a part of the externality. However, some other factors not mentioned in this paper could as well affect sustainable development in the European Union. These factors are relevant for further future research. Remarkably,

sustainable development in the European Union economy has three interlinked and equal dimensional areas of concern that could be associated with factors inherent to sustainable development, which are economic, social, and environmental factors. Meanwhile, there is a lingering perception that "it is not possible to achieve a desired level of ecological or social or economic sustainability (separately) without achieving at least a basic level of all three forms of sustainability, simultaneously."

It is indicative that this is one of the European Union´s fundamental objectives. According to the special report by the European Union Commission´s political strategy center, another factor that could affect sustainable development is the "global existential challenge", which urgently requires a common EU policy response. This is arguably one of the economic factors that impact sustainable development within the European Union economy.

The fundamental aspect of the social factor on sustainable development in the European Union is where social justice gives prominence and credibility to social rights, equality, and human dignity. Meanwhile, it is argued that where social and economic performance is concerned, there remains a huge task of determining whether the present level of welfare condition could be sustained for future generations. However, there are calls for concerns about climate change and sustainability, where environmental and climatic events need urgent intervention in the wake of time. According to the recent standard Euro barometer survey where environmental factors need to be emphasized, some proactive steps are already been carried out to mitigate the effects of climatic conditions necessitated by environmental factors. Some countries in the European Union like Spain, Italy, and Latvia have already taken a leading position in ensuring a sustainable transformation in response to extreme climatic events. The Austrian government has equally commenced a Klimabonus for all Austrian residents since October 2022, meant to cushion the effects of climatic change due to CO2 emission on its citizens.

The study of sustainability is a significant contribution considering the negative effects of 'greenhouse gases' and carbons emitted during the production process, which had necessitated climate changes and diverse environmental issues. However, in arriving at the author's calculation, the costs associated with externality, and its consequential effects are not reported as part of the cost of production or associated with the market prices of goods and services. This is evidently beyond the scope of this paper, and a basis for further research on the study of externality and sustainability.

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Students' Perception of the Importance of Participating in DRS System

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Abstract. The Deposit Refund System (DRS) encourages people to recycle plastic bottles, which helps to reduce the amount of waste that ends up in landfills and also protects the environment. The aim of this article was to find out the level of motivation of students of the Univesity of Economics in Bratislava, from the Faculty of Commerce to participate in the DRS and to define the highest motivation factor that would increase their level of motivation. The aim of the article was also to investigate the current state of the subjective perception of student retention, as well as the possible influence of education.

Keywords: Recycling, Education, Deposit Refund System, PET bottles, Cans, Sustainable Development, Waste Management.

JEL classification: *Q56, Q58, M31*

1 Introduction

Nowadays, plastic is a very important and necessary material, but it is necessary to take care of its impact on the environment and the efficiency of its use (Watkins, E., et al., 2019). The DRS is one of the economic instruments used for environmental protection that helps with several environmental and social problems (Numata, D., 2009). First, it can reduce waste by encouraging people to return their empty PET bottles and cans instead of throwing them away. Secondly, thanks to this system, it is possible to increase the rate of recycling and reduce the use of original materials. Many studies that have been conducted have confirmed the positive impact of DRS on reducing inappropriate waste disposal (Calabrese, A., et al., 2021). When people return their empty packaging, it can be properly recycled and reused, reducing the need to extract and process new materials. Finally, a DRS can also generate economic benefits, such as creating jobs in the recycling industry and generating revenue from the sale of recycled materials. It can also reduce waste management costs, which can benefit communities and local governments. The DRS enabled the reduction of environmental pollution and promoted the recycling of a large amount of materials (Numata, D.,

2009). It is therefore an effective approach to reducing waste and increasing the rate of recycling (enviweb.cz, 2003). The aim of this article was to find out the level of motivation of students of the University of Economics in Bratislava to participate in the Deposit Refund System, identify the highest motivation factor and to find out if passing education process about this topic had an impact on students' subjective perception of knowing the target that is set for 2023. We believe the findings will help us to focus our future efforts on increasing participation in the DRS and motivate our students to participate in the DRS to the greatest extent possible. We found out that most of the students from our sample either strongy agree or agree that they are motivated to participate in the DRS. The highest motivation was found to be the deposit amount. We found that only a minority of students think they know the goal set for 2023 for returning PET bottles and cans. Also, only a minority of the students passed the educational process on this topic.

2   Background and literature review

The history of the Slovak deposit return system began in 2003, when the possibility of its implementation was first mentioned. In 2019, a strategy was defined and it focused on recycling of PET bottles and metal and aluminium cans. On January 1, 2021, the Ministry of the Environment established the administrator of the deposit refund system as the governing body of the DRS in Slovakia. DRS Administrator created a consortium of four non-profit professional associations that represent manufacturers and retailers, covering 80% of products in plastic bottles and cans on the Slovak market and approximately 3,000 business establishments. Slovakia launched this system on January 1, 2022 as the 11th European country and it took 10 months (sensoneo.com, 2023). In 2022, Slovakia has introduced a deposit return system for PET bottles and cans. The system requires beverage manufacturers to collect a deposit for their products, which is returned to the consumer by the retailer when empty containers are returned to designated collection points. The goal of the system is to increase the recycling rate and reduce the amount of waste (slovenskozalohuje.sk, 2023). It also ensures a sufficient amount of secondary raw materials for the production of fully recycled packaging (Schneider, D., Tomić, T., Raal, R., 2021). The Deposit refund system requires consumers to pay a deposit which is subsequently refunded when consumers return the reusable part of the commodity (Kulshreshtha, P., Sarangi, S., 2001). For each returned PET bottle and can that is marked with the Z sign and whose volume is from 0.1 to 3 liters, €0.15 is returned to the consumer (odpady-portal.sk, 2022).

By providing a financial incentive for consumers to return their empty packaging for recycling, the system promotes responsible disposal and reduces the amount of waste that ends up in landfills or harms the environment. In 2023, Slovakia must focus on ensuring sustainable, efficient and ecological transport by strengthening and optimising the vehicle fleet or strengthening the infrastructure of intermediate warehouses (asb.sk, 2023). This system is already operating in many European countries.

Fig. 1. Overview of the current status of DRS in European countries (sensoneo.com, 2023).

Some of these countries have been using the system for many years and have seen significant improvements in recycling rates and reductions in waste. The What We Waste study revealed that the 315 million people who live in European countries and do not have a DRS system produce 126 per capita waste from beverage packaging, while in countries that have this system in place (129.4 million inhabitants) it is average waste per person is only 16 beverage packages (sensoneo.com, 2023). In the implementation of this system, we find differences and specifics in different countries, which vary depending on the country and region, but the basic concept remains the same. It is about motivating people to return their empty bottles (odpady-portal.sk, 2018).

The environmental efficiency of this system is determined by the percentage of return. The functionality of the DRS depends on whether the usability, which the consumer receives from returned deposits is higher than the costs associated with returning the product (time, work, etc.).
Assumptions for effective DRS are mainly technical and economic conditions:
● Sufficiently dense networks of collection points.
● Quality logistics of returning products for processing.
● Optimal distribution of processing plants.
● Ensuring the collection of recycled materials.
● Energy-efficient recycling, etc.
It is no less important to ensure all these conditions in accordance with the goals of ecological digital economy (Červeňová, M.,2022).

Implementing a deposit return system can be difficult due to several factors. One of the biggest challenges is the need for infrastructure and logistics to manage the

collection, transport and processing of returned containers. This includes establishing a network of collection points as well as ensuring that retailers have the capacity to handle and store large volumes of returned bottles and cans (minzp.sk, 2018).

Another challenge is the involvement of all stakeholders, including retailers, manufacturers and policy makers. Some may resist the change due to concerns about increased costs or administrative burden. In addition, there may be issues related to public awareness and education regarding the issue. Some people may not be familiar with the DRS or may be resistant to changing their habits, which may limit the effectiveness of the program (wri.com, 2023). Finally, there may be technical and legal challenges to overcome, such as the need to comply with various environmental regulations and requirements (linkedin.com, 2018). Despite the challenges, implementing a DRS is worth it. The benefits of reducing waste and promoting recycling can have long-term positive effects on the environment and public health. In addition, the introduction of such a system can create economic opportunities, such as the development of new jobs in the recycling and waste management sectors (Royne, Marla B., et. al., 2015).

It is important to note that while there may be challenges in implementing a deposit refund system, these challenges can be addressed through careful planning, stakeholder engagement, and effective public communication. With the right approach, it is possible to establish an efficient and sustainable system that will benefit everyone.

Four principles that must be followed to achieve the same collection efficiency:

1. Performance - in order to fulfill the goal and achieve the desired results, it is necessary to match a meaningful amount of deposits with a sufficient amount of collected packaging.

2. Convenience - it is important that the system is practical, fair and easily accessible for consumers and also traders who will choose the packaging.

3. Producer responsibility – The deposit system is funded by producers, their investment will be returned thanks to unclaimed deposits through commodity returns and eco-modulated extended producer responsibility fees.

4. Integrity of the system - Data clearing centers, reliable management of redemption technology and transparent will build confidence in the system (collection-sk.tomra.com, 2023).

An effective DRS is able to capture up to 90% of all disposable packaging (collection-sk.tomra.com, 2023). The biggest advantage of the mandatory deposit-return system for beverage packaging is its proven performance, as the return rate can reach more than 90%. The amount of the deposit gives consumers a reason to return the bottle, thanks to which less waste ends up in landfills (minzp.sk, 2018).

2.1 The deposit return system in Slovakia

In Slovakia, the deposit refund system for PET bottles and cans is a very positive step that could ensure a more sustainable future. It is important to implement policies and promote responsible consumption and management that uses waste efficiently,

thereby minimizing it (euractiv.sk, 2022). The success of a DRS depends on several factors, including public awareness and participation, collection and recycling efficiency, and enforcement. In order to ensure efficiency in achieving goals, it is important to monitor the impact of the system on Slovak consumers, or their willingness to participate in recycling (odpady-portal.sk, 2018). It is important to inform people about the benefits of a DRS for several reasons. First, awareness can increase participation in the system. When people understand the benefits of DRS, they are more likely to get involved and help achieve the goals. The goal set for 2023 is to return 80% of all PET bottles and cans. The return target of 85% is set for 2024, and we should reach 90% in 2025 (minzp.sk, 2023).

Fig. 2. Return targets for PET bottles and cans for the Slovak Republic (Bede, D., 2021).

Motivating people to participate in DRS can be challenging. However, there are some aspects as education, convenience, incentives, awareness campaigns and community involvement that can help (slov-lex.sk, 2023).

By combining these strategies, it is possible to motivate more people to participate in the deposit return system and have a positive impact on the environment. This system deals with the reduction of the most visible part of waste in cities and nature and to achieve the goals in the field of recycling (Balcers, O., Brizga, J., Moora, 2019). The financial reward proved to be the only system capable of ensuring 90% recycling. The system works on a principle that is based on charging a surcharge that reflects the cost of inefficient packaging disposal. Subsequently, when it is returned, there is a discount in the amount of the fee paid, which ensures that the packaging is returned in good condition and can be used again. The financial motivation can ensure the circulation of the life cycle of materials such as plastic and aluminum (ecobnb.com, 2020).

3   Research objectives and methodology

The aim of this paper was to find out if students of generation Z from the Faculty of Business at the University of Economic are motivated to participate in the DRS system in Slovakia and to find which is the highest motivation factor that increases their motivation. The aim of this article was also to find out if passing the education process

about this topic has an impact on students' subjective perception of knowledge about the target that is set for returning PET bottles and cans for Slovakia in 2023. The main goal could be fulfilled with the help of a sub-goal, which represented obtaining information about the DRS in Slovakia.

To achieve the set we used universal methods as deduction, abstraction, collection, analysis, synthesis and primary quantitative research. In the primary quantitative research, we addressed students of the Faculty of Business from the University of Economics in Bratislava. Students from were asked to fill out a questionnaire in which they answered their attitude towards the backup system in Slovakia. The survey took place for 2 weeks from 12/04/2023 to 26/04/2023 and 149 respondents took part in it. The population was defined as the students of the Faculty of Business. Based on this definition, we created a sample.

Representative sample size

$$n = \frac{\left(z^2 \times p \times (1-p)\right) + e^2}{e^2 + z^2 \times p \times \dfrac{(1-p)}{N}}$$

Population size (N): 1100
Permissible margin of error in % (e): 7,47
Variance in % (p): 50
Confidence level in %: 95

n = 149

Research questions formulated by the authors:
RQ1: How motivated are students to participate in the DRS by recycling PET bottles and cans?
RQ2: What is the highest motivating factor?
R3: Do you think you know the target that is set for the year 2023 for the Slovak republic?
R4: Did you pass the education process at the University of Economics that was related to the Deposit Refund system?

4   Results and discussion

In this article we focused on the attitude of students of the University of Economics in Bratislava from the Faculty of Commerce towards participation in the DRS. Our aim was to identify their level of motivation, the highest motivation factor and also whether passing education process about this topic has an impact on their subjective perception of their knowledge of the set target for returning PET bottles and cans in Slovakia in 2023.

RQ1: How motivated are students to participate in the DRS by recycling PET bottles and cans?

Table 1. The level of motivation of students to participate in the DRS by recycling PET bottles and cans.

How strongly do you agree that you are motivated to participate in the DRS? (1 – strongly disagree, 5 – strongly agree)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,3	1,3	1,3
	2	13	8,7	8,7	10,1
	3	12	8,1	8,1	18,1
	4	55	36,9	36,9	55,0
	5	67	45,0	45,0	100,0
	Total	149	100,0	100,0	

Source: Author's own research processed in SPSS

From the table above we can see that 67 students strongly agree that they are motivated to participate in the DRS by recycling PET bottles and cans. Second largest group of students, which is 57 of them answered they rather agree that they are motivated to participate in this system. We found out that 122 (81%) of all students either strongly agree or rather agree they are motivated, 12 (8,05%) students answered that their motivation is neutral, 13 (8,72%) answered that they are rather not motivated and 2 (1,34%) students answered that they strongly disagree that they are motivated.

RQ2: What is the highest motivation factor?

Table 2. The highest motivation factor
What would increase your motivation level?

		Frequency	Percent	Cumulative Percent
Valid	More collection points	59	39,6	39,6
	More advertising campaigns explaining the importance of participating in the DRS	14	9,4	49,0
	Greater awareness of the importance of the DRS in educational institutions	14	9,4	58,4
	Increasing the deposit amount	62	41,6	100,0
	Total	149	100,0	

Source: Author's own research processed in SPSS

From the table above, we can see that 62 students (42%) marked increasing the deposit amount as a highest factor that increases their level of motivation. The second largest

group of students representing 59 (40%) of them identified increasing the number of places to collect PET bottles and cans as the second highest motivation factor. 14 (9%) answered that their motivation would be increased by advertising campaigns and the last part of the students, which is 14 of them (9%) answered that greater awareness of the importance of the DRS in educational institutions would motivate them to participate in the system.

R3: Do you think you know the target that is set for the year 2023 for the Slovak republic?
The question was dichometrically determined, while the emphasis was on subjective perception.

R4: Did you pass the education process at the University of Economics that was related to the Deposit Refund system?

Table 3. The impact of the education process related to the DRS on the knowledge of the amount of the return target of PET bottles and cans

		Do you think you know the target that is set for the Slovak Republic in 2023?		
		Yes	No	Total
Did you pass the education process at the University of Economics that was related to the Deposit Refund system?	Yes	23	34	57
	No	28	64	92
Total		51	98	149

Source: Author's own research processed in SPSS

From the above table, we can see that 51 students (34%) of all students responded that they think they know the return target for PET bottles and cans, which was set for the Slovak Republic in 2023.
We found that only 57 of students (38%) went through educational process regarding the Deposit return system and its importance of which 23 students (40%) think they know the goal that is set for 2023 and 34 (60%) of them think they don't know the goal. 92 of students (62%) did not pass educational process at all and from this group, 28 students (30%) think they know the goal that is set for 2023 and 64 of the students (70%) don't think they know what is the set goal.
From all of the students in total, we found out that from 149 students (100%) only 23 students, which represents 15% of all respondents think they know the target of

returning PET bottles and cans in DRS thanks to the passing the educational process at the University of Economics.

Our effort was to generalize the results to a defined population, for which we used the Chi-square test due to the nature of the data. We recorded the results of the Chi-square test in Table no. 4.

Table 4. Chi-square test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1,787[a]	1	0,181
Continuity Correction[b]	1,342	1	0,247
Likelihood Ratio	1,772	1	0,183

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 19,26.

b. Computed only for a 2x2 table

Pearson's Chi-Square value is 1.787 with 1 degree of freedom. The asymptotic significance is 0.181 (p-value), which indicates that there is no significant association between the variables in the table. The continuity correction value is 1.342 and the likelihood ratio is 1.772, both with 1 degree of freedom. The asymptotic significance for both of these values is above 0.05, indicating that there is no significant association between the variables.

It should be noted that independence can be assumed on the basis of the test, which means that the education process related to the given topic was not related to the knowledge of the goal related to backup, which is set for the year 2023. Due to the non-fulfillment of all assumptions, the Chi-square test can be considered the result is only indicative.

We found that the educational process is poorly set up. It is necessary to focus more time on the topics of sustainability, to explain to young people the importance of participation in achieving the goals set by the European Union.Based on these findings, we recommend intensifying education at the Faculty of Business on this topic, as it is very important for the future of sustainability in our country. It is necessary for young people to participate in the fulfillment of the set goals, because they are the last generation that can prevent global warming (theguardian.com, 2018). We also recommend creating more collection points, as young people stated in the discussion that they do not want to carry empty containers with them. We recommend the creation of collection points at universities, as this factor was marked as one of the highest that

would increase motivation of students. It would also be appropriate to educate young people about this issue by using marketing campaigns that would explain the importance of participating in the DRS, as those campaigns. The state, universities and interest groups should increase the intensity of their communication and intensively communicate the benefits of this system in detail

5   Conclusion

The deposit return system represents an effective and sustainable solution for various environmental challenges. It supports responsible consumption and conservation of resources and reduces waste generation. By refunding the monetary value for returning PET bottles or cans, consumers are motivated to participate in the DRS, which leads to an increase in the recycling rate and also to a reduction in the amount of waste. We found that the amount of the deposit is the highest motivation factor for the students of the Faculty of Business of the University of Economics in Bratislava. The second highest motivation factor is increasing the number of collection points, where they can return used PET bottles and cans. Regarding students' motivation to participate in the Deposit refund system, 81% of the students have a positive attitude and answered that they strongly or rather agree that they are motivated to participate in this system. We also investigated whether the educational process about the importance of the DRS changed their subjective perception regarding the knowledge of the return target set for Slovakia for 2023. We found that out of 149, 92 students did not pass the education process at all, 57 students passed the education process and most of them, representing 34 (60%) students, still do not think they know what goal is set for 2023 for Slovak republic.

This research was conducted only at the Business Faculty, it would be appropriate to conduct research at the entire University of Economics in Bratislava and also at other universities, because it is these educational institutions that create the behavior of young people. In the future, it would also be appropriate to address the attitude of young people towards the researched problem, so that the consequences of these behavioral intentions can be better understood. Other studies conducted on young Slovaks (e.g. Čvirik-Ölveczká, 2020, Čvirik et al., 2021) reached similar conclusions about the need to increase education.

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The Relationship Between Unemployment and the Risk of Poverty in the Slovak Republic

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Abstract. Unemployment is a factor that affects the economic security of individuals and society as a whole. The poverty risk rate is one of the main factors related to social inequality and social protection. Unemployment and long-term unemployment can increase the poverty risk rate because individuals have limited or insufficient income and employment opportunities. The relationship between unemployment, long-term unemployment and poverty rates is currently the subject of various research topics. This paper focuses on these interrelationships in Slovakia. The aim is to analyse the data and explore the correlations between these variables. The thesis mainly used statistical data provided by the Slovak Statistical Office and other relevant studies. The methods of analysis, synthesis and correlation were used. These data highlight the relationship between unemployment, long-term unemployment and poverty. The results of the article are intended to provide information for reducing unemployment, limiting long-term unemployment, and reducing the risk of poverty in Slovakia.

Keywords: Unemployment Rate, Poverty Risk Rate, Long-Term Unemployment Rate, Correlation.

JEL classification: *E21, E27*

1   Introduction

Unemployment is understood as a relationship in which individuals seek work but cannot find it. This phenomenon can be caused by various factors such as the state of the economy, recession, demographic changes and many other factors. (Stiglitz, 2012) In order to explain the phenomenon of unemployment, the theory of supply and demand is often used. This theory describes the process by which individuals seek employment and the labour market adapts to changes. According to this theory, unemployment arises due to mismatches and incompatibilities in the labour market as employers look for the best person for the job and individuals look for jobs that match their skills and ideas. In recent years, the theory of 'hidden unemployment' has been developed, suggesting that there are large numbers of people who are not officially registered as unemployed but are still interested in full-time work, or are looking for work and working part-time. These people are known as the 'hidden unemployed'. The theory states that official unemployment statistics may be distorted and that the measurement of unemployment should take into account several factors. Berg, Kucera, and Lena-Nozal (2016), "'Hidden unemployment': An Analysis of Contingent Employment in Europe", examines hidden unemployment in Europe in the context of precarious employment. In doing so, they highlight the importance of studying hidden unemployment and its impact on the labour market. Prolonged unemployment can cause people to develop passive habits, which can hinder future employment. In addition, this form of unemployment can have a negative impact on society by reducing productivity and forcing governments to increase spending on social assistance." A step forward on unemployment is the study by Andrei Kupak et al. (2019), which focuses on analysing unemployment data for Slovakia and comparing it with unemployment rates in EU countries. The study found that unemployment in Slovakia has distinct regional differences, with the southern and eastern parts of the country having the highest number of unemployed people. They also found a negative correlation between unemployment and regional economic growth. This study suggests that regional factors should be taken into account when estimating unemployment rates. (Klube, 2010) Rayard, Nickel, and Jackman (1991) in "Unemployment: Macroeconomic Performance and the Labour Market" refer to the "lagging unemployment" theory, which states that long-term unemployment has long-term effects on the labour market. These consequences are that the unemployed lose skills and experience, making them less attractive to employers and therefore less likely to be hired. This can also lead to lower productivity as the unemployed do not use their skills and experience in the labour market.

Poverty is characterised by a number of indicators such as low income, poor housing

conditions, social exclusion and limited access to education and health services. This article focuses on the UK and shows that poverty is still a problem even in developed countries. (Bramley et al., 2016) Author Martin Ravallion (1994) defines poverty as the inability to meet basic needs such as food, shelter and clothing due to lack of financial resources. In Measuring Poverty in Developing Countries, Ravallion discusses different ways of measuring poverty in developing countries, stressing that the definition and measurement of poverty should depend on context and culture. The 'income structure' theory is a theory of the relationship between income inequality and the risk of poverty, according to which people with lower incomes are at greater risk of falling into poverty. It also looks at factors that influence income inequality, such as education, gender, race and ethnicity.The paper "Income Inequality, Income and Poverty in OECD Countries" by Ivan Kuhn and Leri Singel Jr. (2015) demonstrates this theory. Based on data from successful OECD countries, the authors conclude that income inequality is an important factor affecting the risk of poverty. The paper also looks at factors that influence this relationship, such as education, gender, and other social factors. The theory of relative deprivation examines how an individual or family feels in relation to the rest of society and how this affects their level of poverty risk. In Relative Deprivation and Poverty in the United States and Canada (2010), Lars Osberg and Andrew Sharp use this theory to understand poverty rates in the United States and Canada. The authors test their hypotheses using data from a variety of sources and find that feelings of relative deprivation have a significant impact on the risk of poverty in both countries. The cultural theory of poverty argues that poverty is not only a matter of economic resources, but also a matter of culture and values passed down from one generation to the next. According to this theory, people in poor communities can be influenced by certain attitudes that perpetuate poverty. This theory is often used in academic papers on poverty. One paper that mentions the culture of poverty theory is Diane Purvin's "The Culture of Poverty: A Critical Review" (2016). In this paper, Purvin critically analyses and evaluates the culture of poverty theory and considers its implications for poverty research and social policy. Another paper on culture of poverty theory, "Poverty Theory and Pro-Poor Programmes in Social Development" (2016) by Mark Brennan and Julie Ann Golbowski, focuses on poverty theory and pro-poor programmes in the context of social development. In this article, Brennan and Golbowski discuss various theories of poverty, including cultural theories of poverty, and consider the implications for various anti-poverty programmes. The authors argue that poverty theories can help identify the causes and factors that contribute to poverty in a particular community and help design and implement effective anti-poverty programmes.

Baldwin and Bepp (2015) focus on the effect of unemployment on poverty risk in the EU. According to the authors, unemployment has a significant negative effect on a country's socio-economic development, especially in terms of poverty risk. The authors argue that unemployment is one of the main factors that increase the poverty risk in the

EU; therefore, the authors are interested in how to reduce this negative effect. The study highlights the importance of social measures and policies to reduce the negative effects of unemployment. The authors argue that EU countries should implement active labour market policies, including training and retraining programmes, to improve employability and reduce unemployment. They should also implement social measures, such as housing assistance, social assistance and job search assistance, to support families and individuals in need. The findings of this study will have important implications for the design of EU policies and strategies to reduce the risk of poverty. The authors highlight that despite the critical unemployment situation, there are policies and measures that can help reduce the negative impact of unemployment on the risk of poverty. Gregg's (2018) study examined the relationship between unemployment and poverty in the United States. The aim of the study was to determine how strong this relationship is and whether it varies across different population groups. The data used showed that there is a strong relationship between the two variables, with higher unemployment increasing the risk of poverty. The authors also suggested that this relationship may be stronger for certain demographic groups, such as African-Americans and immigrants. The authors also examine the impact of various factors on this relationship in different states in the US and find that the relationship between unemployment and poverty varies from state to state, which may be due to the different economic and labour market structures in different regions. Overall, this study highlights the importance of the relationship between unemployment and poverty in the US and attempts to debunk the myth that poverty is solely due to a lack of employment.A study by Bazzoli and Fiori (2017) examines the relationship between unemployment and poverty risk in Italy. The authors use several factors to measure poverty, such as material deprivation, social exclusion and material well-being. Their study shows that unemployment significantly increases the risk of poverty in Italy, especially for young people and low-skilled professionals. They also found that geographical and social factors influence the relationship between unemployment and poverty. The study also reveals regional differences in the risk of poverty in Italy. For example, employment opportunities are limited in some regions and high in others. There are also differences in the risk of poverty between urban and rural areas. These results suggest that the relationship between unemployment and poverty risk in Italy is indirect and depends on several factors.The study by Gunderson and Shaw (2018) focuses on the relationship between unemployment and poverty in Canada. The authors examine several indicators of poverty, such as material deprivation and lack of social ties, and show that unemployment has a negative impact on these indicators. In other words, the unemployed are at greater risk of material deprivation and have more limited access to social contact.

The authors also analyse the impact of geographical and social factors on the relationship between unemployment and poverty. They find that this depends on the geographical and social context, i.e. the impact of unemployment on poverty differs in

different regions of Canada. This suggests that policies to reduce unemployment and poverty may only be effective in certain regions or for certain groups, and that Gunderson and Shaw's findings have important implications for unemployment and poverty policy in Canada. The relationship between unemployment and poverty varies across regions and it is important that policies take these differences into account and are tailored to the needs of different regions and populations. The study also suggests that policies should include not only measures to improve labour market conditions, but also measures to improve the living conditions of people living in poverty, for example by providing social services and support to those most vulnerable to poverty.

2   Unemployment and poverty in the Slovak Republic

The correlation between unemployment, long-term unemployment and poverty has been the subject of much research and debate in both economic and sociological contexts. Unemployment is known to have a negative impact on the lives of individuals and society as a whole, but whether this negative correlation is directly linked to long-term unemployment and poverty is still a matter of debate. In this chapter, we focus on the analysis of the relationships between unemployment, long-term unemployment and poverty. Based on existing statistics and data, we will try to answer the question of how these factors are linked and what the implications are for individuals and society.
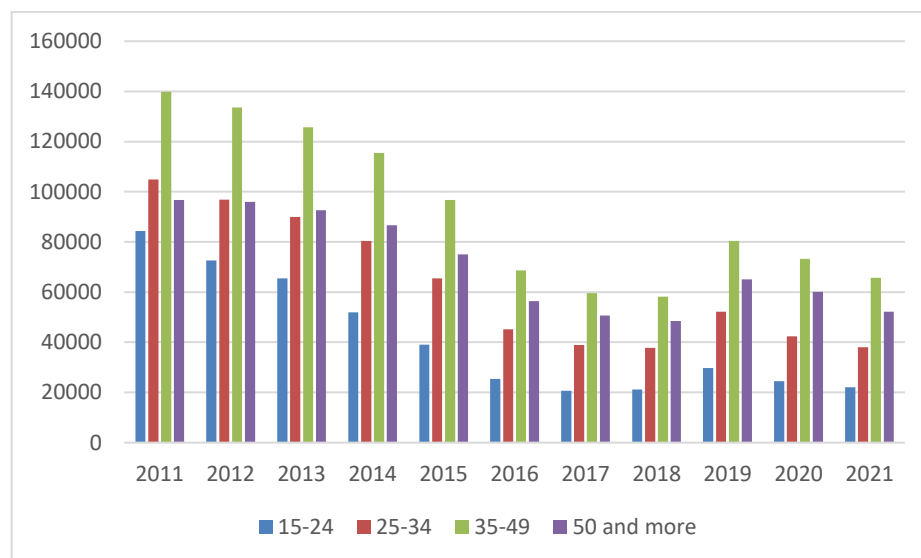
Fig. 1. Unemployment rate in Slovakia in the period 2011-2021

The rise in the unemployment rate in Slovakia over the period 2011-2021 is a significant phenomenon that affects both the economic and social situation. Figure 1 shows the overall unemployment rate for the period under review, which is relatively high, ranging between 15.4% in 2018 and 8.8% in 2013. During this period, there have been significant changes in the unemployment rates for different age groups. The most affected age group was the 25-39 age group between 2011 and 2013, with unemployment rates at a record high of 15.4%. In the following years, the situation for this age group improved, mainly due to economic growth and job creation. On the other hand, the 15-24 and 25-38 age groups contributed to the decline in the unemployment rate in 2014, the following years brought a similar trend where the unemployment rate for these groups was still on the decline. The age group of 50 years and above had the lowest unemployment rate during the period under review. This group was the hardest hit by the crisis in 2013 when the unemployment rate stood at 13.4%. Subsequently, in this age group we observe a significant decline in unemployment when this indicator dropped to 8.7% in 2021.
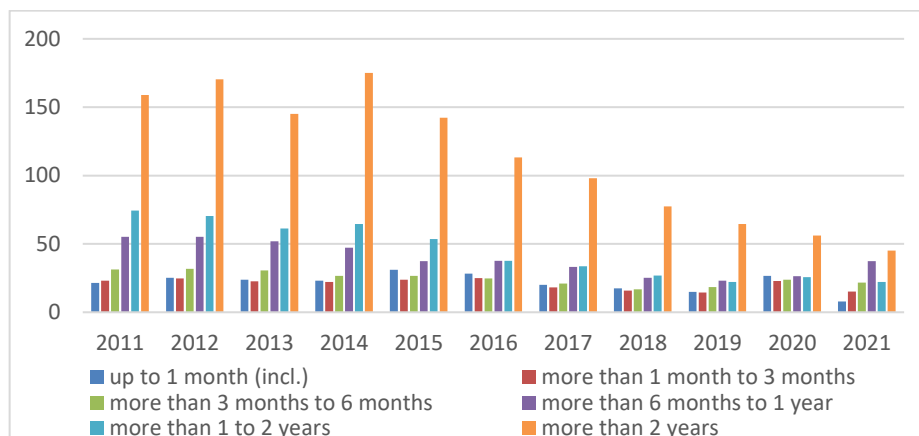
Fig. 2. Long-term unemployment rate in Slovakia for the period 2011 - 2021

Long-term unemployment rate data for Slovakia over the 2011-2021 reference period show high values. The highest unemployment rate was recorded in 2014 when it reached 51.9%. This high unemployment rate can be explained as a consequence of the global economic crisis, which also hit Slovakia and caused a significant increase in unemployment across the country. Long-term unemployment has been gradually declining since 2014, with Slovakia recording its lowest value in 2019 at 23.2%. However, it is important to note the number of unemployed has varied depending on the duration of the unemployment situation. The highest number of unemployed population was in the period when the duration of unemployment was more than 2 years

and mostly during 2011-2014, on the contrary, the lowest unemployment rates are in the period from one to three months during the whole period under review.
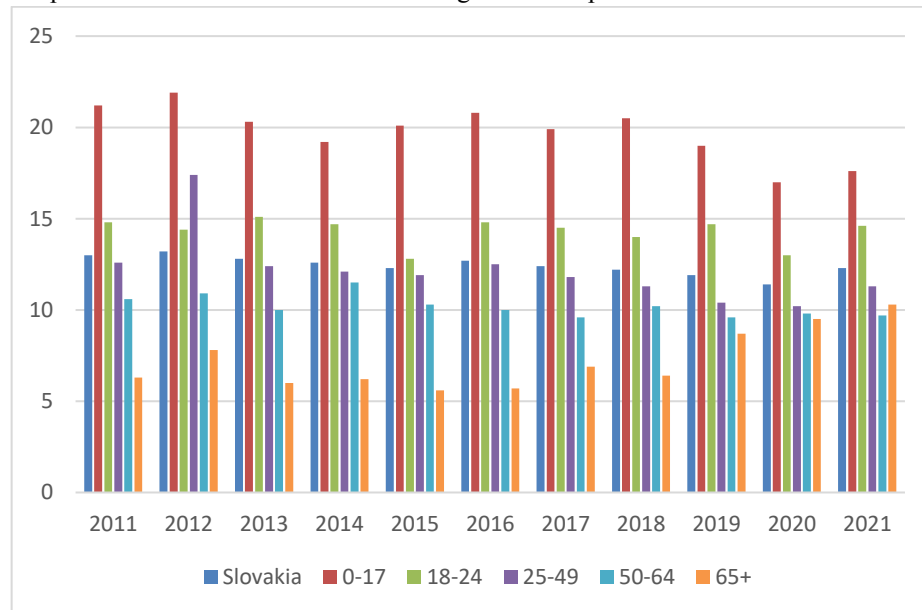
Fig. 3. At-risk-of-poverty rate in Slovakia for the period 2011 - 2021

The overall poverty risk rate in Slovakia ranges from 11.4% to 13% in the 2011-2021 reference period. The unemployment rate was relatively equilibrium at 13% in 2011 and this decreased slightly over time to 11.4% in 2020, but in 2021 the poverty risk rate rose to 12.3%. In the case of age groups, it is clear that the most at risk age group is children under 17. The poverty rate stood at 21.2% in 2011, but has slowly decreased over the last decade to 17.6% in 2021. The 25-49 age group recorded a rate of 12.6% in 2011, falling to 10.2% in 2020, but rising again to 12.6% in 2021. On the other hand, the least vulnerable group was made up of the 65+ population, which recorded a value of 6.3% in 2011. Gradually, this trend rose to a value of 10.3% in 2021. This age group is affected by various factors such as health care costs, low pensions and economic insecurity.

2.1 Relationship between unemployment and poverty

Table 1. Correlation of the unemployment and poverty in Slovakia

	PO	TUM	UM1m	UM1-3m	UM3-6m	UM3m-1y	UM1-2y	UM2y
PO	1							
TUM	0,7773	1						
UM1m	0,1617	0,2666	1					
UM1-3m	0,4596	0,5419	0,8728	1				
UM3-6m	0,6920	0,8603	0,5233	0,8196	1			
UM3m-1y	0,8748	0,9001	0,2573	0,6239	0,9189	1		
UM1-2y	0,7909	0,9396	0,4806	0,7085	0,9014	0,9176	1	
UM2y	0,7854	0,8424	0,5662	0,7129	0,8065	0,8351	0,9609	1

Source: own processing according to the Statistical Office of the Slovak Republic
Legend to the table
PO -   Poverty
TUM - Total unemployment
UM1m - Unemployment rate up to and including 1 month
UM1-3m - Unemployment rate over 1 month to 3 months
UM3-6m - Unemployment rate over 3 months to 6 months
UM3m-1y - Unemployment rate over 6 months to 1 year
UM1-2y - Unemployment rate over 1 year to 2 years
UM2y - Unemployment rate more than 2 years

This comprehensive table shows the relationship between three important variables in Slovakia for the period 2011-2021: the unemployment rate (TUM), the long-term unemployment rate (LTU) and the poverty rate (PR). Examining these relationships provides important insights into the socio-economic situation in Slovakia. The unemployment rate (LTU) is the share of unemployed people in relation to the total unemployed population in Slovakia. This ratio is an important indicator of economic activity and is often associated with the risk of poverty. From the table we can see that there is a moderate positive correlation (0.7773) between the unemployment rate and the poverty rate. This suggests that a high unemployment rate may be associated with a population's risk of poverty. The other columns in the table represent different periods of unemployment. We can see that there is some correlation between long-term unemployment and the poverty rate. For example, the correlation between moderate long-term unemployment (UM2y) and moderate poverty was 0.7909. This positive correlation suggests that the long-term unemployed have a higher risk of poverty. Other results in the table show correlations by duration of unemployment. There appears to

be some correlation between short-term and long-term unemployment. For example, unemployment of between one and three months (UM1-3m) had a correlation of 0.5419 with moderate unemployment of two years or more (UM2y). These relationships can be important for assessing the effectiveness of employment policies and their impact on social stability and poverty.

3   Conclusion

As part of the data analysis, we concluded that there is a direct relationship between unemployment, long-term unemployment and poverty. For the reference years 2011-2021, we observed unemployment together with long-term unemployment linked to an increased risk of poverty. During the analysis of the age groups, we found that young individuals in the 15-24 age group were most affected by unemployment, particularly in 2013. However, their situation gradually improved with the growth of the economy. The age group of 50 years and above experienced the lowest unemployment rate. Analyzing the at-risk-of-poverty rate in Slovakia for the period 2011-2021, we observed a gradual decrease. The age groups most affected by the risk of poverty were children under 17 years old and the elderly above 65 years old. Several factors, such as low pensions, increased expenses, and economic uncertainty, contribute to this situation. Through correlation analysis between unemployment, long-term unemployment, and poverty, we found positive results for the observed period. This implies that an increase in the unemployment rate has a significant impact on the rise of long-term unemployment and poverty.

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Household Indebtedness and Life Satisfaction in Slovakia

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Abstract. One of the central findings of the economics of happiness literature is that an individual's subjective well-being (SWB) depends not only on economic resources such as income, but also on other dimensions such as wealth including liabilities. While the direct effects of wealth, income and debt have been studied extensively, there is scarce evidence on the effects of debt burden and credit constraints on SWB. The goal of this paper is to analyze the impact of debt burden on life satisfaction of Slovak households, using the Household Finance and Consumption Survey (HFCS) microdata. We show that life satisfaction has generally improved between 2017 and 2021, mainly driven by the indebted households. In general, holding debt is associated with higher life satisfaction, as it goes hand in hand with the wealth accumulation. Importantly, we also analyze the impact of indebtedness at the intensive margin using the debt service-to-income (DSTI) indicator, as an objective measure of debt burden. There are clear hints of a negative relationship between one's life satisfaction and the intensity of debt. This suggests that the burden is also perceived subjectively and may have an implication for individual happiness. A more comprehensive regression analysis is the subject of further research.

Keywords: Subjective Well-Being, Life Satisfaction, Indebted Households, Survey Data.

JEL classification: *D19, G40, G51.*

1   Introduction

The literature on determinants of subjective well-being (SWB) has been around for nearly five decades and the results are vast (see Clark, 2018, for a detailed overview). Most common findings, *inter alia*, have been the following: SWB (and its components such as life satisfaction) rise with income and wealth (to some point), there is a U shape relationship between age and SWB, and especially that one's life satisfaction does not

only depends on individual's economic resources, but also on the resources (income or wealth) of the reference groups (e.g., neighbors, colleagues, etc.).

Recent empirical literature particularly highlights the importance of wealth for one's SWB (e.g., D'Ambrosio et al., 2020; Brokešová et al., 2021). However, wealth does not only capture household assets, but also liabilities that are taken out to serve for assets' accumulation, which might have an impact on one's SWB.

Indeed, several papers have analyzed the effect of indebtedness at the extensive margin (having/not having debt) on individual SWB and happiness. Tay et al. (2017) review a large set of empirical studies and show that vast majority of them point to at least one negative link between debt and SWB. The critical moderators of this linkage are debt levels, sources of debt as well as overall financial resources. Turunen and Hiilamo (2014) demonstrate that serious health effects can be related to indebtedness – especially in case of unmet loan payments. Coste et al. (2020) arrive to a similar conclusion. Moreover, they found that the effect also depends on belonging into a certain social sub-group (effect of "social norms and comparisons" as explained by Gathergood, 2012).

More recently, literature analyzing the relationship between student debt and well-being has emerged (see Nissen et al., 2019 for critical review of the related literature). In general, studies show that beside the future benefits of the student loan debt (such as higher achieved education and employment opportunities) it has also negative effect on the well-being of individuals and households (Martin, 2016; Kim and Chatterjee, 2019; Korankye and Kalenkoski, 2021).

However, not all studies conclude that indebtedness per se necessarily has a negative effect on well-being. The effect is in fact heterogenous when considering different types of debt. Bialowolski and Weziak-Bialowolska (2021) have used propensity score difference-in-differences approach to study the effect of five different types of loans on SWB. They conclude that credit cards and student loans negatively impact life satisfaction in short term, while mortgages and leasings tend to increase SWB. This phenomenon is associated with the balance between a purchase-related positive and a repayment-related negative effect of credit uptake. On the contrary, Liu et al. (2020) show that housing debt has a negative effect on happiness in China, however strongly depending on the source of debt. In general, there is robust evidence agreeing that in the context of well-being, the type of financing matters (e.g., Will and Renz, 2022).

The aim of this paper is to analyze the impact of debt burden on life satisfaction of Slovak households. For this purpose, we use microdata from the Household Finance and Consumption Survey (HFCS). We show that having debt is associated with higher life satisfaction as it is closely related to accumulation of wealth. We supplement this information by revealing that being credit constrained is linked with lower life satisfaction, which is the first main contribution of the paper.

Accounting for the type of loan could capture the effect of the intensity of debt in a certain way. However, it is not sufficient to fully understand the impact of the debt repayment burden. The second main contribution of the paper is the deeper analysis of the intensive margin of debt measured by the debt service-to-income (DSTI) ratio and its effect on individual SWB. Psychological literature (Greenberg, 1980 or Keese, 2012) suggest that the negative impact of objective debt burden on overall well-being is transmitted via subjective debt burden channel. We support this finding by showing negative relationship between DSTI and life satisfaction.

2 Empirical analysis

This paper uses the last two waves of Household Finance and Consumption Survey (HFCS) conducted in Slovakia in 2017 and 2021, respectively. The microdata contains detailed information on household assets, debts, income, and consumption as well as an exhaustive set socio-demographic characteristics on household and individual level.[1] Our variable of interest is the self-assessed overall life satisfaction of the household representative as a proxy of household subjective well-being. The life satisfaction score takes values between 0 = totally dissatisfied, and 10 = entirely satisfied.

The happiness of Slovak households has generally improved between 2017 and 2021. The distribution of life satisfaction score has shifted to the right during the studied period (Figure 1), increasing by 0.4 points on average.
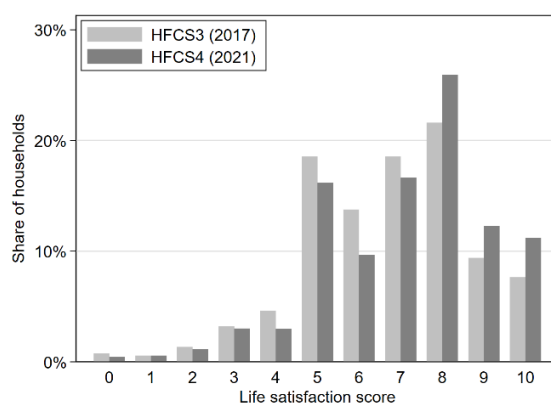
Fig. 4. Distribution of life satisfaction among Slovak households. (Note: Descriptive statistics computed by using survey weights. Source: HFCS 2017 and 2021, NBS, own processing)

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[1] More information about the survey can be found at Household Finance and Consumption Survey homepage:
https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html

However, this shift is asymmetric when comparing indebted and non-indebted households. We observe that the gap between the two widened in favor of the indebted ones. While the happiness of the households without any debt improved only slightly, by 0.2 points on average, it increased significantly among those holding debt[2], by almost 0.8 points on average (Figure 2).
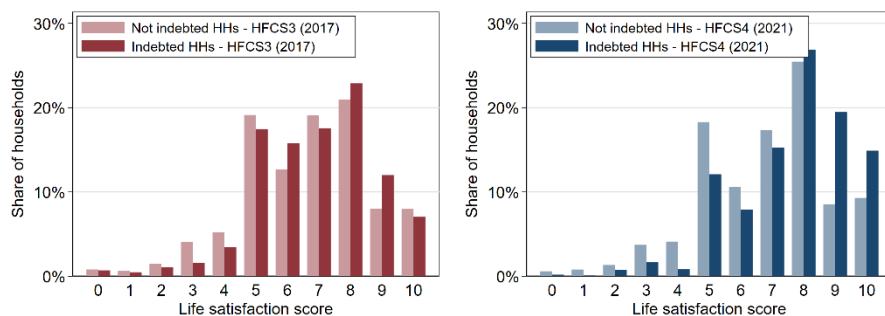
Fig. 2. Distribution of life satisfaction among non-indebted and indebted households. Note: Descriptive statistics computed by using survey weights. (Note: The abbreviation "HHs" stands for households. Source: HFCS 2017 and 2021, NBS, own processing)

We also investigate the importance of other financial and socio-demographic characteristics that have an impact on SWB (Table 1). There are significant differences when comparing households with and without debt. Indebted households are the younger ones, with higher education and higher economic activity, which result in higher monthly net income. There are also significant differences in the household structure and net wealth.

However, if we look at changes between 2017 and 2021 within each subgroup of households separately, not that much has happened. The only noticeable changes are the upward shift in education level and economic activity among the indebted households. That is naturally accompanied by the higher increase in income of those households compared to the non-indebted ones. Thus, there seems to be the selection process playing a role, associated with the reducing of loan affordability between 2017 and 2021. The widening life satisfaction gap between non-indebted and indebted households could be therefore the result of the economic environment at that time. Historically low market interest rates, increasing prices of the real estates at the fast pace and the Covid-19 pandemic causing income shocks and uncertainty about the future economic development. All these factors were accompanied by the increasing demand for credit as well as decreasing affordability of housing. Households that had been considering taking a debt in the near future, especially those that had planned to use it for housing purchase, could suddenly find themselves under pressure. If they managed to seize the opportunity in time, they could experience a "relief effect"

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[2] We account for any kind of debt that involves regular payments (i.e., housing loans, consumer loans or leasing).

resulting in increased happiness. On the contrary, those households that missed their chance might feel less happy. Especially when they saw the house prices continue to grow rapidly and the chances of having desired housing receding.

Table 1. Descriptive statistics of non-indebted and indebted households.

| | 2017 | | 2021 | |
	Non-indebted	Indebted	Non-indebted	Indebted
Respondent				
Life satisfaction score	6.61	6.87	6.81	7.65
Age	56.8	44.2	57.5	43.6
University education	23.2 %	24.0 %	24.0 %	31.8 %
Employed	45.1 %	71.1 %	44.5 %	77.5 %
Self-employed	10.8 %	17.7 %	10.7 %	15.8 %
Unemployed	2.5 %	1.9 %	3.4 %	0.8 %
Retired	39.7 %	7.9 %	39.5 %	5.1 %
Single	10.8 %	13.8 %	12.0 %	14.8 %
Married	59.5 %	66.7 %	60.7 %	69.2 %
Female	40.6 %	28.4 %	39.2 %	29.2 %
Household				
Number of children (<18 years)	0.47	1.02	0.50	1.12
Number of adults	2.10	2.32	2.22	2.17
Mean outstanding debt (EUR)	-	27,590.7	-	37,697.3
Mean monthly installments (EUR)	-	249.9	-	263.65
Mean monthly net income (EUR)	1,214.9	1,539.0	1,332.5	1,830.5
Mean net wealth (EUR)	110,304.2	90,517.4	132,836.8	114,045.5
Urban	57.2 %	56.8 %	53.3 %	57.1 %
Number of observations	1,606	573	1,684	490

Note: Descriptive statistics are calculated by using survey weights. Source: HFCS 2017 and 2021, NBS, own processing.

We focus more closely on households that had applied for loan or credit in the last three years. If they were turned down and the later re-application was not successful either, or if they were not given as much credit as applied for, we consider them to be credit constrained. Figure 3 shows significantly higher gap in life satisfaction between credit constrained and not constrained households in 2021 compared to 2017. This result could be partly explained by the findings of Bialowolski and Weziak-Bialowolska (2021). In short term purchase-related positive effect of housing debt prevails over the repayment-related negative effect. Holding debt may therefore improve SWB situation, as it is closely associates with wealth leveraging.
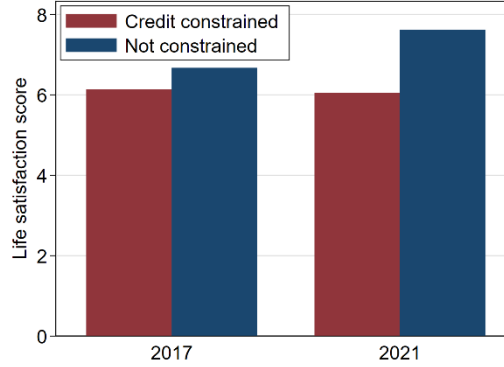
Fig. 3. Average life satisfaction score of credit constrained and not constrained households. (Note: descriptive statistics computed by using survey weights. Source: HFCS 2017 and 2021, NBS, own processing)

However, an important factor that should be also accounted for is the intensity of debt, or the ability to serve debt payments. We calculate the debt burden of the i-th household as:

$$DSTI_i = \frac{Monthly\_installments_i}{Monthly\_net\_income_i - subsistence\_minimum_i}.^{[3]}$$

(1)

Subsistence minimum is calculated based on the household composition and applicable legislative framework at the time. Higher value of DSTI indicates higher debt burden. If the household income is not sufficient to cover monthly installments, the value of DSTI is higher than 1. However, if the income of a household cannot cover even the basic needs, DSTI indicator reaches a negative value. Therefore, we transform DSTI indicator by an arctangent function to scale down some very large values and stack originally negative values next:

$$arctan\_DSTI_i = \begin{cases} arctan(DSTI_i); & if\ DSTI_i > 0 \\ \pi + arctan(DSTI_i); & if\ DSTI_i \leq 0 \end{cases}.^{[4]}$$ (2)

The transformed values are bounded on $(0, \pi)$ and the most frequent DSTI values up to 60% are mapped almost linearly.

Finally, to examine the relationship between debt burden and SWB, we correlate the two within a simple bivariate regression framework. Figure 4 shows that the relationship between the debt burden and life satisfaction of households is indeed

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[3] This is an official formula used by National Bank of Slovakia to calculate DSTI ratio: https://nbs.sk/en/financial-stability/fs-instruments/dsti/.

[4] The arctangent transformation is taken from Cupák et al. (2021).

negative and statistically significant, especially for 2017 year. The higher the burden, the lower the individual's life satisfaction.
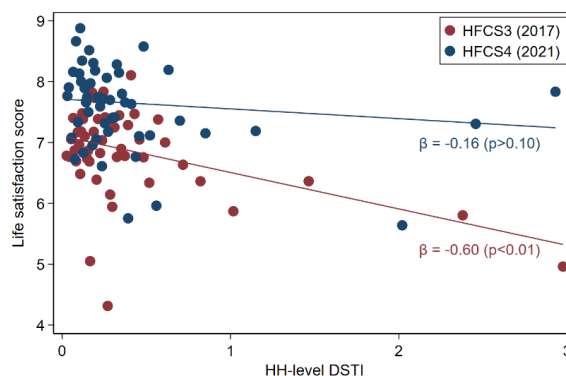
Fig. 4. Relationship between household debt burden and life satisfaction. Note: binned scatter plot created by using survey weights. (Note: The abbreviation "HH" stands for household. Source: HFCS 2017 and 2021, NBS, own processing)

3   Conclusion

Exploring determinants of happiness has been a central theme in the well-being literature. While a lot of research has been done on the impacts of income and assets on one's SWB, substantially less has been done on the impacts of liabilities on individual's happiness. Using the last two waves (2017 and 2021) of HFCS microdata we analyzed the relationship between the well-being of Slovak households and their indebtedness. The analysis has focused not only on the extensive margin of debt, but also on the intensive margin, which is the main contribution of this paper.

We showed that debt as such, does not necessarily have a negative impact on one's life satisfaction. Quite the opposite: it improves the happiness as it is associated with accumulation of wealth. In addition, households that were refused or reduced the amount of credit/loan were less happy than households who were granted the full requested amount. However, the intensity of debt is the key factor making a difference in how the debt is actually perceived. Simple correlation analysis suggests a negative (and in 2017) statistically significant relationship between household happiness and debt burden.

Descriptive findings of this paper should serve as a base stone for a deeper and more sophisticated future research. We propose further extensions of this work using regression analysis to account for multiple factors affecting household well-being situation.

4   Acknowledgement

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The Role of Copper in Zambia

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Abstract. Natural resources stand high on the agenda of a number of Regional Economic Communities (RECs) in Africa (AfDB, 2013). Resource-rich countries usually depend on single main export product. Zambia being a member of both COMESA and SADC as two RECs in Africa has copper reserves of roughly 20 million tons and is the second largest copper producer in Africa. 70% of country's foreign exchange revenue is coming from copper. When copper prices fall on world markets, this means lower convertible currency earnings for Zambia. Zambia's dependence on copper makes the country vulnerable to commodity price fluctuation and external shocks. Diversification of the Zambian economy from dependency of copper and development of other industrial sectors could bring economic growth, more stability and create new opportunities for the economy in the future. The objective of this paper is to map and analyse the current relevant export-related status quo of Zambia as a member of COMESA and SADC based on the raw material basis of Zambia, with an emphasis on its current and potential future extraction of copper, and diversification on mind.

Keywords: Common Market for Eastern and Southern Africa (COMESA), Southern African Development Community (SADC), Zambia, International Trade.

JEL classification: *F 14, O 55, O 57*

1   Introduction

In line with the so-called enthusiasm for resource-based growth, exports from Africa to the rest of the world have narrowed down primarily to certain commodities, mainly oil, minerals and copper ores. Exports from Africa are limited by low diversification and high dependence on primary products depending on the region (Čerňák, 2017). The universal belief that mineral production and export led to economic growth and economic welfare was not confirmed in Zambia (UNCTAD, 2017).

The Central African Copperbelt is the largest copper and cobalt resource in the world (Prosper Africa Factsheets, 2022) and copper mining transformed the Copperbelt

industrial zone into one of the most developed areas of Zambia and Africa in general. But in the 1970s the mining industry experienced serious troubles as the price of copper fell drastically (Čerňák, 2018). Zambia (as member of both COMESA and SADC) has copper reserves of roughly 20 million tons and is the second largest copper producer in Africa. When copper prices fall on world markets, this means lower convertible currency earnings for Zambia. The country had to deal with huge problems every time there was a significant fall in copper prices on world markets (Čerňák, 2021). This situation was repeated in 1990, 2000, 2008, 2009 (see **Fig. 1**).
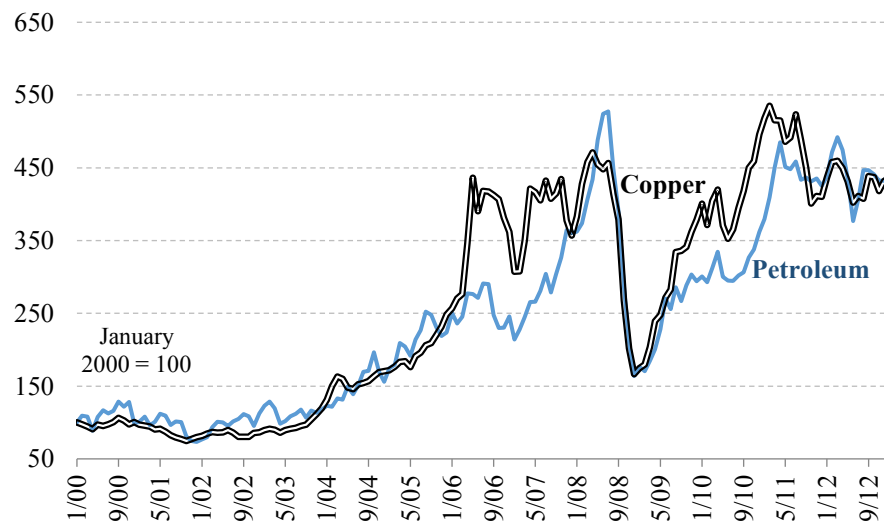
Fig. 5. Copper price index and petroleum price index (January 2000 = 100). Source: AfDB (2013).

The term "spillover" varies in spelling and meanings. In contrast with a different study applying the term "(fundamentals-based) contagion" as the "one where the immediate cause of the spread of contagion is real fundamental connections among countries based on economic links", the study by Mukerji (2018) replicates the definition with the use of the term "spillover" instead of the term "contagion" to indicate the "spread of trends from one country to the other. These trends do not necessarily lead to crises and could be either positive or negative.". For Mukerji (2018) trade and financial links are "potential transmitters of spillovers across countries": volatility spillovers (financial links) and growth spillovers (trade links). The vulnerability index and its two elements (international links and domestic economic fundamentals) for the 1980s, the 1990s and the 2000s calculated by Mukerji (2018) show "the importance of international linkages, as the source of vulnerability, rising steadily. In the 1980s only one-fourth of above average vulnerability countries also had an above average international links component, compared to about half in the 1990s and, an overwhelming, two-thirds in the 2000s!". Zambia is one of the countries where the international link values in the vulnerability index were higher than the average

values in the 1980s (Average: 15.7; Zambia: 163.3), the 1990s (Average: 32.9; Zambia: 183.6) and the 2000s (Average: 50.9; Zambia: 205.6).

The rapid run-up in metals prices through 2011 (see **Fig. 1**) led in southern Africa to both private and public investment in mining and petroleum. This related mainly to copper: "Soaring prices increased copper export earnings more than tenfold, from $518 million in 2003 to $6.5 billion in 2011," (UNCTAD, 2017) and Zambia's total FDI stock of FDI increased from $4.7 billion to $8.4 billion in that period (UNCTAD, 2017). "According to a study by the World Bank (2011), in 2010, when copper accounted for over 85% of the value of exports, royalties accounted for only 2.6% of government revenue and mining taxes accounted for only 3-5% of Zambia's export revenue, which is incomparably less than 25-40% in the rest of the world" (Čerňák and Čiderová (2022).

FDI flows into Zambia are highly concentrated in mining with very limited linkages to other sectors. Although the abundance of natural resources partly explains the high concentration of FDI in the extractive sector, it is also a reflection of the fact that government policies tend to strengthen the sector's comparative advantage (Čerňák, 2021). The objective of this paper is to map and analyse the current relevant export-related status quo of Zambia as a member of COMESA and SADC based on the raw material basis of Zambia, with an emphasis on its current and potential future extraction of copper, and diversification on mind.

This paper is an output of the research project VEGA No. 1/0777/20 and results from scientific research consultations at the University of Economics in Bratislava, Slovakia, and the Cape Peninsula University of Technology, South Africa, in the framework of Erasmus+ funding. After Part 1 Introduction, brief review of fundamental trade-related concepts (in line with the vulnerability index in Part 1 Introduction) follows in Part 2 Literature Review. Part 3 Methodology explains the methods, which were applied, and Part 4 presents the results. Discussion and conclusions follow next.

2 Literature Review

Foreign trade as a part of the sphere of circulation of goods, which represents exchange with foreign countries, consists of two components – export and import. It relates exclusively to one country or a group of countries and the rest of the world. International trade includes foreign trade of several countries and world trade is a summary of foreign trade of all countries participating in the global division of labor. The commodity structure of foreign trade reflects the economic structure, so exports are dominated by goods that are produced in the country, and imports are finished products, raw materials, or parts produced within the international specialization of production. The commodity structure of foreign trade plays a role in its territorial structure because countries are linked in their foreign trade to those countries with which they mutually satisfy their needs of certain goods (Lipková, 1998). "In general, as a result of an increase in exports a country's GDP grows, which in turn creates an impulse for domestic consumption and higher imports, while a sharp growth of imports can occur due to insufficient capacity of domestic production to cover extraordinary demand, as we registered in the case of widespread massive demand for certain goods

caused by the outbreak of the COVID-19 global pandemic." (Zábojník and Čiderová, 2020). Theories have been developed over the years to outline strategies for diversifying economies away from dependency on one or more natural resources (see **Table 1**).

Table 1. Membership in African Regional Economic Communities SADC and COMESA. Source: Čiderová, Repášová, Kovačević & Šimorová (2013), p. 49; COMESA; SADC; UNCTAD and FAO (2017).

Regional Economic Community	**Southern African Development Community (SADC)**	**Common Market for Eastern and Southern Africa (COMESA)**	Commodity Import Dependence (1995-2014)	Commodity Export Dependence (1995-2014)
Headquarters	Gaborone (Botswana)	Lusaka (Zambia)	UNCTAD and FAO (2017)	
Members	**16**	**21**		
Angola	yes	no	Low	High
Botswana	yes	no	Low	High
Burundi	no	yes	Low	High
Comoros	**yes**	**yes**	High	High
Djibouti	no	yes	High	High
DRC	**yes**	**yes**	High	High
Egypt	no	yes	Low	Low
Eritrea	no	yes	High	High
Eswatini	**yes**	**yes**	High	Low
Ethiopia	no	yes	Low	High
Kenya	no	yes	High	High
Lesotho	yes	no	Low	Low
Libya	no	yes	Low	High
Madagascar	**yes**	**yes**	Low	Low
Malawi	**yes**	**yes**	Low	High
Mauritius	**yes**	**yes**	High	Low
Mozambique	yes	no	High	High
Namibia	yes	no	Low	High
Rwanda	no	yes	Low	High
Seychelles	**yes**	**yes**	High	High
Somalia	no	yes	High	High
South Africa	yes	no	Low	Low
Sudan	no	yes	Low	High

Tanzania	yes	no	-	-
Tunisia	no	yes	Low	Low
Uganda	no	yes	Low	High
Zambia	**yes**	**yes**	Low	High
Zimbabwe	**yes**	**yes**	Low	High

Economic diversification has two dimensions – domestic and external, where the external dimension is the international trade (Papageorgiou and Spatafora, 2012). The difference between the value of exports and imports (trade balance) can be active if exports exceed imports, or passive if imports exceed exports. In order to quantify comparative advantages (in theory) in terms of exports and imports (in practice) it is possible to apply the analogy of the trade balance (in the form of a relative trade advantage, *Relative Trade Advantage* – RTA) as a difference of a relative export advantage (*Relative Export Advantage* – RXA) and a relative import advantage (*Relative Import Penetration Advantage* – RMA). The *RXA* indicator has been established in literature since 1965 as the *Revealed Comparative Advantage* (RCA) or the so-called *Balassa Index*, which compares representation of the i-th commodity in the j-th country's export (xij) in the j-th country's total export (Xj) on the one hand (i. e. in the numerator of the fraction) with the representation of the i-th commodity in world exports (xiw) in total world exports (Xw) on the other hand (i. e. in the denominator of the fraction):

$$RCA = (xij/Xj) / (xiw/Xw) \qquad (1)$$

xij = export of the i-th commodity of the j-th country
Xj = total export of the jth country
xiw = world export of the i-th commodity
Xw = total world export

The page limit of this paper does not allow to examine the *RTA* indicator or the *RMA* indicator and the paper only refers to the RCA indicator in Part 2 Literature Review, Part 3 Methodology and Part 4 Results and discussion.

3 Methodology

The objective of this paper is to map and analyse the current relevant export-related status quo of Zambia as a member of COMESA and SADC based on the raw material basis of Zambia, with an emphasis on its current and potential future extraction of copper, and diversification on mind.

 "Exporting countries should pay attention to the fact that from the perspective of the commodity structure of foreign trade exchange their focus on a limited range of commodities may expose them to turbulences on the demand side. From the perspective

of the territorial structure of the foreign trade exchange of an exporting country its focus on a limited range of countries to which its exports are directed could be subject to the economic cycle in these countries, which was also manifested during the COVID-19 global pandemic." (Zábojník and Čiderová, 2020). A suitable method of examining the effectiveness of foreign trade, according to Michník (1998) is to compare the results achieved on the basis of a suitable set of indicators, especially from the point of view of:

- individual types of goods (in this paper Harmonized System – HS commodity groups: 25, 27, 28, 72, 74 relevant to Zambia),

- individual territories (in this paper in the context of Zambia both COMESA and SADC are considered),

- in relation to the world level.

In Part 1 Introduction and in Part 2 Literature Review we mentioned comparative advantages. Zábojník, Čiderová and Krajčík (2020) state that measuring comparative advantages is not easy at all in practice and point out that a method measuring the comparative advantage based on ex-post international trade data in the form of the most common and well-known RCA index is used: A country with RCA>1 (a revealed comparative advantage) for product i is interpreted as a competitive producer and exporter of that product relative to any country producing and exporting the same product at or below the world average (UNCTAD).

The main methods in our scientific statistical data as well as scientific and professional studies of the WORLD BANK and the INTERNATIONAL research were analysis and synthesis of available MONETARY FUND, UNCTAD, FAO, official documents Republic of Zambia Vision 2030 and Speech of the Minister of Finance and National Planning of Zambia Dr. Musokotwane in the National Assembly of Zambia on 30 September 2022.

4   Results and discussion

Between 2020-2022:
-    total exports of Zambia to the world as % of world exports;
-    total exports of Zambia to COMESA as % of Zambia's exports;
-    total exports of Zambia to SADC as % of Zambia's exports;
-    total exports of COMESA to the world as % of world exports;
-    total exports of SADC to the world as % of world exports remained stable (see **Table 2**).

Cumulative HS commodity groups 25, 27, 28, 72, 74 represent:
-    between 12.8% and 20.8% of world exports;
-    between 80.9% and 82.9% of total exports of Zambia to the world;
-    between 36.5% and 57.3% of total exports of COMESA to the world;
-    between 34.7% and 45.6% of total exports of SADC to the world.

Table 2. Exports of Zambia, COMESA and SADC in the global context.
Source: own calculations based on ITC TradeMap database (2023) data.

000 US$	Territory	2020	2021	2022
All products	**World**	17,499,876,321.00	22,138,761,100.00	24,487,201,641.00
Sum of HS: 25, 27, 28, 72, 74	**World**	2,247,006,260.00	3,549,307,164.00	5,101,151,628.00
% of HS: 25, 27, 28, 72, 74	**World**	12.8%	16.0%	20.8%
All products	**Zambia**	8,060,547.00	11,217,517.00	11,689,732.00
Sum of HS: 25, 27, 28, 72, 74	**Zambia**	6,518,759.00	9,303,235.00	9,519,901.00
% of HS: 25, 27, 28, 72, 74	**Zambia**	80.9%	82.9%	81.4%
Total exports of Zambia to the world as % of world exports		0.05%	0.05%	0.05%
Total exports of Zambia to COMESA as % of Zambia's exports		16.13%	14.11%	16.20%
Total exports of Zambia to SADC as % of Zambia's exports		19.79%	18.08%	19.88%
All products	**COMESA total**	98,757,139.00	154,692,740.00	176,794,829.00
Sum of HS: 25, 27, 28, 72, 74	**COMESA total**	36,027,376.00	82,650,684.00	101,291,792.00
% of HS: 25, 27, 28, 72, 74	**COMESA total**	36.5%	53.4%	57.3%
Total exports of COMESA to the world as % of world exports		0.6%	0.7%	0.7%
All products	**SADC total**	159,674,554.00	229,329,874.00	257,917,165.00
Sum of HS: 25, 27, 28, 72, 74	**SADC total**	55,419,351.00	84,707,307.00	117,495,615.00
% of HS: 25, 27, 28, 72, 74	**SADC total**	34.7%	36.9%	45.6%
Total exports of SADC to the world as % of world exports		0.9%	1.0%	1.1%

Individually, HS commodity group 74 (Copper) represents:
- between 0.9% and 1.0% of world exports;
- between 69.5% and 75.8% of total exports of Zambia to the world;
- between 14.6% and 15.8% of total exports of COMESA to the world;
- between 10.2% and 11.0% of total exports of SADC to the world.

The 2022 RCA value of the HS commodity group 74 (Copper) for Zambia is 77.22, which is competitive and the highest Zambia's RCA value when compared with HS commodity groups 25, 28 and 72 (for COMESA it is 16.22; for SADC 11.33). For comparison the 2022 RCA value:

- of the HS commodity group 25 (Salt; sulphur; earths and stone) for Zambia is 14.33 (for COMESA 4.33; for SADC 3.00);
- of the HS commodity group 72 (Iron and steel) for Zambia is 1.22 (for COMESA 0.82; for SADC 1.30);
- of the HS commodity group 27 (Mineral fuels, mineral oils) for Zambia is 0.16 for Zambia (for COMESA 2.04; for SADC 1.67);
- of the HS commodity group 28 (Inorganic chemicals) for Zambia is 2.33 for Zambia (for COMESA 6.67; for SADC 4.56).

Despite the share of the HS commodity group 74 (Copper) reaching from two-thirds to three-quarters of total exports of Zambia to the world, the Government of the Republic of Zambia "set out the goal of expanding Zambian copper production from 800,000 tonnes per year to 3 million, over a decade" (Baskaran and Pearson, 2023) as documented in the Speech of the Minister of Finance and National Planning of Zambia Dr. Musokotwane, National Assembly of Zambia, 30 September 2022:

"In 2022 […] prices of commodities such as copper weakened to an average of US$7,422 per metric tonne in September from US$9,550 per metric tonne in December 2021. …

Madam Speaker, the mining sector continues to be a major driver of the economy, accounting for 17.5% of the GDP and over 70% of foreign exchange earnings in 2021. Production has, however, stagnated at an annual average of 797,000 metric tonnes in the last five years.

Madam Speaker, while our mining output has stagnated, our northern neighbour, the DRC has not only caught up with our production levels, but has gone significantly well ahead of us. Ten years ago, Zambia was producing about 800,000 metric tonnes of copper while that of the DRC was about 400,000 metric tonnes. While we are still at standstill of around 800,000 metric tonnes, DRC has expanded to 1.8 million metric tonnes, which is more than twice our production. All indicators are that it will not be long before they hit close to 2.5 million tonnes. So, when to talk about a target of 3 million metric tonnes ourselves, it is very possible."

Dependence on copper makes Zambia vulnerable to copper price fluctuation and external shocks. Diversification of the Zambian economy from dependence on copper and development of other industrial sectors can bring economic growth, more stability and create new opportunities for the economy in the future as outlined in Zambia's Vision 2030 (see **Table 3**).

Table 3. Republic of Zambia Vision 2030 diversification strategies.
Source: Republic of Zambia Vision 2030.

Sector	Sector Vision	Government Targets/ Goals
Agriculture	An efficient, competitive, sustainable and export-led agriculture sector that assures food security and increased income by 2030	i. Increase agricultural productivity and land under cultivation by 2030; ii. Increase exports of agricultural and agro processed products by 2030; iv. Increase land under cultivation to 900,000 hectares by 2030; v. increasing land under irrigation to 400,000 hectares by 2030; vi. Increase agricultural machinery, tractors per 100 hectares to 2 by 2030; vii. Increase livestock population to 6,000,000 by 2030; viii. Increase fish population to 300,000mt by 2030.
Tourism	Be a major tourism destination of choice with unique features by 2030	i. Develop, rehabilitate and maintain related infrastructure by 2030; ii. Diversify tourism products by 2030; and iii. Increase the participation of locals in the industry.
Manufacturing	Technology based and export focused manufacturing sector, which is dynamic and competitive with effective entities that add value to the locally abundant natural resources by 2030.	i. Develop a fully integrated rural based agro-based and light-manufacturing by 2030; ii. Increase the share of general manufacturing contribution to GDP to 36.12 by 2030; and iii. Increase Manufactures exports as a share of merchandise exports to 71 percent by 2030.
Infrastructure	A well developed and maintained socio-economic infrastructure by 2030	i. Develop and implement public private-partnerships; ii. Achieve affordable and efficient connectivity; iii. Increase GDP contribution.

5   Conclusion

The objective of this paper was to map and analyse the current relevant export-related status quo of Zambia as a member of COMESA and SADC based on the raw material basis of Zambia, with an emphasis on its current and potential future extraction of copper, and diversification on mind.

Economic diversification is a long and not easy process. It depends on several factors. Main factor is implementation of good and well balanced economic policies and their implementations. The policies should be based on investment infrastructure, human resource development and environment. The economic diversification is tightly connected with economic transformation.

Economic diversification can bring economic growth, development of new industrial sectors, introducing a new technologies, reduction of poverty, higher standard of living. It can bring better competitiveness for the products and stronger integration to global

economy as well as in the context of regional integration – in the case of Zambia to COMESA and SADC.

Zambia for its own successful economic growth and elimination of the risk of external shocks (documented through the vulnerability index), should take some measures:

(a) Improve the investment climate needed to reduce the capital deficit;

(b) Ensure massive investment in infrastructure, energy and transport;

(c) To improve the competitiveness of their products and bring added value of products originating from the extraction industry;

(d) To maximize the diversification of its own industry, dependent on the extraction industry;

Zambia is a large country with many underdeveloped sectors with big potential to grow in the future.

It is clear that Zambia aims to gradually diversify its economy and focus onto other industrial sectors (energy, infrastructure, telecommunications, agriculture or tourism), which is related to its global approach, in order to dominate the other industries and ensure a more significant economic impact in the region. Based on all these factors we believe that Zambia can successfully accomplish the diversification process and move away from the dependence on the copper industry. In Zambia, the diversification process was gaining the priority more than ever.

It has been confirmed that FDI can play a positive role in the process of increasing Zambia's economic development as well as across the region. They can provide significant amount of financial resources which can be used for developing other sectors for the benefit of the regional value chain. This will depend on several factors of the economic reforms and the ability to pursue its long-term development strategies, in particular to accelerate its own economic growth, to industrialize the economy, to improve the education system and to introduce new technologies.

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Valuation of Non-Equity Instruments of Current Eurozone Banking Sector

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Abstract. The paper presents the analysis of the increase in interest rates impact on the valuation of own funds and eligible liabilities in the scrutiny of interest rate risk in the banking book (IRRBB). Paper was prepared within the scope of EBA confidential analysis, leaving all market sensitive information, personal data or other confidential information. Aim of this paper is to present evaluation of current banking regulation and market challenges, with a prism to introduce *pro futuro* recommendations based on joint legal and economic analysis.

Keywords: Own Funds, Eligible liabilities, Banking, CET1.

JEL classification: *E43 / E58 / G21*

1   Background and objectives of this paper

Current macroeconomic conditions pose great challenges for banks. Interest rates (IR) increases, and foreign exchange (FX) movements may significantly impact the value of both assets and liabilities recognised in banks' balance sheets. While assets repricing and related sensitivities towards further interest rate shocks and FX changes are generally more explored, effects on liabilities deserve further analysis, also to gauge potential effects on the prudential value of own funds.[5] and TLAC/MREL[6] instruments coming from adverse movements of these risk factors and interaction with accounting, prudential and hedging strategies put in place by banks. While the actual data are market sensitive, analysis built on them can be used for market and policy makers to evaluate current macroeconomic phenomena on banks within the eurozone.

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5 As defined by Article 25 and 72 and on of CRR.
6 As defined by BRRD

Nonetheless, current banking crisis regarding situations on USA market [7][7] in connection with Swiss crisis of Credit Suisse forces policy makers and supervisors to evaluate IR increases on banking business. As per Basel III regulation, EU regulation of CRR, CRD, BRRD and other important legislation, we need to quickly evaluate changes in the macroeconomics and its impact on prudential regulation, to save in ultima ratio taxpayers of "too big to fail" moral hazard. Banks are at central of business activity, therefore when they experience financial distress, governments usually come to the rescue, offering emergency liquidity and various forms of bailout programs [10]. Mentioned facts are also important for SREP process used to evaluate risk of institutions on financial stability.

The impact of IR and FX movements on liability instruments can be quite material. For instance, significant institution based in UK announced as part of its Q3 2022 results a further emission of senior notes as a consequence of a significant reduction of the value of the Tier 2 and eligible liabilities instruments (USD 7 billion of which: almost USD 4 billion due to the increase of interest rates and USD 3 billion due to FX effects), which has generated questions on the current practices of EU banks. The impact can be therefore severe and can present significant risk on financial stability, which the regulation is designed to protect. Here we can observe the main conflict of law v. actuality or timely response to raising issues of market.

Within set background, author analysed a specific information on current banks' accounting and prudential practices on non-equity instruments, as well as on hedging strategies and associated IR and FX impact on the valuation of those instruments. Therefore the purpose of this paper is to provide an overview with market analysis to provide views that could need to be further investigated and monitored in this regard. All in the note of maintenance of financial stability.

2   Data on non-equity instruments

In November 2022, the EBA launched a stocktake on non-equity instruments' to collect the information deemed useful for the analysis of the issue at stake. As with cooperation with data collected by EBA, we used a representative sample covering institutions of different asset size of 56 institutions – located in 22 jurisdictions across the EU. Due to the market sensitive information, we can share only jurisdiction of the banks which data was used in the analysis: AT, BE, BG, CY, CZ, DE, DK, ES, FI, FR, GR, HR, HU, IE, IT, LU, LV, NL, PL, RO, SE, SI, SK. For the purpose of the analysis, large banks were defined as institutions with RWAs higher than EUR 100bn. Medium banks were defined as institutions with RWAs higher than EUR 30bn. Small banks were defined as institutions with RWAs lower than EUR 30bn.

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7 For details see: Hinh, T. Dinh.: The Current Banking Crisis and U.S. Monetary Policy, PP – 10/23, Policy Center of the New South 2023

The data collection encompassed the treatment of AT1, Tier 2 and MREL/TLAC instruments[8], and covered four main areas of investigation:

- **Accounting choices**, including the classification of AT1 instruments[8] as equity or debt, accounting classifications of debt instruments, use of hedge accounting, foreign currency denomination.
- **Prudential choices**, including alignment of accounting and prudential valuations. This also encompassed how banks might reflect FX movements on the value of AT1 instruments accounted for as equity, the prudential measurement basis used, and the exclusion from the carrying value of certain accounting items (e.g., accrued interest, hedge adjustments).
- **Hedging practices** on interest rate and FX risk, including the use of derivatives and hedge accounting (or election at FVtPL[9]), natural hedging, and other practices.
- **Impact** of the increase in interest rates and FX movements on AT1, Tier 2[10] / MREL/TLAC.

2.1 Accounting practices for financial liabilities

In accordance with IFRS 9, financial liabilities can be measured either at amortized cost (AC) or at fair value through profit or loss (FVtPL). Moreover, hedge accounting requirements are applied when there is a hedging relationship between a hedging instrument and a hedge item (e.g., a recognised asset or liability) in accordance with the rules provided in the standard.

Following a change in interest rates, when instruments are measured at AC without hedge accounting, their carrying amount will not reflect any impact. On the contrary, instruments measured at FVtPL or at AC with a fair value interest rate hedge will be affected by such a change in interest rate. In the latter case, the carrying amount of the instrument (i.e., hedged item) will be adjusted in the balance sheet (B/S) and the associated FV gains or losses will be recognised in P&L[11].

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8 The Tier 1 capital of an institution consists of the sum of the Common Equity Tier 1 capital and Additional Tier 1 capital of the institution.
9 Means fair value through profit or loss. Certain of the Corporation's investments in equity and debt securities have been designated as investments at FVTPL. Changes in the fair value of investments designated as investments at FVTPL are reported in net earnings or loss.
10 As set in Article 62 and on CRR
11 See IFRS 9 6.5.8

2.2 Current prudential treatment of own funds and TLAC/MREL instruments

In the Basel discussions from 2019[3], an agreement was reached on a high level 'internal' principle on measurement of non-equity capital/TLAC[9] instruments: *Non-equity regulatory capital and other TLAC-eligible instruments should be measured and reported, for purposes of calculating regulatory capital ratios, based on the amount of Common Equity Tier 1 that would be generated if the instrument is written down, taking into consideration any applicable Basel III amortisation requirements for the instrument (eg 5-year, straight-line amortisation for Tier 2 instruments). This principle should inform the reference amount to which such amortisation requirements shall be applied.*

A majority market is in favour of basing the amount recognised as capital purely on the accounting value. We propose to clarify the measurement approach in the Basel standards on disclosure, including with respect to the interaction with the prudential filter on FV changes related to own credit risk. We prefer to continue to discuss this issue in following paper.

The prudential treatment of Tier 2 instruments is however clarified with the amendments introduced by CRR2. Article 24 specifies that the valuation of assets and off-balance sheet items shall be affected in accordance with the applicable accounting framework, Article 64 further clarifies that the appropriate measurement basis should be the carrying amount for Tier 2 instruments.

2.3 Areas of investigation and preliminary analysis conducted

Analysis confirmed that both classifications as equity and debt have been used for **AT1 instruments**, with a general preference for the former (i.e., 76% of the sample classified AT1 instruments as equity). However, some mixed practices (e.g., classification of some instruments as debt and others as equity, or classification of the principal amount as debt and accrued interest as equity) have also been observed.

In terms of hedging of AT1 instruments, different practices from a risk management perspective have been observed. Some institutions have hedged (economically) the interest rate risk on those instruments viewed as interest rate sensitive, while other institutions have taken the opposite view in consideration of the discretionary nature of the coupon payments.

A few institutions that issued AT1 instruments in a foreign currency and accounted for the instrument as equity, have reported using a different conversion rate for accounting and prudential purposes. This implies that while the conversion rate at the date of

issuance is used for accounting purposes.[12] , the current conversion rate is used for prudential purposes (including an adjustment both on the AT1 and CET1 amount).

As regards to **Tier 2** and **MREL/TLAC instruments** it has been observed that the majority of banks are using mainly or only measurement at amortized cost. In addition, in many cases fair value accounting hedges on interest rate risk have been implemented on the instruments. This concerns 43% of the institutions of the sample for Tier 2 instruments and most large institutions. In a few cases other accounting treatments have also been reported such as FVtPL classification (achieving a similar outcome as FV accounting hedges in the presence of a hedging instrument) or the use of cash flow hedges.

In terms of **currency of issuance**, divergent practices have been observed. While most issuances of EU banks are in EUR and, therefore, insensitive to FX movements, larger and more international eurozone banks have also reported significant issuances in USD. Non-euro eastern European countries have also reported significant issuances in EUR. Finally, a more balanced funding profile has been observed in the Nordic countries.

The **prudential measurement** of Tier 2 and MREL/TLAC instruments has also been investigated and heterogenous practices have been observed in this regard. The carrying amount has been identified as the type of measurement more broadly used (i.e., prudential value is aligned with the accounting value, with the exception of specific prudential treatments such as Tier 2 amortization). However, other measurement basis have also been widely used, in particular the nominal amount or the outstanding amount. In addition, some banks have also made specific adjustments, such as excluding accrued interest or excluding the hedge adjustment arising from the FV accounting hedge. Majority of large banks have not taken into account hedge adjustments in the prudential value.[13]. This could lead to increased systemic risk and inevitable moral hazard.

Some banks reported using **macro accounting hedges**, rather than micro hedges. In these cases, the hedge adjustments have been booked from an accounting perspective in a separate accounting line rather than directly in the value of the individual own fund instruments. As a result, using the 'carrying amount' has resulted in the exclusion of the hedge adjustments from the prudential amount.

In the first three quarters of 2022, institutions using FV accounting hedges or classification at FVtPL have reported a notable **decrease**.[14] in the accounting value of

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12 See IAS 21

13 For a sample of 15 large banks, defined as RWAs higher than EUR 100bn, 73% reported excluding hedge adjustments from their Tier 2 prudential figure and 93% excluded hedge adjustments from their MREL/TLAC prudential figure.

14 For the 3 first quarters of 2022, the median reported decrease in the accounting value of Tier 2 instruments is 7.1% for Tier 2 and 7.6% for MREL / TLAC for the sub-sample of institutions using (partially) either FV accounting hedges or FVtPL classification. In terms of RWAs, the median impact is 0.21% for Tier 2, and 0.49% for MREL/TLAC.

their Tier 2 / MREL/TLAC instruments due to interest rate movements. From a financial perspective the P&L impact is close to zero (there is a gain on the own fund instrument and a loss on the derivative). However, from a prudential perspective, when the carrying amount is used without adjustments, the decrease in value of the instrument is fully reflected in the Tier 2 or MREL/TLAC amount. On the other hand, when the nominal amount, outstanding amount or carrying amount excluding the FV hedge adjustment is used, the impact from interest rate movements has not been reflected in the prudential value. A heterogeneity of impact is therefore observed due to divergent accounting and prudential practices.

3   Preliminary analysis

Analysis performed on the data submitted by banks overall reveals heterogeneous practices in the way banks account and measure non-equity instruments - both for accounting and prudential purposes -, as well as on the – economical and/or accounting - hedging strategies used to manage the risks those instruments are exposed to. This heterogeneity plays also an important role in the way banks have been – and will be - impacted by IR and FX movements.

Amid the various findings identified, the divergences among banks that have been detected are as follows:

- Prudential measurement basis: While the carrying amount is generally the most common basis used for prudential purposes for instruments classified as liabilities (especially Tier 2), different practices have been observed in particular on banks that have reported the use of the nominal value or other similar basis (e.g. the outstanding value). In some cases this approach was also followed for Tier 2. This could lead to differences between prudential supervision or resolution supervision, base on the practices used by the banks. Following differences can cause late identification of issues connected to the instruments used, therefore arises legal bias risks. As we presume, uniform reporting practices could be beneficial for risk mitigation.
- Hedge adjustments: In other cases, banks have reported to use the carrying amount as the prudential basis for instruments classified as liabilities, with an adjustment being made to filter out the effect of any FV hedge. Those adjustments have been observed to be performed at the level of the instruments (i.e., for determining their prudential value) and have, therefore, not affected the amount recognised in P&L (i.e., no impact at the level of CET1 capital). Some banks have reported the willingness to avoid undue volatility in own funds (in the absence of prudential filters) and to ensure that the prudential amount does not depend on the hedge strategy (e.g., micro, macro, economic or no hedge) as the main rationales behind such adjustments. In this regard, it is worth highlighting that banks that indicated that this approach has been consistent over time regardless the sign of the adjustments (positive or negative effect on CET1).

- Treatment of accrued interest: Similarly, diversity in the consideration of accrued interest in the prudential figures have been also observed with a proportion of banks removing this component for prudential purposes, both for Tier 2 and TLAC/MREL instruments. Among the main reasons provided for such treatment was its plausible lack of compliance with the provisions governing the eligibility criteria regarding the minimum residual maturity of one year envisaged for TLAC/MREL instruments[15], or the minimum original maturity of five years envisaged for Tier 2 instruments[16], and/or the requirement for amounts to be fully paid up. Lack of compliance with regulative aspects is important marker for the instruments, as it can disqualify them to be used by the financial institutions in their business activities, which can lead in severe cases to infringement of capital requirements.

- Treatment of FX effect: Some heterogeneities have been also encountered in the way banks are reflecting the effect of FX in the AT1 instruments classified as equity and issued in foreign currency. While most of the banks do not use the updated conversion rate neither in the accounting nor in the prudential values, others have used the conversion rate at reporting date only for prudential purposes. For the latter case, banks have reported that the adjustment made on the value of the liability is also reflected in the CET1 figures (considering the gain/loss associated to a decrease/increase in the value of the liability). This treatment has been reported to be used with the main objective of aligning the value of the liability to the amount that would be paid in case of redemption which would allow to a prompt reflection of any embedded gain/losses on the prudential figures. This can be seen as best practices also set by EBA within the CET1 and eligible liabilities compliance exercises [2].

On the usage of carrying vs the nominal amount, the use of the carrying amount for own funds instruments is in line with the requirements set out in the CRR[17]. On the other hand, it was also stressed that the usage of nominal – at least for eligible liabilities – could result in less volatile figures, especially if the treatment is applied consistently over time. In this context, the need to ensure a level playing field among banks should be highlighted. This is because whilst banks using the nominal amount will not suffer any variation in the prudential figures as a result of IR movements - regardless of the accounting and hedging strategies in place, banks making use of fair value measurement – also due to the usage of FV accounting hedges – are already reflecting these effects in their prudential figures. Using the nominal value could lead to a potential overestimation of the loss absorbency capacity of banks in certain situations.

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15 See Article 72a(1)(b) CRR
16 See Article 63(g) CRR
17 In accordance with Article 64(2)(a) CRR, for Tier 2 instruments, the amount reflected for prudential purposes is calculated using the carrying amount. In addition, Article 24 CRR provides that the valuation of assets and off-balance sheet items shall be effected in accordance with the applicable accounting framework

Loss absorbency capacity is closely connected to the moral hazard of too big to fail institutions present on the market, therefore this marker should be prioritized.

With regards to the exclusion of some factors from prudential figures (like accrued interests), the issue arises from loss absorbency capacity in case of liquidation. The starting point of the valuation of own funds and eligible liabilities instruments should be the carrying amount. Nevertheless, the question is whether all the eligibility criteria set out in the CRR should still be met (i.e., exclusion of those factors could be justified in cases where the provisions are not complied with.[18]). In particular, it could also be considered that from the CRR provisions the eligibility criteria are applicable only to instruments (i.e., the principal) and not to the interest that is recognised only as a result of the measurement of the carrying amount. In this regard, accrued interests could never meet the 'fully paid up' criterion since they are paid by the issuer to the holder and not the reverse. In addition, it was stressed that the exclusion of any components included in the carrying amount could lead to asymmetries between accounting and prudential figures and could lead to a different definition of carrying amount for both purposes and for reporting under FINREP and COREP.

In the discussions provided on the roundtable with the banks, it was also noted that that some institutions have ultimately kept a treatment corresponding to the one used when prudential filters were still in place in order to remove volatility from own funds. Following approach is in correspondence with prudent supervision. In addition, it was stressed that the continuity of the use of a unique/consistent treatment by banks is an important aspect of own funds management (i.e. no use of opportunistic treatments by banks depending on the impact on CET1). Cautiousness should be exercised in requesting some changes in the treatments given the potential consequences in terms of additional issuances by some banks under certain circumstances, meaning volatility on the market, too much specification on certain types of bank products (NPL connected to specific market friction, e.g. aviation or start-up/fintech market, as been extremely volatile for SVB bank). In all cases we propose that there should be a need for a deepened understanding of the practices and discussions with the banks before making any policy decision (also considering practices in other non-EU jurisdictions). This approach is beneficial for policy makers, as it directly reflects market needs. However, consensus can be sometimes hardly reached, therefore we propose to continue of prudent perspective to be used in the negotiations.

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18 Paragraph 65 TLAC/MREL EBA report, refers to the issue of interest being eligible, and highlights that all eligibility criteria, in particular the subordination requirement and minimum maturity of 1 year need to be met.

4   Conclusion

Analysis above highlighted some potential areas of further investigation in the way banks account for their own funds and eligible liabilities instruments and the impact observed from the current macroeconomic environment.

Capital is supposed to protect a bank from all sorts of uninsured and unsecured risks apt to turn into losses. Two principal functions of capital are recognised– to absorb losses and to build and maintain confidence in a bank. Capital is needed to allow a bank to cover any losses with its own funds. A bank can keep its liabilities fully covered by assets as long as its aggregate losses do not deplete its capital [4]. Any losses sustained reduce a bank's capital, set off against its equity items (share capital, capital funds, profit-generated funds, retained earnings), depending on how its general assembly decides [5]. Banks run a considerably greater risk of losses resulting from borrower defaults, rendering some of their assets partly or entirely irrecoverable. Capital has become a main issue of banking system. Within systematically important banks, share of capital in total assets/liabilities moves between 2.5 and 8 % [6]. Able to operate at the lower end of the range are large banks with a quality and well-diversified asset portfolio. Anyway, and this we presume to be deemed as factual, capital/ own funds adequacy deserves constant attention. Asset growth needs to respect the amount of capital.

In this regard, we conclude that additional regulative guidance on the application of the current framework may be needed on some aspects. In order to get a better (and wider) understanding of practices, we support a roundtable with banks and professional associations to be held to discuss more in depth mentioned aspects.

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Competitive Analysis of Spa Industry in Slovakia: Combining SWOT, EFE and IFE Analysis

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Abstract. This article deals with spa tourism in Slovakia and its importance for health care, tourism, and the economy. Slovakia has a rich history of spa tourism dating back to the Hungarian state. The spa industry forms an important part of public health care and also has an important role in tourism. Spa towns often form the centres of economic, cultural and social activity in Slovakia. The spa industry and spa tourism are also of economic and socio-political importance. There is a competitive struggle between European countries in the field of spa and spa tourism. Spa establishments are trying to attract younger clients and to improve the quality of the services provided. However, there is outdated and stagnant legislation which hampers the development of spas. The article also discusses the economic problems associated with staffing and innovation of spa businesses. The analysis of the spa tourism environment in Slovakia is carried out by means of a scoring system, which will enable the establishment of priorities for improvement in this area.

Keywords: Spa Industry, Analysis of Spa Industry in Slovakia, Marketing Analysis of Spa Industry.

JEL classification: *Z30, Z32, M31*

1   Introduction

In the European context, Slovakia is considered a traditional spa destination with an ancient history connected with the establishment of the first settlements near thermal or mineral springs [1]. Already from contemporary maps of the Austro-Hungarian state, the largest concentration of spas (both therapeutic and cleansing) was in Upper Austro-Hungary, i.e., in the territory of today's Slovakia [2]. The spa industry is not only an important component of the health care provided to the public but also plays an

important role in tourism, as a means of satisfying the needs of interested persons, clients, and patients. Entire regions are often based on the tradition and offer of spa sites - not only because of their contribution to treatment but also because of their cultural and social history, as spa sites have often formed the centers of economic, cultural, and social activity in Slovakia [3]. According to the Association of Slovak Spas [4], the spa industry and spa tourism cannot be understood as a means for treatment, but two other aspects are also important - economic and socio-political. These are based on the context of development and should be taken as full aspects. From this perspective, it is also necessary to mention the competitive struggle that is taking place, especially within European countries [5]. According to Suhányi [5], younger clients who suffer from fatigue due to their fast-paced lifestyles are also coming to the spa. Thus, spa facilities are trying to provide better services, more professional medical care and improve the quality of accommodation and catering facilities. However, the biggest problem in this area is the outdated and stagnant legislation, which is also mentioned by Kmeco in his work [6].

Although spa tourism is a cultural and historical phenomenon in the Central European area, according to Halenárová [7], only in the last 10 years has spa tourism in Slovakia received significant attention in the literature - thanks to authors such as Eliášová, Matlovičová, Gúčik, Marčeková, and Kulla. However, in her article, the author also discusses the economic problems associated with the personnel and innovation of spa enterprises. In 2022, according to the online economic journal [8], there were 31 spa enterprises operating in 25 spa towns in Slovakia, but their development is slowed down due to weak state support, insufficiently updated legislation, and the spas themselves, which draw on their tradition and the loyalty of domestic clients.

2   Methodology

The main objective of the paper is to examine the environment of spa tourism in Slovakia based on the analyses and to prioritize the individual findings based on the scores in the analyses.

In this paper, two methods are used to fulfill the main objective. The first one is SWOT analysis as a basic tool that is used to evaluate the current situation from different perspectives, namely strengths, weaknesses, opportunities, and threats. This analysis is a combination of O-T and S-W analysis. The O-T analysis is an external (external) analysis that focuses mainly on the external environment (opportunities and threats). The S-W analysis is an internal (internal) analysis, which is an analysis of the internal factors of the organization (strengths and weaknesses). For the relevance of the SWOT analysis, we use the assignment of weights to each factor based on a numerical evaluation. Each parameter (factor) is assigned a numerical weight ranging from 1 to 5 points, with 5 points being the highest possible weight and 1 point being the lowest possible weight. Once all parts of the SWOT analysis have been evaluated and numerically scored, it is necessary to sum the strengths with the weaknesses and the opportunities with the threats. Based on the result that we record on the axis of the

SWOT analysis; we can find out what strategy is the most suitable for the enterprise. We know four outcome analyses:

- An offensive strategy that uses strengths to exploit opportunities and manage threats.
- A defensive strategy that focuses on minimizing weaknesses and limiting threats.
- Escape strategy, which focuses on minimizing weaknesses and exploiting opportunities to avoid threats.
- An alliance strategy, which exploits strengths and opportunities in collaboration with other actors to manage threats and minimize weaknesses.

Although a SWOT analysis is a useful tool for identifying the strengths and weaknesses of a business and the opportunities and threats in the environment, it may not provide a sufficiently detailed view of the specific factors influencing business performance. Therefore, it is advisable to complement SWOT analysis with another tool [9] such as the internal and external factors evaluation matrix - EFE and IFE analysis.

EFE analysis helps to identify and evaluate opportunities and threats affecting the overall environment in which the enterprise operates. This analysis helps the business to focus on the relevant factors affecting its performance to better compete in the market.

IFE analysis focuses on identifying the strengths and weaknesses of the business and weighting them for the overall performance of the business. This analysis allows the enterprise to focus on areas where it has a competitive advantage and improve its weaknesses. The combination of these tools allows the enterprise to gain a comprehensive view of its current situation, competitive environment, and future opportunities and threats.

The basis for both versions of the matrices is the identification of key external (EFE) and internal (IFE) factors that affect or may affect the enterprise. Each factor is then assigned a weight from 0.0 (lowest importance) to 1.0 (high importance). The number indicates how important the factor is if the enterprise (in this case a spa or spa tourism enterprise) wants to succeed in the industry. The sum of all weights must equal 1.0. The factors themselves should not be given too much weight (i.e., assigned a weight higher than 0,30) because success in an industry is only partly determined by one factor. The next step is to assign ratings in both types of matrices:

The external matrix evaluation (EFE) expresses how effectively a company's current strategy responds to opportunities and threats. We set the numbers from 4 to 1, where 4 indicates a better response, 3 is an above-average response, 2 is an average response, and 1 is a poor response. Ratings as well as the height are assigned subjectively to each factor separately.

The rating in the internal matrix expresses how strong or weak each factor is in each enterprise (or in the area under study). The numbers range from 4 to 1, where 4 indicates great strength, 3 indicates little strength, 2 indicates little weakness, and 1 indicates great weakness. Strengths can only be given ratings of 3 and 4, weaknesses range between 2 and 1.

Finally, both matrices express the score, which is the result of the weights multiplied by the rating. Each key factor must be rated. The total weighted score is simply the sum of all the individual weighted scores for the factors.

3   Results and discussion

Environmental analysis is an essential tool for any business that wants to be successful in the marketplace. The most used in the business environment is the basic SWOT analysis, which, however, in terms of defining strengths, weaknesses, opportunities, and threats, does not show the importance of the individual factors identified. Therefore, in our following findings, we focus on the elaboration of a point analysis. In the field of spa tourism in Slovakia, this tool is even more necessary as spas are an important element of tourism. The SWOT point analysis helps businesses to identify their strengths, weaknesses, opportunities, and threats. Based on this analysis, a business can identify what it is doing well and what it can improve. EFE analysis focuses on the external factors affecting the enterprise such as opportunities and threats. IFE analysis, on the other hand, focuses on the internal factors of the business, such as strengths and weaknesses. They help businesses determine their competitive position and set a strategy to move them forward in the market.

In the field of spa tourism in Slovakia, these analyses can be very useful. As spas are dependent on many factors such as weather, seasonality, and competition, it is important for spas to have an overview of their environment and to be able to react appropriately. With this knowledge, spas can set a strategy that will move them forward in the market and improve their competitive position.

In the following parts of this scientific paper, we will focus on the results of the SWOT analysis, EFE analysis, and IFE analysis in the field of spa tourism in Slovakia. We will analyze the significant factors that influence spa tourism in Slovakia and suggest strategies that can help businesses in this sector to achieve greater success.

3.1   SWOT Analysis of Spa Tourism in Slovakia

Table 2. SWOT analysis - strengths of spa tourism in Slovakia

	Factor	Value
1.	Numerous thermal and mineral springs with healing effects	5 points
2.	Spa with a rich history and tradition	4 points
3.	Geographical location in Central and Eastern Europe	4 points
4.	Combination of spa services with tourist activities (hiking, cycling, skiing)	4 points
5.	A diverse range of spas and wellness centers	4 points
TOTAL		**21** points

Source: own elaboration

Table 2. SWOT analysis - weaknesses of spa tourism in Slovakia

	Factor	Value
1.	Outdated infrastructure in some spas	-2 points
2.	Insufficient advertising and marketing activities on foreign markets	-3 points
3.	Low level of service quality in some spas	-3 points
4.	Low seasonality in some regions	-2 points
5.	High prices of some spas	-3 points
TOTAL		**-13** points

Source: own elaboration

Table 3. SWOT analysis - opportunities of spa tourism in Slovakia

	Factor	Value
1.	Growing interest in wellness services and spa treatments	5 points
2.	Use of digital technologies to promote spa tourism	4 points
3.	Possibility of using European funds for infrastructure modernisation	4 points
4.	The possibility of expanding the range of services to include new trends in tourism	4 points
5.	Cooperation with other tourist destinations and spas to create package offers	4 points
TOTAL		**21** points

Source: own elaboration

Table 4. SWOT analysis - threats to spa tourism in Slovakia

	Factor	Value
1.	Impact of the COVID-19 pandemic on tourism and travel restrictions	-5 bodov
2.	Competition from abroad and the increasing trend of travelling abroad	-4 body
3.	Changes in legislation and tax conditions	-3 body
4.	Impact of climate change on the availability of thermal and mineral springs	-3 body
5.	Lack of cooperation between tourist destinations and spas	-3 body
TOTAL		**-18 bodov**

Source: own elaboration

Table 5. Results of SWOT analysis in Slovakia

Parameter	Mathematical operation	Resulting value
strengths + weaknesses	21 + (-13)	8
opportunities + threats	21 + (-18)	3

Source: own elaboration
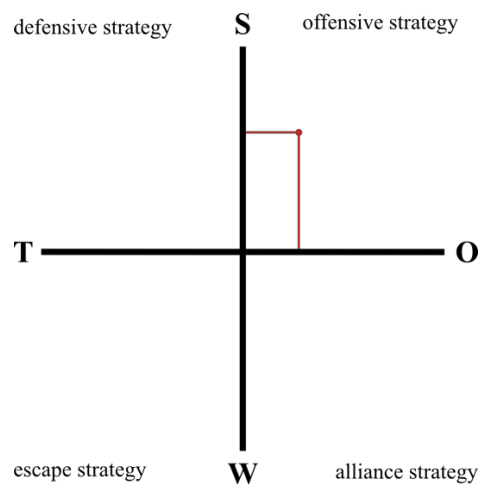
Figure 1. Resulting strategy based on SWOT analysis scores
Source: own elaboration based on calculations

The offensive strategy that emerged from the results of the SWOT analysis suggests that spa tourism should focus on using the strengths and opportunities to increase competitiveness and improve the position of spa tourism in Slovakia as a position in the overall market. As strengths have higher weighted scores than weaknesses and opportunities have higher weighted scores than threats, this is an indication that efforts and resources should be made to improve and exploit these factors. Concrete steps could focus on improving the quality of services at the spa and creating new products and services that would attract more visitors to Slovakia. Improving the marketing strategy and promotion of spa tourism could help to raise awareness of spas and the attractiveness of Slovakia as a destination. Although there are also some weaknesses and threats, an offensive strategy should focus on strengthening strengths and exploiting opportunities to achieve a better market position and competitive advantage.

3.2 EFE and IFE analysis of spa tourism in Slovakia

Table 6. External Factor Evaluation (EFE analysis) for spa tourism in Slovakia

External Factors	Weight	Rating	Weighted score
Opportunities			
Growing interested in wellness services and spa treatments	0,30	3	0,60
Use of digital technologies to promote spa tourism	0,18	2	0,36
The possibility of using European funds to modernize infrastructure	0,18	2	0,36
Possibility of expanding the range of services to include new trends in tourism	0,18	2	0,36
Cooperation with other tourist destinations and spas to create package offers	0,16	3	0,48
Total weighted score	**1**		**2,16**

Threats			
Threats			
Impact of the COVID-19 pandemic on tourism and travel restrictions	0,30	1	0,30
Competition from abroad and the increasing trend towards international travel	0,25	2	0,50
Changes in legislation and tax conditions	0,15	2	0,30
Impact of climate change on the availability of thermal and mineral springs	0,15	1	0,15
Lack of cooperation between tourist destinations and spas	0,15	2	0,30
Total weighted score	**1**		**1,55**

Source: own elaboration

For the EFE analysis, we find that the overall weighted opportunity score is 2.16 and the threat score is 1.55. From the result, we can conclude that there are more opportunities than threats in the external environment of spa tourism in Slovakia. Based on these results, businesses could increase their competitiveness and growth, however, it should be taken into account that there are still some threats that the sector should pay attention to and prepare for with adequate measures. Overall, spa tourism businesses in Slovakia should take advantage of their opportunities and focus on growth, while being prepared to address threats to minimize their negative impact.

Table 7. Internal factor evaluation (IFE analysis) for spa tourism in Slovakia

Internal Factors	Weight	Rating	Weighted score
Strengths			
Uniqueness of local natural resources	0,20	4	0,80
Quality spa services and treatments	0,15	4	0,60
Good location in the centre of the spa towns	0,10	3	0,30
Environmental care and sustainability	0,05	4	0,20
Long tradition of spa recreation	0,10	3	0,30
Greater accessibility to travel and transport	0,10	3	0,30
Qualified spa staff	0,10	3	0,30
Fight against seasonality	0,20	2	0,40
Total weighted score	**1**		**2,80**

Internal Factors	Weight	Rating	Weighted score
Weaknesses			
Lack of modern technologies and their poor use	0,20	2	0,40
High prices of spa treatments and accommodation (for self-payers)	0,15	2	0,30
Insufficient diversification of the offer	0,10	1	0,10
Poor accessibility for people with health problems	0,10	2	0,20
Insufficient infrastructure for holidaymakers and tourists to the place of spa treatment	0,20	1	0,20
Seasonality and high fluctuations in visitor numbers	0,15	1	0,30
Lack of cooperation between the spa and surrounding communities	0,10	2	0,20
Total weighted score	**1**		**1,55**

Source: own elaboration

The overall weighted strengths score is 2.80, indicating that spa tourism in Slovakia has strengths that can be further exploited to improve competitiveness and gain a larger market share. On the other hand, the weaknesses have an overall weighted score of 1.55, indicating that spa tourism in Slovakia needs to focus on addressing some weaknesses to compete effectively in the market and ensure sustainable growth.

4   Conclusion

The key idea of the scientific article is to analyze the environment based on analyses and matrices - namely SWOT analysis, EFE analysis, and IFE analysis as necessary tools for shopping tourism in Slovakia, which are important elements of tourism. These analyses enable spas to identify their strengths, weaknesses, opportunities, and threats and, based on this, to develop a strategy that will move them forward in the market and improve their competitive position. The results of the SWOT analysis suggest that spas should focus on exploiting strengths and opportunities, such as improving the quality of services and creating new products and services, improving the marketing strategy and promotion of spa tourism, which could help to increase the awareness of spas and the attractiveness of Slovakia as a tourist destination.

According to the methodology of the research paper, environmental analysis is an integral tool for any business that wishes to be successful in the marketplace. The basic SWOT analysis is the most used in the business environment, but in relation to defining strengths, weaknesses, opportunities, and threats, it does not offer sufficient importance to the individual factors. Therefore, in our research, we focus on the elaboration of a point analysis. In the field of spa tourism in Slovakia, this analysis is even more important as spas represent a significant part of the tourism industry. The SWOT point analysis helps businesses to identify their strengths, weaknesses, opportunities, and threats. Based on this analysis, a business can find out what it is good at and what it should improve. EFE analysis focuses on the external factors that affect the enterprise such as opportunities and threats. IFE analysis, on the other hand, focuses on the internal factors of the business.

The advantage of these tools is their multi-purpose nature - they are used with ana to identify factors that can later be used to build an IE matrix, GE-McKinsey matrix, or benchmarking. Therefore, it is advisable to extend this article in the future with further scientific research and exploration to contribute to the knowledge in the field of spa tourism in Slovakia.

5   Acknowledgement

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Comparison of the Legislative Requirements Governing the 2014-2020 Programming Period and the 2021-2027 Programming Period in the Slovak Republic

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Abstract. The programming period is a seven-year period in which the Member States of the European Union can draw funds for activities supported by the European Structural and Investment Funds. The institutional, procedural arrangements for the implementation of the European Funds within the Member States are regulated by European and national legislation. The paper aims to compare the 2014-2020 programming period and the 2021-2027 programming period in terms of the setup of processes resulting from national legislation. The comparison will be based on the comparison of Act 292/2014 on the Law on the and Law 121/2022 Coll. on contributions from European Union funds and on amendment and supplementation of certain acts. By analyzing the above-mentioned laws, we have found that from the institutional and procedural point of view, changes have been made in the setting of the new programming period. These changes could simplify the implementation of the European Structural and Investment Funds in Slovakia in the coming years.

Keywords: European Structural and Investment Funds, Programming Period, Legislation.

JEL classification: *R58, H70*

1   Introduction

The European Union's regional policy, otherwise known as Cohesion Policy or Economic, Social, and Territorial Cohesion Policy, is one of the most important investment instruments. According to the European Commission, more than 365 billion of the European budget has been allocated in the 2014-2020 programming period (European Commission, 2014). The main feature of this policy is the principle of solidarity through which funds are redistributed from more economically advanced states to less developed, underdeveloped states, or poor states to reduce regional disparities and improve the quality of life of the population (Wokoun, 2011). Structural

policy is a part of economic policy. Its key role is to enable weak, structurally disadvantaged regions to minimize their disadvantages and provide them with access to overall economic development and growth. EU structural policy is considered a complement to national regional policy (Bauer, 2001). Structural policy and structural funds as an instrument are by their very nature directly aimed at reducing disparities between regions as well as reducing disadvantaged regions or areas of member states. In other words, it is a policy whose main objective is to provide Member States with the financial means to ensure economic and social development and thus move closer to the developed countries (Kováčik, 2019). The principles of the European Union's regional policy are divided into five basic areas. The main principles - programming, concentration, partnership, additionality, and monitoring and evaluation are supplemented by the authors Marek, and Kantor (2009) with other principles, namely subsidiarity, coordination and harmonization, integration, convergence, compatibility, and proportionality. The implementation of the Structural Funds of the European Union is conducted in a Member State through operational programs. These are medium-term documents drawn up for predefined areas, which contain the objectives and main needs of the sector, a full description of the measures planned to achieve the main objectives and needs, and a financial plan and provisions for securing it. An operational program is developed by the relevant central government body with the participation of socioeconomic partners by the objectives and priorities set out in the national plan (Kováčik, 2019).

2   Methodology

The institutional and procedural set-up of the programming period is regulated by European and national legislation. Given the gradual transition in the implementation of the European Structural and Investment Funds to the programming period 2021-2027, it is important to compare the settings and differences in the two programming periods.

The paper aims to identify the main differences in the settings in both programming periods based on Act 292/2014 on the contribution provided by the European Structural and Investment Funds and on the amendment and supplementation of certain acts and Act 121/2022 Coll. - Act on the contributions from the European Union funds. In the paper, we focused on the differences resulting from the approved Act 121/2022 Coll. - Act on contributions from European Union funds.

The methods used in the paper include analysis and comparison. Analysis was used in the study of the individual laws and then the comparison of the laws was conducted.

3   Main findings

The set-up for the implementation of the European Structural and Investment Funds is legislatively regulated in each programming period. In the 2014-2020 programming period, the provision of contributions from the European Union funds is regulated by

Act 292/2014 of the Collection of Laws on the contribution provided from the European Structural and Investment Funds and on the amendment and supplementation of certain acts. The law entered into force on 1 November 2014.

The programming period 2021-2027 is regulated by Law 121/2022 of the Collection of Laws. Act 121/2022 is divided into 8 parts and includes and regulates general provisions, the competence of the authorities, the procedure for granting the contribution, specific procedures for granting the contribution, the procedure for granting the contribution to the financial instrument, financial relations for granting the contribution, the settlement of financial relations and the management of the State's receivables and the last eight parts relate to common and transitional provisions.

3.1   General provisions - European Union funds

The first and significant difference in the programming periods under review is the number of funds from which Member States will draw funding. In the 2014-2020 programming period, implementation took place from the five funds listed in Table 1. In the 2021-2027 programming period, two funds remain the same - the European Regional Development Fund and the Cohesion Fund. The European Social Fund Plus will focus on the social area, promoting employment and inclusion.

Table 1. European Structural and Investment Funds in the 2014-2020 and 2021-2027 programming periods

Funds for the 2014-2020 programming period	Funds for the 2021-2027 programming period
European Regional Development Fund	European Regional Development Fund
European Social Fund	European Social Fund Plus
Cohesion Fund	Cohesion Fund
European Maritime and Fisheries Fund	European Maritime and Fisheries and Aquaculture Fund
European Agriculture Fund for Rural Development	Asylum, Migration, and Integration Fund
-	Internal Security Fund
-	Financial support instrument for border management and visa policy
-	Just Transition Fund

Source: Law 292/2014 of the Collection of Laws. Act on contributions from European Union funds and on amendments to certain acts and Act 121/2022 of the Collection of Laws. Act on contributions from European Union funds and amend certain laws.

To support local fishing and local communities, the European Maritime, Fisheries, and Aquaculture Fund was established and continues the objectives of the European Maritime and Fisheries Fund.

In the context of the current European challenges, additional funds have been established to support the Member States of the European Union: The Asylum, Migration and Integration Fund, the Internal Security Fund, and the Just Transition

Fund. The specific objective of the Just Transition Fund is "to enable regions and people to address the social, employment, economic and environmental consequences of the transition to achieve the Union's 2030 climate goals and the 2050 climate-neutral economy based on the Paris Agreement" (Ministry of Investment, Regional Development and Informatization, 2021, p.3).

3.2   Competence of the Authorities

The role of the Government of the Slovak Republic under Law 121/2022 is to designate the Managing Authority and approve the Partnership Agreement of the Slovak Republic for the years 2021-2027 and to approve the Operational Program, except for the Asylum, Migration, and Integration Fund, the Internal Security Fund and the Instrument of Financial Support for Border Management and Visa Policy. Compared to the previous period 2014-2020, the competencies of the Government have been reduced. The government has also been tasked with appointing additional bodies. Based on a proposal from the managing authority, it designated the intermediate body, the audit authority, and the paying agency.

The Ministry of Investment, Regional Development, and Informatization of the Slovak Republic remains the central coordinating body for the next programming period. The Ministry of Finance will be the paying authority for the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the European Maritime, Fisheries and Aquaculture Fund, and the Equitable Transition Fund. The paying authority shall perform the same tasks and activities as those conducted by the certifying authority.

In the programming period 2021-2027, new bodies are also created whose competencies have not yet been regulated in the law. For integrated territorial development, a Partnership Council and a Sustainable Urban Development Cooperation Council are created. According to Law 121/2022, the role of the Partnership Council is to coordinate the preparation and implementation of the integrated spatial strategy and approve the integrated spatial strategy and the project plans for the integrated spatial investment. The same activities focusing on sustainable urban development arise for the Sustainable Urban Development Cooperation Council. The status, composition, tasks, performance of activities, and method of decision-making shall be approved by the Ministry of Investment, Regional Development, and Informatization and submitted for approval by the higher territorial unit or municipality.

The newly established body is ensuring the protection of the financial interests of the European Union. The programming period 2021-2027 is ensured by the Office of the Government of the Slovak Republic. The main activities resulting from the law are the protection of the financial interests of the European Union, the collection of data on irregularities, and the reporting of irregularities to the European Commission. The Office of the Government of the Slovak Republic is the coordinating body for the fight against fraud. The Ministry of Finance of the Slovak Republic is the coordinating body for financial instruments. The Office of the Government of the Slovak Republic continues to function as the body ensuring the protection of the financial interests of the European Union. The managing authority has the right under the law to authorize

the intermediate body in writing to conduct certain activities. In the programming period 2021-2027, only a ministry, other central government body, or a state contributory organization may be designated as an intermediate body.

As intermediary bodies were designated individual ministries - Ministry of Labor, Social Affairs and Family of the Slovak Republic, Ministry of Education, Science, Research and Sport of the Slovak Republic, Ministry of Transport and Construction of the Slovak Republic, Ministry of Environment of the Slovak Republic, Ministry of Economy of the Slovak Republic, Ministry of the Interior of the Slovak Republic, Office of the Government of the Slovak Republic - Office of the Government Plenipotentiary for Roma Communities, Slovak Innovation and Energy Agency and the Office for Public Procurement (Ministry of Investment, Regional Development, Informatization of the Slovak Republic, 2023). The Managing Authority for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument of Financial Support for Border Management and Visa Policy programs develops and approves the management system for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument of Financial Support for Border Management and Visa Policy programs and its changes.

The Managing Authority has been given the responsibility under the law for making payments to the beneficiary, which were previously conducted by the Paying Authority.

3.3   Procedure for granting the allowance

The applicant shall apply following a call for applications. The place of publication of the call is changed. Calls for proposals were previously published on the provider's website. According to Law 121/2022 on contributions from European Union funds, the call should be published in the information monitoring system. Similarly, changes to a call or cancellation of a call will be communicated to applicants within the information monitoring system. Another change about the call for proposals is the reduction of the deadline for completing or amending the application, from the previous 15 days to 10 days.

Similar changes apply to the project plan. The call for project proposals is also being moved from the website to the information monitoring system. Another change is that the evaluation report, because of the evaluation process of the project plan, can be part of the conditions for the grant.

In addition to the conditions for sending a written proposal for the conclusion of the contract and setting a deadline for the acceptance of the proposal, the applicant is also required to fulfill another condition. Neither the provider nor a member of its statutory or supervisory body may have been convicted of a valid offense of subsidy fraud, an offense of damage to the financial interests of the European Union, an offense of procurement and public auction rigging, an offense of bribery, an offense of indirect corruption or an offense of receiving and granting an undue advantage.

The granting of an additional allowance was also regulated as part of the special procedures for granting the allowance. An additional contribution could be granted if there was an increase in the total eligible expenditure of the project relating to the main activities of the project and without the payment of which it would not be possible to

achieve the objectives of the project as set out in the contract. At the same time, the provider must have funds available to provide the additional contribution. This part in Law 121/2022 is not.

3.4 Specific procedures for granting the allowance

In the area of national projects, there is a change in the means of communication. Also in this area, instead of a website, there will be a switch to an information monitoring body through which the provider will invite the prospective applicant to publish and submit the national project.

Integrated territorial investment projects or sustainable urban development projects that are part of an integrated territorial strategy or part of a sustainable urban development spatial strategy are introduced as part of the new law. The application and approval process are no different from other projects. The Integrated Spatial Investment and Integrated Spatial Investment for Sustainable Urban Development projects have replaced the area of major projects in Law 292/2014.

In the area of technical assistance, the Slovakia-Czech Republic and Slovakia-Austria cross-border cooperation programs and the Asylum, Migration and Integration Fund, the Internal Security Fund, and the Financial Support Instrument for Border Management and Visa Policy will be implemented on a flat-rate basis.

3.5 Procedure for granting a contribution to a financial instrument

The fifth part of Law 121/2022 deals with the procedure for granting a contribution to a financial instrument. That Part regulates the possibilities for granting a contribution to a financial instrument, the rules for granting a contribution to a financial instrument, and the implementation of the financial instrument. At the same time, the rules for the use and reimbursement of the financial instrument contribution and the rules for the reimbursement of the financial instrument contribution in the event of financial correction are also regulated. The financing agreement and the contract with the financial intermediary are also defined.

The financial instrument contribution is granted based on a Financing Agreement for an existing or newly created financial instrument. Examples of such a contribution are to invest in the equity of the institution to contribute to the financial instrument in the form of a separate block of funding or to a special account of the institution implementing the financial instrument. The recipient of a contribution to a financial instrument shall apply for a contribution to the financial instrument by the contract.

In addition to the financing agreement, a contract with the financial intermediary shall also be adopted. This is a contract concluded between the beneficiary of the financial instrument and the financial intermediary. In addition to the rights and obligations of the parties, the general terms and conditions of these contracts are set out in the law. The financial intermediary shall be obliged to use the financial facility contribution by the contract with the investment strategy of the financial facility until the end of the financial facility. Both the final beneficiary and the intermediary are obliged to use the funds to meet the objectives of the program.

3.6 Financial relations in the granting of the allowance

After the entry into force of the contract or the entry into force of the decision, the provider may request the contribution using a payment request. The reimbursement of the funds shall be made by the beneficiary by the conditions laid down in the contract or decision. In the event of an obligation on the part of the beneficiary to reimburse a financial contribution that does not exceed EUR 100 without interest, the provider shall not apply the reimbursement. Compared to the previous programming period, the amount where the provider does not claim reimbursement has increased. In the programming period 2014-2020, the amount was set at up to € 40. For cross-border cooperation programs, the amount has not changed, the value cannot exceed €250 in an accounting year.

3.7 Settlement of financial relations and administration of the State's claims and common and transitional provisions

In addition to the provider, the provider of the contribution to the financial instrument, the audit authority, and the paying authority have been added as eligible entities to conduct financial corrections. A financial correction may be made by an entity before the closure of the project. The last eighth section of the law deals with the conflict of interest, processing of personal data, disclosure, information monitoring system, and information system for accounting of European Union funds. The information monitoring system refers to the public administration system administered by the Ministry of Investment, Regional Development, and Informatization.

4 Conclusion

The correct procedural and institutional set-up of the programming period contributes to the efficient and effective implementation of the European Structural and Investment Funds. Therefore, we consider it important to know the setting of the programming period, the foundations of which are legislatively regulated.

The paper aimed to highlight the differences in the procedural and institutional setup of the 2014-2020 and 2021-2027 programming periods. In the paper, we focus on identifying the differences resulting from the national legislation, Act 292/2014 on the contribution provided by the European Structural and Investment Funds and on the amendment and supplementation of certain acts, which were in force and effect during the 2014-2020 programming period. Law 121/2022 of the Collection of Laws - Law on Contributions from European Union Funds and on Amendments and Additions to Certain Laws, valid and effective during the programming period 2021-2027.

Differences in the setting of the programming period can be seen in both institutional and procedural settings. A summary of the main differences starts with the creation of new European Union funds, which will finance the objectives and priorities of the 2021-2027 programming period, while at the same time a single operational program - Slovakia - is being created. In addition, there is an institutional change where the competencies of the authorities are changing. New bodies are also created in the

new programming period which were not present in the previous programming period. There is also a change in communication with the applicant. There is a shortening of deadlines and an increase in financial limits.

The main objective of the changes resulting from Law 121/2022 is to simplify the implementation process for the applicant, and the beneficiary and to speed it up.

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Evaluation of Self-Employment Support in a Selected Group of Supported Unemployed With the Same Work Experience

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Abstract. Allowance for self-employment is one of the tools of the ALMM (active labor market measures) aimed at reducing the unemployment rate. The aim of the research work is to monitor the sustainability of self-employment and employment among the unemployed with work experience in the skilled construction industry, crafts, metallurgy, engineering. The research focuses on the Slovak supported unemployed in the 2012-2016. We monitor sustainability in the short and long term by socio-demographic and other factors. Through the probit model, we monitor the sustainability of the allowance and self-employment from 6 months to 4 years after the end of financial support. The results show that the allowance has a higher sustainability of employment than self-employment. The length of previous registration as unemployed (days) is an important variable in the short and long term after the end of receiving financial support. In the short term, the age of the supported unemployed plays an important role. In the long term, the sustainability of the self-employment is important for the supported, who have decided to start a business based on previous experience. The results of the work can help to effectively select applicants for support with work experience in certain qualified areas based on selected factors.

Keywords: Sustainability, Unemployed, Self-employed, Employed.

JEL classification: *I38, H53, J01*

1   Introduction

The allowance for self-employment is one of the tools of active measures on the labor market. The contribution to support self-employment can be examined from two parts. The first is monitoring the return of the supported unemployed on the labor market. The second is monitoring the sustainability of self-employment among the supported unemployed.

Research works focus on comparing different programs [5][18] comparing participating and non-participating unemployed to programs or businesses founded by unemployed and employed [2][8]. Other researches use the characteristics of the supported unemployed [7][15][17] to determine the degree of sustainability. Studies investigating self-employment use quantitative methods such as PSM methods [5][16], regression model [13] probit and [15] logistic regression [17][10][12], Duration model [11]. The probit model was used in the research. Research works mostly focus on the comprehensive monitoring of the supported unemployed. In our case, we examine a selected group of supported unemployed with previous work experience and its smaller subgroups such as qualified construction worker, craftsman, worker in the metallurgical industry, engineering and similar workers (ISCO_71 and ISCO_72) in Slovakia.

The aim of the work is to examine the sustainability of self-employment and employment among a selected group of supported unemployed people with past work experience. We use socio-demographic factors, the amount of financial support, compatibility between work experience and field of business and the number of days of registered unemployment. The research focuses on the supported unemployed in the 2012-2016, sustainability in self-employment or employment in the range of 6 months to 4 years after the end of receiving financial support. All the supported unemployed received an allowance to start self-employment. In order to fulfill the research objective, we created a research question: Which factors influence the sustainability of self-employment and employment among the supported unemployed with work experience ISCO_71 and ISCO_72 from 6 months to 4 years after the end of financial support?

2   Literature review

Self-employment support is an ALMM (active labor market measures) tool. The primary aim of support is to reduce the unemployment rate, but it can also support the development of self-employment. The support of self-employment is an effective tool for the sustainability of employment or self-employment according to the results of studies [1][5][10][8]. In Germany, the sustainability rate is 70% in the short term [4]. In Slovakia, the rate of sustainability of self-employment after three years is 40.33% or 37.58%, depending on the region [17]. In France, after 5 years of sustainability, it is 59.4% [8].

Women decide to end their self-employment more often than men [14]. Entering self-employment is not popular among the older unemployed [15]. In a review of studies focusing on the sustainability of the program, the unemployed in middle and younger age have a higher survival rate of self-employment [18], also in the long term [17]. In research in Slovakia, education has no effect on sustainability [17].

In general, previous experience has a positive effect on the rate of self-employment in the labor market [14]. The supported unemployed also have different previous work experiences. The supported unemployed mostly have previous experience in skilled and low-skilled occupations such as: worker, craftsman, trader, technician, repairman and others [17][8]. The field of business varies slightly from country to country. In the Czech Republic, the supported unemployed most often engage in business: sale of

goods, cosmetic services, exhibitions of residential buildings, carpentry, and others [9]. In Germany they start a business in construction, business-related services [15] and in France construction (manufacturing industry, building industry), trade and services [8].

In Slovakia, the highest sustainability is among the supported unemployed with work experience in craft and skilled production [17]. For this reason, the research focuses on qualified construction worker, craftsman, worker in metallurgy, mechanical engineering and others supported by work experience.

Financial support associated with the support of self-employment reduces the imbalance in the market at the start of a business [3][6][15]. If the supported unemployed remain self-employed or employed, so the amount of financial support is an important factor [17]. The length of registration in unemployment has an impact on the sustainability of the program. Those supported with longer registered unemployment have a lower survival rate in self-employment and employment than those with a shorter number of days in registered unemployment [16].

Self-employment support has been used in Slovakia for a long time. The highest number of applicants for the allowance for self-employment was in 2012. In the following years, interest in self-employment allowance among the unemployed decreases [21]. The applicant for allowance must meet several conditions, such as registering unemployment for at least 3 months, submitting a business plan, establishing a trade license and others [20]. One of the important conditions is continuous business activity. In 2012, the supported unemployed had to be self-employed for at least 2 years [21]. Since of May 2013, the self-employment condition has been increased to 3 years [22]. If supported unemployed person does not fulfill the condition, he or she must return part of the financial support [20].

3   Methodology

In the research, we focus on analyzing support recipients with work experience in subcategories 71 and 72 of the ISCO code. These are qualified construction workers, craftsmen, workers in metallurgy, engineering and similar workers. We are looking for candidates with qualified work experience. We assume higher sustainability of employment and self-employment than those supported without experience with lower qualifications. Researches analyzing sustainability often uses regression models. Researches or parts of researches use probit estimation [5], probit [15] and logit model [8] multivariate ordered logistic regression models [9] [17] or use multivariate logit analysis [19]. In our research, we use a probit model with a dependent variable monitoring the sustainability of self-employment or employment in the short and long term.

$$Y = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9)$$

In the research, we use data on a selected sample of supported unemployed between 2012 and 2016 from the database of the Ministry of Labour, Social Affairs and Family of the Slovak Republic (MLSFSR). These are recipients of the allowance for self-employment. The research work focuses on sustainability in four basic groups. Four

different dependent variables are used. In the sustainability of self-employment and employment, we monitor the state of the supported unemployed after the end of receiving financial support.

Table 1. Description of binary dependent variables

The name of dependent variable	abbr	Description of the dependent variable
self-employment in the short time	SEMP (short time)	If the supported person was self-employed, the value of the variable is 1. If the supported person was employed, the ALMP instrument or unemployed, the value of the variable is 0. Time period is 6-30 months after the end of receiving support.
self-employment in the long time	SEMP (long time)	If the supported person was self-employed, the value of the variable is 1. If the supported person was employed, the ALMP instrument or unemployed, the value of the variable is 0. Time period is 36-48 months after the end of receiving support.
employment and self-employment in the short term	EMP (short time)	If the supported person was employed or self-employed, the value of the variable is 1. If the supported person was unemployed or in the ALMP, the value of the variable is 0. Time period is 6-30 months after the end of receiving support.
employment and self-employment in the long term	EMP (long time)	If the supported person was employed or self-employed, the value of the variable is 1. If the supported person was unemployed or in the ALMP, the value of the variable is 0. Time period is 36- 48 months after the end of receiving support.

Source: own processing with data from MLSFSR

In the first and second rows of Table 1, we monitor the dependent variable of sustainability of self-employment in the short and long term. In a short term, it analyzes subsidized self-employed persons who remained in business between half a year and 2.5 years after the end of receiving support. In the long term, we monitor the sustainability of self-employment from 3 to 4 years after the end of receiving support. In the third and fourth rows, we monitor the dependent variable of employment sustainability in the short and long term (table 1). The time interface for monitoring the sustainability of employment and self-employment is the same.

In the research work, we use socio-demographic variables: gender, age, family status and education. We divided the age of the supported unemployed into three groups. The first group is supported unemployed people under the age of 26, the second group is supported unemployed people from 27 to 40 years old and the third group is over 40 years old.

As part of the research, we created a binary workmatch variable based on self-assessment of the match between work experience (ISCO) and self-employment area (NACE). We created a match between work experience and the field of business (workmatch=1) on basic of own reflection, e,g.: unemployed with work experience of auto mechanic (ISCO_7231001), who decided to start a business in the field of motor vehicle repair (NACE_45200), retail sale of vehicle parts (NACE_45320), car sales (NACE_45110), car rental (NACE_77110) or unspecified wholesale (NACE_46900). If the unemployed supporter did not indicate the field of business or his work experience did not correspond to the field of business, workmatch has the value 0. The independent variable fin shows the amount of financial support provided in euros. The last independent variable dbs (daysbeforesupport) tracking the length of previous registration as a supported unemployed person in days.

Table 2. Independent variables used in model

The name of independent variables	Description of the independent variables
gender (X_1)	binary variable: gender (men=1; women=2)
ageunder26 (X_2)	supported persons who were under 26 years of age at the time of support
age27to40 (X_3)	supported between the ages of 27 and 40 at the time of support
ageover40 (X_4)	supported over the age of 40 at the time of support
familystat. (X_5)	family status (single=0; married, divorced, widower=1)
education (X_6)	level of the highest education achieved (0-unidentified, 1-primary education, 2-lower secondary vocational education, 3-higher secondary vocational education, 4-university education)
workmatch (X_7)	binary variable: match between work experience and field of business=1, mismatch between work experience and field of business=0
fin (X_8)	amount of financial support in euros
dbs (X_9)	length of previous registration as unemployed in days.

Source: own processing with data from MLSFSR

In the research paper, we use the characteristic features of the supported unemployed supplemented by monitoring the sustainability of only a selected group of supported unemployed with similar work experience and their compliance with the field of business (self-employment).

4   Sustainability of self-employment and employment

The research work focuses on monitoring the sustainability of supported unemployed with work experience in the subcategories of ISCO (71 and 72). The total examined sample is 1054. The percentage of men is 99.72%. The higher percentage of supported unemployed are married, divorced, or widowed (70.30%), single (29.70%). The average age in the studied group is 38 years. Of the total number, younger than 26 make up 13.76%. In the age category of 27 to 40 years, the number of supported is 48.48%. The number of supported over 40 years is 37.76%. The greatest interest in support is among selected middle-aged unemployed people. The highest percentage of those supported has lower secondary vocational education (56.93%) followed by has higher secondary vocational education (39.18%), primary education (2.56%) and university education (1.23%). We noted the agreement between the field of work experience and the field of business in 77.80%. The minimum number of days of previous registration as unemployed was 104 and the maximum number of days is 588. The largest percentage decided to do business in less developed district (61.29%).
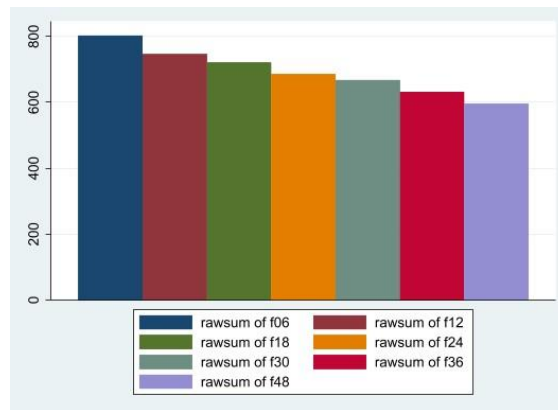
Fig. **1** The number of self-employed persons from 6 months to 4 years after the end of receiving financial support

The number of supported unemployed who remain self-employed decreases every year (fig. 1). After 6 months from the end of receiving financial support, 71.16% remained self-employed. After the first year, only 60.72% of all examined supported unemployed remained self-employed. After three years, it was 56.17% and after four years 53.19%.
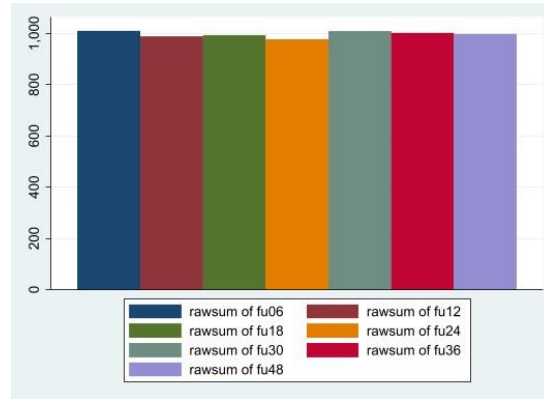
Fig. **2** The number of supported active on the labor market from 6 months to 4 years after the end of receiving financial support

After 6 months from the end of receiving financial support, 89.85% remained active on the labor market. After the first year from the end of receiving financial support, the percentage of those supported who remained active on the labor market is 87.86%. After two and a half years since receiving the support, we have seen an increase in the number of people active on the labor market in the amount of 89.56%. In the third and fourth year, it was 89.28% and 89.13% (fig.2). Depending on the type of work experience, the degree of sustainability of self-employment and employment can be different.

Table 3. Results of sustainability of self-employment and employment

	SEMP (short time)	SEMP (long time)	EMP (short time)	EMP (long time)
gender	0	0.182	0	0
	(.)	(0.24)	(.)	(.)
ageunder26	-0.132	-0.224	**0.702***	0.173
	(-0.85)	(-1.52)	**(2.08)**	(0.72)
age27to40	**0.317****	0.0996	**0.569****	0.231
	(3.24)	(1.12)	**(3.45)**	(1.83)
ageover40	0	0	0	0
	(.)	(.)	(.)	(.)
familystat	0.185	0.158	0.205	-0.174
	(1.71)	(1.58)	(1.08)	(-1.12)
education	-0.0389	0.0870	0.0964	0.146
	(-0.50)	(1.22)	(0.70)	(1.34)
workmatch	0.170	**0.229***	0.128	-0.0179
	(1.68)	**(2.43)**	(0.75)	(-0.13)
fin	0.0000108	0.0000584	**-0.000289***	**-0.000198***
	(0.18)	(1.07)	**(-2.46)**	**(-2.27)**
dbs	**-0.000251*****	**-0.000194*****	**-0.000267*****	**-0.000302*****
	(-4.77)	**(-3.84)**	**(-3.61)**	**(-4.84)**
_cons	**0.628***	-0.498	**2.374*****	**2.164*****
	(2.01)	(-0.60)	**(4.04)**	**(4.74)**
N	1046	1049	1046	1046

The results in the sustainability of self-employment are different for those supported. The variable age is statistically significant, when monitoring the sustainability of self-employment and employment in the short term. In the sustainability of self-employment, the support is most effective for the unemployed between the ages of 27 and 40 with a lower number of days in registered unemployment during a short period after the end of receiving financial support. In the long term, we observe a positive effect on the compatibility between the field of business and previous work experience. Supported unemployed, who have decided to start a business in the field in accordance with work experience in ISCO subcategories 71 and 72 have a higher probability of sustainability of self-employment in the long term. In the sustainability of employment, we observe a positive impact on young unemployed people under the age of 26 and unemployed people between the ages of 27 and 40. The allowance for starting self-employment for the unemployed has a positive effect on the return to the labor market of the unemployed, who are middle-aged and younger and have work experience in subcategories ISCO 71 and 72. The amount of financial support is a tool for reducing the initial barriers at the beginning of self-employment. If the amount of financial support increases, the probability of maintaining employment in the short-term and long-term decreases. If the number of days of unemployment increases, it has a negative impact on the probability of sustaining employment and self-employment. Self-employment support is more effective for the unemployed with work habits and a lower number of days of unemployment.

5   Conclusion

The main aim of the research work is to analyze the sustainability of self-employment and employment through the monitoring of selected factors in the short and long term among the supported unemployed in the years 2012-2016. The monitored unemployed received an allowance for self-employment in Slovakia. The research work focuses on monitoring the sustainability of self-employment and employment, among those supported with work experience in subcategories ISCO 71 and 72 in Slovakia.

After the first year of support, the sustainability of employment is 87.86%. In the fourth year after the end of receiving support, the employment rate is 89.12%. There are lower percentages in the sustainability of self-employment. In the first year after the end of receiving support, 60.72% of all supported unemployed were self-employed. In the fourth year, it was 53.19%. In foreign researches, overall sustainability is higher. In Germany, the self-employment rate is 70%, after three years from the end of receiving financial support [4]. In France the survival rate is 59.4%, after five years [8].

If the length of previous registration as unemployed in days before support increases, the probability of sustainability of self-employment and employment decreases in both the short and long term. Self-employment support for the qualified unemployed should not be intended for those who have lost work habits due to long-

term unemployment. From the point of view of the sustainability of self-employment, the self-employment allowance for unemployed middle-aged people is more effective only in the short term. From the point of view of the sustainability of employment, the allowance is a suitable tool for the younger unemployed and the unemployed in the middle age. Previous experience in the field of construction, metallurgy, engineering, and craftsmanship with the aim of opening self-employment in the same field increases the probability of sustainability of self-employment in the long term for the supported unemployed in the long term. The amount of financial support is negatively statistically significant in the sustainability of employment in the short and long term. As the amount of financial support increases, the probability of sustainability decreases. Financial support is perceived as a means to remove barriers when starting a business [5], not as a temporary means for applying to the labor market. Therefore, if the amount of financial support increases, the probability of maintaining employment decreases. In the analyzed group of supported unemployed there is a large number of men, the gender variable is zero in most of the results. The independent variables gender, family status, education, and age over 40 are not statistically significant for the selected supported unemployed with work experience ISCO 71 and 72.

Several policy recommendations can be formulated from our results. In other countries, we observe a higher sustainability of the program than in Slovakia, therefore it would be appropriate to consider the use of other additional tools to support unemployed persons, such as additional business training. The selection of supported unemployed with ISCO 71 and 72 qualifications should be primarily oriented towards people with a lower number of days in registered unemployment and in middle age. The amount of financial support is considered an important factor, which is slightly negatively statistically significant in the research when examining the sustainability of employment. In the future, it would be appropriate to focus on changing the method of paying financial support to increase the sustainability of self-employment and employment.

The research focuses on examining the sustainability of self-employment and employment among those unemployed who received self-employment allowance for the unemployed in Slovakia. In the research, we analyze supported unemployed with work experience in subcategories ISCO_71 and ISCO_72. For this reason, the investigated number of supported unemployed is lower, the number of men is high. In the future, research can help in the effective selection of supported unemployed people with selected work experience in qualified fields.

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E-marketing Communication in the Beverage Industry

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Abstract. The aim of the research is to identify best practices in working with social media by analyzing the e-marketing communications of a soft drink company and its direct competitors. For this purpose, the social media accounts of 3 selected soft drink manufacturing companies using their own social media accounts between February and March 2023 are monitored and analyzed. The social media networks monitored include Twitter, Instagram, Facebook, and YouTube. Businesses promote their new or existing products on their social networks on an almost daily basis and often use celebrities for this promotion. By using celebrities, they gain more engagement from social media users in the form of likes, comments, views, and new followers.

Key words: Marketing Communication, Social Media, Online Marketing, Marketing on Social Networks, Social Networks.

JEL classification: *M31, L81, L82*

1   Introduction

Marketing is one of the most important tools for the operation of a business. According to Karlíček (2018), marketing activities consist primarily of building relationships with existing customers or building customer relationships with the brand. The success of companies depends on clearly defining the target group of customers, i.e., those whom the company wants to reach with its product. It is not possible to reach all customers equally and therefore market segmentation is the best solution (Pollák and Markovič, 2022). Thus, for marketing, a firm asks itself simple questions, namely who its customer is, what value it offers to customers, how it will ensure their long-

term satisfaction if possibly, and what competitive advantage it has and how it will maintain that advantage (Karlicek, 2018).

Nowadays, in these fast-paced times and in a time when most of us can't live without the internet, it's a smart idea to use social networks and the web for marketing. People can learn more about products every day without having to search for the information directly. Targeted and accurate advertising is such an important part of any company's sales strategy. For example, companies can reduce costs and gain a lot of new customers by targeting a group of potential customers through social networks using specific criteria such as gender, age, education, occupation, or their hobbies (Pollák and Markovič, 2022). However, it is possible to argue that ability of a company to attract and then retain customers is dependent on the ability to create high quality innovative products and services (Pollák, Dorčák and Saruc, 2015).

There is no need to have millions of followers and supporters or a service or product that everyone loves. However, it is necessary to know how to engage people, listen to them, present information well and evaluate it. Internet users behave differently online than in the real world, they are rushed, distracted and inattentive. Within the flood of content that is on social media, people tend to only notice posts that are relevant to their current needs, evoke strong emotions, or are distinctly different from other content. Thus, the content of posts should be short, to the point and have a clear objective (Losekoot and Vyhnánková, 2019).

Online advertising is an important tool for corporate rivalry. On the supply side, the online marketing market is characterized by a high proportion of small businesses. These businesses, due to their limit, mainly made up of limited resources (personal, financial and time), must operate as efficiently as possible if they want to survive in a turbulent and hypercompetitive market (Pollák, 2015). Therefore, companies compete for buyers and their attention, creating brand preferences and influencing purchasing decisions. Efficiency is a significant competitive advantage regarding local competitors in the battle for customer. Being more effective than a competitor is not only matter of low prices of inputs, but also the matter of responsible marketing department (Pollák, Dorčák and Saruc, 2013).The rapid development of information and communication technologies provides firms in the digital world with a wide range of advertising tools and enables advertising to perform its informative, persuasive, and competitive functions (Wiktor and Sanak-Kosmowska, 2021). Indeed, social media presence has become an essential part of marketing strategies and promoting products online through business accounts, and social media advertising has proven to be effective (Sokolova and Kefi, 2020).

Today, more than 90% of teens have at least one social media account and their social media presence been growing. Influencers are present in all sectors: health and fitness, fashion, food, high-tech and more. Bloggers on YouTube, Instagram and Facebook often showcase products they have tested by giving their opinion to their followers or promoting products online to other users (Sokolova and Kefi, 2020). According to Sedalo, Boateng, and Kosiba (2022), social networks are essential platforms for advertising and promoting products and services and allow businesses to design their advertising materials using rich, dynamic, and interactive media at minimal cost. In fact, businesses should be transparent with customers on social networks to improve their online image and gain the trust of social network users. Lastly, trust and

a positive customer experience can encourage customers to become active brand promoters and develop brand loyalty.

As consumers have become accustomed to the virtual world and moved to the internet and virtual marketplaces, marketers have focused their marketing attention on this market. In response to this major shift of consumers from traditional to digital media, marketers are constantly trying to grab opportunities by designing product, price, place, and promotion strategies for this market (Faruk et al., 2021). A more multi-dimensional communication where consumers are more interested and find more credibility by tracking and streamlining the opinions of other customers instead of getting traditional information from marketing ads (Shareef et al., 2019). Thus, marketing professionals are adapting traditional marketing strategies to social media, and consumers' shift from traditional media to digital media allows them to reach, inform, engage, sell, learn, and serve their target audiences more effectively (Faruk et al., 2021). Consequently, companies are looking to leverage the useful collective knowledge available on social media to support different types of marketing decisions.

The aim of the research will be to identify good practices in working with social media by analyzing the e-marketing communication of a soft drinks company and its direct competitors.

2   Literature review

Farivar and Wang (2022) investigated the effectiveness of influencers, their social community, influencer marketing settings, and its impact on followers' perceptions, experiences, and decision-making. Influencer marketing is set in a social setting in which followers interact with multiple communities of influencers. Influencer marketing has become a popular approach for companies to reach potential customers and promote products and brands. Influencers are social media users who have gained a significant network of followers by posting content on social media. Additionally, these influencers have built a trusted relationship with their followers and are instrumental in engaging their followers, so they serve as an ideal group for product promotion and placement. Fink and Collective (2020) claim that social networks offer countless opportunities for business marketing strategies that harness the power of communities, especially when combined with traditional approaches such as celebrity endorsement. Hence, the reach, frequency, and speed of communication between communities on social networks offers an ideal tool for marketers. Specifically, the authors tested the long-term effect of celebrity endorsement on Facebook purchase intent among 234 community members. Results showed that the credibility of celebrity promoters increases purchase intention among members of a sponsored Facebook fan community by improving brand image.

Cheng Chu Chan, Chen and Leung (2023) suggest that visual elements in social media marketing must be strategically designed to evoke audience interest and action. The objective of their research was to investigate how different visual strategies, including visual volume, variety, and dynamics, interactively influence viewers' emotional and behavioral responses to social media posts. Further extending the AIDA (Awareness, Interest, Desire, Action) model, they uncovered the underlying

mechanisms that drive the positive effect of visual volume on viewers' intention to visit restaurants after viewing social media posts about restaurants. Liu, Shin, and Burns (2021) also concluded that the visual focus of social media posts on fun, interaction, and trendiness significantly increases customer engagement, while a focus on customization does not. Their research used big data in examining the impact of luxury brand marketing activities on social media on customer engagement.

Zhang and Erturk (2022) conclude that for more success in e-commerce, it is preferable to focus on live broadcasts, short videos, customer reviews, and private traffic management on platforms tailored for this purpose. They explored the potential for improving digital marketing for SMEs in New Zealand by leveraging different approaches used by SMEs in China. Lastly, they concluded these results by using semi-structured interviews with Chinese participants to gain insight into the online marketing strategies and platforms used in China.

Kusumasondjaja and Tjiptono (2019) researched differences in consumer enjoyment and purchase intention when consumers encounter food advertisements on Instagram with different promoters and levels of visual complexity. Therefore, they conducted an experimental survey involving 180 undergraduate students from several universities in Surabaya, Indonesia. Participants actively used Instagram for at least one year, and the results showed that celebrity-promoted food ads generated more enjoyment and excitement than ads promoted by food experts. Overall, food ads using high levels of visual complexity generated more pleasure and excitement than less complex ads. Ares et al (2022) also reached similar conclusions. Their results showed that images, music, news, price promotions and celebrity endorsements were the elements in advertising that participants in semi-structured interviews remembered most. The research was conducted on 209 participants from Montevideo, the capital of Uruguay, in two private educational institutions and a public health facility. As a result, the interviews were recorded, transcribed, and then analyzed using content analysis based on a deductive-intuitive approach. In addition, results showed that participants were exposed to digital food marketing, with fast food restaurant advertisements and food ordering apps being mentioned most frequently.

Using data collected over 12 months from a major online retailer, Dolega, Rowe, and Branagan (2021) explored the impact of daily social media activity on daily business outcomes - website traffic, orders, and sales. Those findings show that social media leads to increased website traffic but does not cause a significant increase in product orders and sales revenue. However, when it comes to larger social media campaigns, these already lead to more orders and sales revenue, and Facebook has proven to be a very effective channel.

Hanaysha (2022) tested the influence of four elements of social media marketing on consumer purchase decisions in the fast-food chain industry. For this study, the required data was collected from visitors to fast food outlets in the United Arab Emirates through a quantitative online survey. The results confirmed the importance of brand trust in predicting purchase decision and showed that informativeness, perceived relevance and interactivity have a positive influence on consumer purchase decision. Wiktor and Sanak-Kosmowska (2021) identified and empirically evaluated the importance of online advertising in the development of firms' competitive strategies in the online advertising world and say that the intensity of industry competition encourages firms

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to exploit their information superiority over consumers and create moral hazard in the advertising messages and the process of building competitive advantage. They also highlight that companies consciously use online advertising in sectoral market competition, monitor and analyze competitors' advertising activities, and create content that has a major impact on consumer behavior. Finally, Jacobson, Gruzd, and Hernández-García (2020) analyzed a sample of 751 online adults to determine consumer perceptions of the use of social networking sites for marketing purposes. In doing so, they looked at marketing convenience, which refers to an individual's comfort in using information posted on social networks for targeted advertising, customer relations, and opinion seeking. Specifically, they found that consumers' perceived risks and benefits of using social media are related to their comfort with marketers using their publicly available social media data. Most online users are uncomfortable with marketers using their publicly available social media data.

3   Data and methods

For observation and comparison, we have selected the 3 most well-known enterprises involved in the production of soft drinks. These businesses are chosen because of their activity and visibility on various social media. The companies are Kofola, Pepsi and Coca-Cola. Each of these businesses has its own social media marketing communications. In this instance, the reason for selecting these companies for analysis is to compare their marketing strategies. By examining the presence of these companies in the market, we can gain insight into their competitive dynamics, consumer preferences and potential social media strategies. Although Kofola does not have the global reach of Coca Cola and Pepsi, its importance and popularity in the local market make it an interesting subject for analysis. Understanding how Kofola competes with globally recognized brands such as Coca Cola and Pepsi in the local market can provide valuable insights into its marketing tactics, and potential growth opportunities. Adding Kofola to our analysis allows for a more comprehensive examination of the soft drink market and provides a broader view of the dynamics between global players and local competitors in a particular market.

As the first method, we will use observing. The open-source social media data of the selected soft drink manufacturing companies will be analyzed from February 1, 2023, to March 31, 2023. The media analyzed will include their social networks, specifically Instagram, Facebook, YouTube, and Twitter. The follow-up will include the Czech accounts of these companies, if any, and the main official accounts where the country is not directly specified. Relevant data from the selected social networks will be analyzed through their own accounts on these networks.

The second approach will be a comparison. By observation, open data of selected enterprises that are also involved in the production of soft drinks will be analyzed and then these enterprises and their communications on selected social networks will be compared. Due to the comparison, it will be possible to determine if there are any areas in which the businesses stand out compared to their competitors, or where they could improve and where their online marketing communication differs.

The results of all quantitative data will be processed in MS Excel, where the basic statistical characteristics (average) will be presented, and graphs will be created from the data.

4   Results and discussion

The companies' own accounts on these social networks were used to observe the activity. The number of followers and the number of posts posted on each social network, the number of stories posted on Instagram, the number of likes on Facebook pages, and the number of likes received over a given period on posts posted and the number of views on Instagram videos and Twitter posts were also observed. For February 2023, Coca-Cola gained the most followers on Twitter. It gained 386 new followers for the month. This was followed by Kofola, which gained 25 new followers, and Pepsi, which even lost 1,217 followers, gained the fewest new followers for February. In the case of Instagram and YouTube, the limitation was that these social networks only show rounded numbers of followers, so it is not possible to say the exact number of followers gained. On Instagram, Kofola gained approximately 100 new followers, the Czech Pepsi CZ account lost approximately 100 followers, the global Pepsi account had 1.7 million followers for the whole month, the Czech Coca-Cola CZ/SK account lost approximately 100 followers and the global Coca-Cola account had 2.8 million followers for the whole month. In the same round number of followers, Kofola had 25,400 followers on YouTube for the whole month of February. The same was true for Pepsi CZ's Czech channel, which had 3,340 followers for the entire month. Pepsi's global channel gained approximately 2 000 new followers on YouTube and Coca-Cola gained the newest followers on the social network, reaching approximately 10 000 new followers. Across Facebook business pages, all observed businesses lost followers for February 2023. Kofola lost 183 followers, Pepsi CZ lost 42 followers, Pepsi lost 9,906 followers and Coca-Cola lost 34,428 followers.

Pepsi posted the most posts, 135 in total, to selected social networks for February 2023, mainly to its global accounts. Altogether, 114 posts were added to Twitter, where posts were related to a new campaign for Pepsi Sugar Free with actors Ben Stiller and Steve Martin, a collaboration with Peeps, and the Super Bowl, which took place on 13 February and Pepsi is a secondary sponsor. Throughout February, Pepsi published 19 posts on Instagram on the same themes and added 5 short videos on YouTube where the above-mentioned actors present the new sugar-free Pepsi in short funny videos. On Facebook, Pepsi did not add a single post.

Coca-Cola also added many posts to its selected social networks, 93 in total. Mostly on YouTube, where it added one or more new videos almost every day. On YouTube, Coca-Cola has a global channel where it posts videos in different languages for different countries. During February 2023, for example, Spanish, Japanese, English and Czech Coca-Cola commercials appeared there. Overall, Coca-Cola added a total of 86 posts to YouTube during the month of February. On Facebook, Coca-Cola also has one main account, but this is automatically translated into the language of the account from which users are viewing the site, in this case Czech. Coca-Cola posted 7 posts on this Facebook page in February related to the Coca-Cola drink and the upcoming Angel

Awards, which Coca-Cola sponsors. On Twitter, Coca-Cola only added 3 short posts on its global account. On Instagram, Coca-Cola added 4 posts to its global account in February regarding a collaboration with a Spanish singer Rosalía.

Kofola has only posted 6 posts in the whole February, all on the social network Twitter. The posts were related to the introduction of the new energy drink Semtex Extrem with Slovak rapper Separ, recycling of plastic bottles and the success of one-liter returnable glass bottles, new workshops for the public by Kofola's Leros brand and the establishment of a new non-profit organisation Kvapka Rajecka Dolina.

For the month of February 2023, the selected businesses were most active on Twitter, followed by Instagram and YouTube, and finally Facebook, where the fewest posts were made.

In terms of Instagram stories, companies posted a total of 52 stories and Coca-Cola was the most active on its Czech account, with 31 stories posted in February. These stories were mostly related to a competition to win a trip to Disneyland Paris. On Pepsi's global account, Pepsi published 6 stories for February that involved collaborations with Peeps. Chart 1 shows how businesses added stories to their Instagram accounts in February 2023.
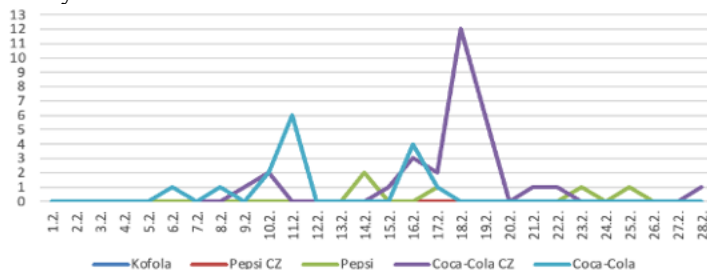

Chart 1: Instagram Stories February 2023
Source: Own elaboration

Facebook was the lightest of the selected social networks, whether with posting, number of followers or likes on the pages of these selected businesses. In fact, for the month of February, all the selected businesses lost users who gave a "Like" to their Facebook page. Coca-Cola did best on YouTube. In February 2023, it received a total of 110 788 300 views on its global YouTube channel, which it has had since January 2006. Even though Pepsi added only 5 posts to its global channel, which it has had since November 2005, it received a total of 10 573 785 views for the month of February. The Pepsi CZ channel, which was created in July 2016, although no new videos were added, received 1,633 views for February. Kofola, which has had a YouTube channel since June 2013, also added no videos and received 57,846 new views for February 2023. Pepsi was the most active on Twitter, gaining a total of 96,708 likes on posts published in February. Coca-Cola received a total of 708 likes on its Twitter posts. Coke received the lowest number of likes on Twitter at 82.

On Instagram, Coca-Cola received the most likes on its global account, with a total of 514,640. The average number of likes on new posts was 128,660, with the most likes on a post being 497,474 and the fewest being 2,570. Across its Czech account, Coca-Cola received a total of 7,585 likes for the month February. The highest number of likes on a post was 5,982, the lowest was 107 and the average number of likes for February

was 1,264. Pepsi on Instagram received a total of 156,731 likes for February 2023, with an average of 8,707 likes, where the highest number was 26,142 and the lowest was 1,489. Pepsi received a total of 103 likes on its Czech account. The average number of likes was 34, with the highest number of likes being 37 and the lowest being 31. Kofola did not add any new posts to its Instagram account for the month of February.

The highest number of newly added posts on YouTube resulted in Coca-Cola gaining a total of 22,977 likes for February 2023. Although Pepsi did not add as many posts to its global YouTube channel for February as Coca-Cola, it still received many likes on its new posts. The total was 12,130 likes, the most being 6,800 and the least being 291.

Pepsi received the most views of new posts on Twitter due to the large number of posts added. On average, its new posts for February 2023 received 1,671,087 views and a total of 190,503,897. While Kofola did not add as many posts, it still had an average of 1,082 views, for a total of 6,493 views. Coca-Cola, although it added the fewest Twitter posts for February, had an average of 57,300 views on its new posts and 171,900 total views.

On its global profile, Pepsi had an average of 3,221,440 views for videos added in February, and its new posts received a total of 35,435,839 views. Coca-Cola had an average of 2,894,182 views on its global profile for new videos with a total of 8,682,545 views. On Coca-Cola's Czech profile, new videos for February 2023 had an average of 48,871 views and a total of 195,484 views. Kofola and Pepsi CZ did not post any videos on their Instagram profiles in February 2023.

In terms of posts, these selected companies posted most frequently to Instagram, followed by Twitter, YouTube, and posted to Facebook at least for the month of March 2023 from the selected social networks.

For the month of March, businesses posted a total of 46 stories on Instagram, see Chart 2. Coca-Cola posted 7 stories on its global account, Kofola posted 4 stories and Pepsi posted 3 stories on its Czech account. Regarding likes on the Facebook pages of businesses, only Coca-Cola gained 20,298 new likes in March. Pepsi lost 11,986 likes on its global profile, 33 likes on its Czech profile and Kofola lost 69 likes on its Facebook page in March 2023. Like February, Coca-Cola was the most successful on YouTube in March. It added another 195,620,260 views to its YouTube channel in March. Pepsi racked up more views on its Czech channel, 563,361, than on its global channel, which received 285,463 views in March. Kofola, although it did not add any YouTube videos in March, added 62,331 views to its channel.
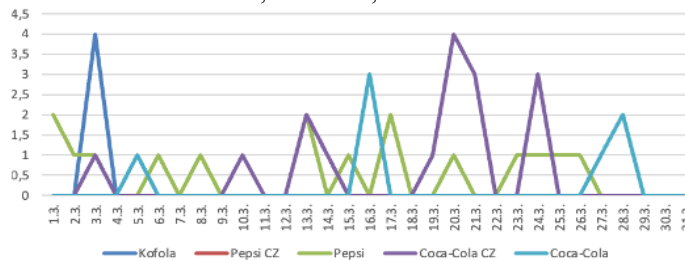

Chart 2: Instagram Stories March 2023
Source: Own elaboration

By being most active on Twitter, Pepsi gained a total of 4,457 likes on its posts for the month. Coca-Cola received a total of 956 likes on Twitter. Moreover, Kofola, with the same number of posts added as Coca-Cola, received a total of 45 likes on Twitter for March.

On Instagram, Coca-Cola's global profile led in likes, with a total of 64,523 likes on its posts in March 2023. On the Czech Instagram profile, Coca-Cola CZ/SK received 17,888 likes in March. Pepsi's global Instagram profile received a total of 52,108 likes for March. Over March, the Czech profile of Pepsi CZ received a total of 1,758 likes on its posts. Kofola did not add any new posts to its Instagram profile in March 2023 either.

Just as in February, Facebook pages of selected businesses had the fewest likes. Kofola did not add any posts and Coca-Cola received 9 likes for its only post in March. Pepsi's Czech page received the most likes on Facebook, with a total of 361. Furthermore, on YouTube, Coca-Cola received the most likes on its channel. The total number of likes was 34,432. Pepsi received a total of 1,994 likes on its global channel. Lastly, Kofola did not post any new videos on its YouTube channel in March 2023.

Pepsi had the highest number of Twitter impressions for its posts added in March, attracting a total of 1,016,100 users to view its posts. In fact, Coca-Cola had a total of 225,300 views for its Twitter posts in March, with an average of 37,550 users viewing its posts. Kofola's posts on Twitter were viewed by a total of 4,161 users in March.

5   Conclusion

Businesses use their social media accounts almost every day, posting with their regular or new products. To achieve this, they use their social media accounts such as Twitter, Instagram, YouTube, and Facebook. Most often, the visual aspect of the posts, interactivity and humor play a major role in these posts. Familiar celebrities are also an important element of the added posts related to the promotion of new or permanent products. Thus, businesses get more engagement from other users in the form of likes, comments, or new followers. However, the results with the number of followers were only approximate, as some social networks such as Instagram and YouTube do not show the exact number of followers, but only a rounded number. Companies that were more active on the selected social networks during the period under review had more likes, views, and new followers on their profiles. By being more active, companies also increased awareness of their products and can reach potential customers who will buy the products.

Furthermore, social media activity has an impact on a company's economic performance, but it is only one of many factors that contribute to the overall success of a business. While a strong social media presence and effective social media marketing strategies can positively impact brand awareness, customer engagement and ultimately sales, it is necessary to consider the broader context and other business factors that contribute to economic performance. However, it is important to note that social media activity alone does not guarantee economic success. A company's overall business strategy, product quality, customer service, pricing, distribution channels and

competitive environment play a significant role in determining its economic performance.

The aim of the research was fulfilled. Data from observations on social networks were processed in Excel. Then this data was analyzed and presented in graphs in the results and discussion of findings chapter.

For future research, it would be interesting to analyze the exact social networking business data that each social network offers to its users. However, this data is only visible to account holders and, for instance, on Instagram, various statistics on posts, stories and followers are visible to them in reports.

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A Review of Selected Equity and Credit Investment Strategies of Reinsurer

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Abstract. This paper analyses specific type of investor on financial markets – a reinsurance company and its value-creating process, with focus on its investment activities. A special attention is focused on reinsurer's idiosyncratic investor's profile due to core business activities, i.e. underwriting. This makes its investment profile an objectives different to other market participants. We modelled and analysed reinsurer's three main investment strategies based on underlying asset classes of particular portfolios. Each of these portfolios is comprising of three sub-portfolios which are managed by different portfolio managers. Analysed investment strategies are: (i) Listed Equity Portfolio, (ii) Corporate Credit USD Portfolio and (iii) Structured Credit USD Portfolio. We analysed and compared performance of these strategies, risk-adjusted performance, volatility and duration (where applicable). Performance of investment strategies is assessed on 2010-2015 time-frame against selected composite benchmark. This period was chosen for analysis due to the relative macroeconomic stability of previous decade (2010-2019) which have been dominated by strong returns among many asset classes.

Keywords: Reinsurer, Investment Strategies, Portfolio Management.

JEL classification: *G22, G11, G32*

1   Introduction

Retail insurance companies and many companies seek ways to reduce risks. It has become an important issue as managers have been under pressure from company shareholders manage risk exposure more efficiently. The consequences of firm's risk-taking have effect on firm's performance and value. Particular type of such risk retail insurers aim to minimize is characterised by high-variance risks of their insurance portfolios. Insurers and businesses intend to transfer risks fully or at least partially on a second party by buying reinsurance protection from reinsurance companies in order to cover losses they do intend to fully retain. Reinsurance reduces underwriting and

solvency risks and enables insurers to sell additional insurance products, i.e. underwriting. Such transfer of risk imposes additional cost on risk transferor in form of reinsurance premium payable to reinsurer. The crucial task for management of reinsurer is to understand how to achieve value creation (Barton, 2011 or Jesse and Currall, 2011). The reinsurer aims to create economic value from its underwriting and investment activities which generate economic results (either profit or loss). Both activities represent different risk-return relationships.

This paper, does not study underwriting activities, but focuses on economic value created from reinsurer's investment activities by its asset management arm. The previous decade (2010-2019) was characterised by strong returns across multiple asset classes. Diversification was the biggest challenge and both, equity and bond markets were either fully valued or overpriced. Asset managers needed to implement more comprehensive portfolio strategies to cope with the prevailing investment field of lower return and higher risk. Government bonds were more overpriced than equities and the issue for asset managers was whether fully valued equity markets could be diversified into even more expensive government bond markets. In addition, many companies decided to pursue large buybacks of their shares which contributed with additional fuel to equity market growth. Finally, a large growth sector was contributed thanks to continually supportive monetary and fiscal policy. When making investment decision, reinsurer chooses different asset classes while considering trade-offs between its expected return and risk profile. In addition opportunity costs of variety of multiple investment opportunities into various asset classes are considered as well. This paper compares performance of three investment strategies of reinsurer, in particular: Listed Equity Strategy, Corporate Credit USD Strategy and Structured Credit USD Strategy on a 5 year time horizon during the time of economic stability (2010-2015). For each investment strategy several portfolios managed by various portfolio managers are selected and appropriate benchmark is assigned to given strategies and portfolios.

2   Literature Review

2.1   Fundamentals of Reinsurer

Reinsurance companies are specific type of investors on financial markets who dispose with significant amount of financial resources, in particular free capital which enables them to allocate available resources either fully or partially into financial assets based on their investment policy and risk profile. Available financial resources of reinsurance stream from their core business activities, i.e. underwriting, with focus on reinsurance and wholesale insurance. Retail insurers and industrial conglomerates seek reinsurance because of their need for controlled risk management and financial and operational stability. The answers to relationship between capital, reinsurance and risk taking for insurance firms who seek to maximize their value are provided by Venter (2001), Mankaï and Belgacem (2016). In addition, reinsurance is beneficial for reinsuree especially in financial terms in positive earnings and valuation effects (Venter, 2006). Retail insurers buy reinsurance despite it reduces their expected profit from short-term perspective (increased cost for reinsurance premium) as the risk-

neutral subjects will use reinsurance to maximize the total value of the firm as the benefits of reinsurance provides stability (long-term focus). Reinsurance maximises retail insurer's expected utility in form of its wealth, hedges underwriting risk and provides stability and various benefits - positive externalities (Mao, Carson, and Ostaszewski, 2017). Therefore potential losses are stabilised, capacity and limit liability on specific risks is increased (against insurance claims during catastrophes), thus reduced capital costs. Reinsurance reduces the volatility loss ratio, but on the purchase of reinsurance increases costs (Cummins, Dionne, Gagné, and Nouira, 2008).

Risk transfer from retail insurer to reinsurer is expensive. The reinsurance pricing has been widely discussed which led to multiple premium methodologies. In general terms however, the higher magnitude of the expected risk transfer to a reinsurer, the more expensive the reinsurance premium is (MacGregor, Nanthakumaran and Orr, 2012; Wu and Olson, 2013; Porth, Pai and Boid, 2013). When risks are low and uncorrelated across geographical regions, reinsurance premium are more favourably priced in favour of the risk transferor. The price of reinsurance premiums has been constantly increasing due to larger volatility of losses caused by natural catastrophes and lower investment returns in recent years. In perfect market, reinsurance premium for catastrophic events should be similar to expected losses as catastrophic events are uncorrelated with financial markets (Froot, 2001 and Gall, Nguyen, Cutter, 2015).

Reinsurer is active in multiple business segments, thus consolidates income from underwriting into specific segments due to risk pooling (reduction of variance of aggregate risks of reinsurance portfolios with diversification at the same time). Reinsurer applies valuation frameworks for liabilities (underwriting) and assets (investing). Biggest reinsurers apply their own internal methodologies, however since January 2023 new standard IFRS 17 has been adopted (IFRS, 2023) and provides unified method for valuation of liabilities and assets.

2.2   Reinsurer's Investment Process

Reinsurer employs capital which becomes available to different risk pools of insurance and reinsurance risk (underwriting risk) and invests them into assets on financial markets (investment risk), thus underlying liabilities are matched into assets by applying asset liability matching framework (ALM). This approach enables split of economic balance sheet into investment and underwriting balance sheet, thus separate underwriting risk from market risk and enable to earn profit on the top of underwriting activities, from investment activities, thus create additional added value. A comprehensive and generally accepted model of total return of reinsurer is provided by Bingham (2000) from which various accounting frameworks were developed.

Considering risk pool of particular liability and underlying investment portfolio, reinsurer's portfolio managers seeks ways to choose the most suitable investment strategy that matches risk profile of given portfolio. Reinsurer uses multiple investment strategies. The result of the chosen investment strategy is the portfolio performance itself, which is measured against the respective benchmark (Prather, Bertin, and

Henker, 2004). Active strategies are managed with the aim to beat the respective benchmark, whereas the primary reason for passive strategies is not necessarily to beat benchmark, but further objectives are predominantly considered. Benchmarks in insurance or reinsurance companies can be set in relation to liabilities incurred. This benchmark type based on growth rate of liabilities is relatively easy to beat as portfolios with significant weightings in in equities tends to exceed the growth rate of liabilities (Blake and Timmermann, 2013; Korkie, 2002; Tonks, 2002). Portfolio managers could choose from a variety of investment strategies which are based on their risk profiles. In the most cases they decide between safe and risky assets (Fama and French, 2014). The challenge for investors, however, is not limited only to choosing the particular asset class (equities, bonds, derivatives, credit, etc.), but rather to more complex question of how to compose portfolio that suits their risk profile in the best possible way (Massa and Patgiri, 2009). Reinsurer's investment strategies focus on their investment objectives while maintaining sufficient liquidity and managing risk and regulatory requirements. Risk management and diversification techniques must be also incorporated and are influenced by the regulatory environment and the ratings agencies that evaluate their financial stability (Moody's, S&P, Fitch) and are required to maintain high levels of capital reserves, which can limit the amount of risk they are able to take on in their investment strategies. Considering reinsurer invests significant portion of its portfolio into fixed income and credit securities, duration management is critical. Duration is a measurement framework of the sensitivity of an asset or liability to changes in interest rates.

3 Methodology and Data

We modelled and analysed reinsurer's three investment strategies: (i) Listed Equity Portfolio, (ii) Corporate Credit USD Portfolio and (iii) Structured Credit USD Portfolio. Portfolio performance is analysed by using Bloomberg PORT function. In addition to Bloomberg Terminal, BlackRock Aladdin technical platform was used to source data, construct portfolios and calculate risk and return analysis, regional and currency exposure and portfolio duration.

Performance of investment strategies is assessed on 2010-2015 time-frame. This period was chosen for analysis due to the relative macroeconomic stability of previous decade (2010-2019). 5 year period was chosen as a result of shorter contractual time frame of underlying liability portfolio from underwriting and is not studied in this paper.

3.1 Listed Equity Portfolio

The investment objective is to outperform equity market measured by the selected MSCI benchmark while retaining a defined level of portfolio diversification and liquidity. Permitted portfolio securities are listed equities on various developed markets and minor part of portfolio can be constructed from emerging market equities. The use of leverage and short selling is not permitted. Listed equity strategy includes

the total amount of funds allocated by reinsurer into equity investments. Based on regional, i.e. geographical exposure, reinsurer applies three main equity portfolios: (i) Global Equity (Large Cap Companies), (ii) US Equity Portfolio (Large Cap Companies) and (iii) Local Currency portfolio.

3.2 Corporate and Structured Credit USD Portfolio

The objective is to actively manage portfolio to earn a reasonably high and stable level of income and achieve a total return in excess of the selected benchmark. Corporate credit portfolio represents the total amount of funds allocated by reinsurer into corporate credit securities and consists of 3 smaller sub-portfolios, referred to as "Credit 1 USD PF", "Credit 2 USD PF", "Credit 3 USD PF" where each of these sub-portfolios are managed by different portfolio manager.

Structured credit portfolio is the total amount of funds allocated by reinsurer into structured credit products which based on definition by Oaktree Capital (2019) are created via securitisation process which involves pooling similar debt obligations into interest-bearing securities by those assets and issued and sold to investors. This pooling relocates risk and return potential in the underlying loan. Reinsurer in this type of portfolios invests into securitised consumer credit products. Structured credit portfolio consists of 3 smaller sub-portfolios, referred to as "Strategy 1 PF", "Strategy 2 PF", "Strategy 3 PF" where each of these sub-portfolios are managed by different portfolio manager.

4 Results and Discussion

4.1 Listed Equity Portfolio

We analysed performance of equity strategy on three equity portfolios: Global Equity Portfolio, US Equity Portfolio and Local Currency Equity Portfolio on a time frame from December 2010 till June 2015. As benchmarks we applied MSCI World USD index for Global Equity Portfolio, S&P 500 for US Equity Portfolio and MSCI China A Shares for Local Currency Equity Portfolio.

Table 3. Return Analysis of Listed Equities Portfolios

Portfolio	NAV (m USD)	ItD Return (%)	Font size and style
Listed Equity	**2774**	**78.4**	**MSCI World USD**
Global Equity (Large Cap)	1132	62.5	MSCI World USD
US Equity Portfolio (Large Cap)	1551	92.1	S&P 500 TR

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		110.9	MSCI China
Local Currency Portfolio	91		A Shares

Table 1 provides overview of Listed Equity investment strategy comprising of three portfolios. Reinsurer applied this strategy from November 2011 till November 2015. The total net asset value (NAV) as of 31 December 2015 of all listed equity portfolios was 2.774 bil USD. Of this amount, 1.132 bil USD represents Global Equity portfolio (40.81% share of Listed Equity's NAV) investing into enterprises with large capitalisation whose performance is assessed against MSCI World USD. US Equity Portfolio of 1.551 bil USD NAV (55.91% share of Listed Equity's NAV) invests similarly as the former into large cap companies with geographic focus on the USA only. Local Currency Portfolio of 91 mil USD NAV (3.28% share of Listed Equity's NAV) focuses 100% on Chinese equities.

Table 2. Regional & Currency Exposure of Listed Equity Strategy

Regional Exposure	NAV (%)	Currency Exposure	NAV (%)
USA	81.1	USD	83.6
Europe	13.8	EUR	4.4
China	4.0	GBP	5.2
Emerging Markets	1.0	CHF	1.4
		JPY	2.5
		Other	2.9

When analysing listed equity currency exposure based on Table 2, the biggest proportion of 83.6% is denominated in USD which is in line with geographical exposure in Table 2 with 81.1% of portfolio streaming from North America. The remaining 18.9% currency exposure accounts for 4.4% in EUR, 5.2% GBP and 1.4% CHF which makes these European currency's share 11% on currency exposure in comparison to 13.8% on geographical exposure. Asia-Pacific geographic exposure is 4.0%. In terms of corresponding currency to this region, JPY accounts for 2.5% exposure, the remaining part is included in other currencies. This currency and geographical exposure are a result of investments by reinsurer's asset management which within ALM allocated funds to given currencies due to exposure from underlying

liabilities from underwriting activities which were underwritten within given geographies.
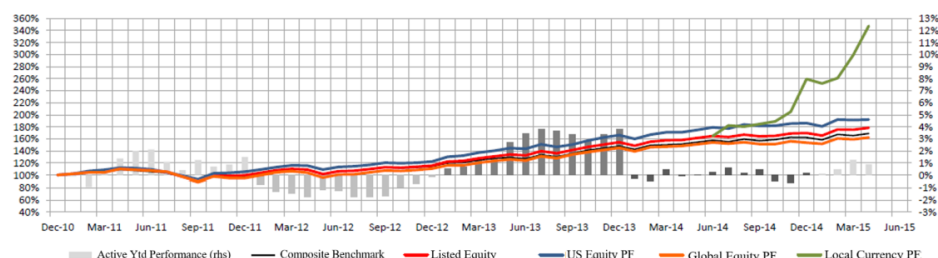

Fig. 6. Equity Strategies Performance Analysis 2010-2015

Source: Prepared based on Bloomberg Terminal and BlackRock Aladdin data (2023).

Based on Table 1 and Fig. 1 we assess performance of Listed Equity strategy which is comprising of three main portfolios. The best performing strategy was Local Currency portfolio which with inception to date (ItD) absolute return of 110.9%, US Equity Portfolio (Large Cap) with ItD absolute return of 92.1%, Global Equity (Large Cap) with ItD absolute return of 62.5%. The Listed Equity Strategy's ItD absolute return is 78.4%. All portfolios outperformed the composite benchmark.

4.2 Corporate Credit Portfolio

Reinsurer's investments into corporate credit are realised via Corporate Credit USD Portfolio comprising of three sub-portfolios, in particular Credit 1 USD PF, Credit 2 USD PF, Credit 3 USD PF. Each sub-portfolio is managed by different portfolio manager with funds being allocated into different types of corporate credit representing 95.7% of NAV. The remaining part of NAV is invested into Souvereigns of 3.4% and cash 0.9% Of 95.7% of NAV allocated into corporate credit, 51.4% of this amount is allocated into industrials (focus on consumer non-cyclical of 14.1%, communications of 9.1%, energy of 9.0%, consumer cyclic of 8.8%). The 35.6% of NAV is invested into financial corporations (focus on banking with 22.5%). Due to the limited scope of this paper, it could not have been possible to accommodate more detailed overview in a separate analysis.

Table 3. Return Analysis of Corporate Credit USD Portfolio

Portfolio	NAV (m USD)	ItD Return (%)	Volatility (%)	Sharpe Ratio
Corporate Credit USD	**7330**	**18.8**	**3.0**	**0.47**
Credit 1 USD PF	2799	20.0	2.85	0.51
Credit 2 USD PF	2224	16.4	3.01	0.51

Credit 3 USD PF	2306	-0.3	n/a	n/a

The best performing ItD sub-portfolio of Corporate Credit USD Portfolio was Credit 1 PF with ItD absolute return of 20.0%, then Credit 2 PF with ItD absolute return of 16.4% and Credit 3 PF which with ItD absolute return of -0.3%. The ItD absolute return of Corporate Credit USD Portfolio was 18.8%. Negative ItD absolute return of Credit 3 PF is caused due to its short existence (launch in May 2015), effect of fees and launch costs.

In terms of assessing risk-adjusted performance by Sharpe Ratio we follow the logic the greater a portfolio's Sharpe ratio is, the better its risk-adjusted performance is. Based on this assessment, both Credit 1 PF and Credit 2 PF were assessed with Sharpe ratio of 0.51 and Sharpe Ratio of Corporate Credit USD Portfolio was 0.47.

In terms of volatility, Corporate Credit USD Portfolio's volatility in measured period was 3.00% or if measured by Beta 0.95. The highest volatility was observed on Credit 2 PF with volatility of 3.01%, beta 0.95. The second highest volatility is calculated for Credit 2 PF of 3.01% and Beta 0.95.

Fig. 2. Active Duration Exposure - Corporate Credit USD Strategies

Source: Prepared based on Bloomberg Terminal and BlackRock Aladdin data (2023).

Measurement of the sensitivity of the price of a bond or fixed income instrument to a change in interest rates is referred to as duration which are influenced by time to maturity and coupon rate. Based on Fig. 2, active duration exposure is assessed for 2014 and 2015. The higher the duration, the more an investment's price will drop as interest rates increase (or increase as interest rates decrease). Securities of Corporate Credit USD Strategies which are the most sensitive to price drop in case of increase in interest rates are securities with 10 year duration. On the contrary, the opposite case is for securities with 5 year duration whose price will increase as interest rates decrease.

4.3 Structured Credit Portfolio

Reinsurer's investments into structured credit is realised via Structured Credit USD portfolio comprising of three sub-portfolios, in particular Strategy 1 PF, Strategy 2 PF, Strategy 3 PF. Each sub-portfolio is managed by different portfolio manager with funds being allocated into Asset Backed Securities (ABS) of 72.7% of NAV. 27.3% is allocated into Auto asset-backed securities (auto ABS) which are structured finance securities that are collateralized by auto loans or leases, such as those to prime (high credit standing) and subprime (low credit standing) borrowers. 24.5% of ABS into securitized credit card debt, 6.6% into student debt and 9.2% other securitized debt. Besides ABS, reinsurer allocates funds into commercial mortgage-based securities (CMBS) of 23.9% of NAV). Due to the limited scope of this paper, it could not have been possible to accommodate more detailed overview in a separate analysis.

Table 4. Return Analysis of Structured Credit USD Portfolio

Portfolio	NAV (m USD)	ItD Return (%)	Volatility (%)	Sharpe Ratio
Structured Credit USD	**1675**	**13.0**	**2.07**	**0.60**
Strategy 1 PF	575	4.5	2.03	0.61
Strategy 2 PF	611	12.6	2.16	0.57
Strategy 3 PF	488	12.9	2.03	0.62

Source: Prepared based on Bloomberg Terminal and BlackRock Aladdin data (2023).

In terms of performance, Structured Credit USD Portfolio bet the selected composite benchmark. All sub-portfolios, in particular Strategy 1 PF, Strategy 2 PF, Strategy 3 PF bet the selected benchmark as well. The best performing ItD sub-portfolio of Structured Credit USD Portfolio was Strategy 3 PF with ItD absolute return of 12.9%, then Strategy 2 PF with ItD absolute return of 12.6% and Strategy 1 PF which with ItD absolute return of 4.5%. The performance of Structured Credit USD Portfolio was 13.0%.
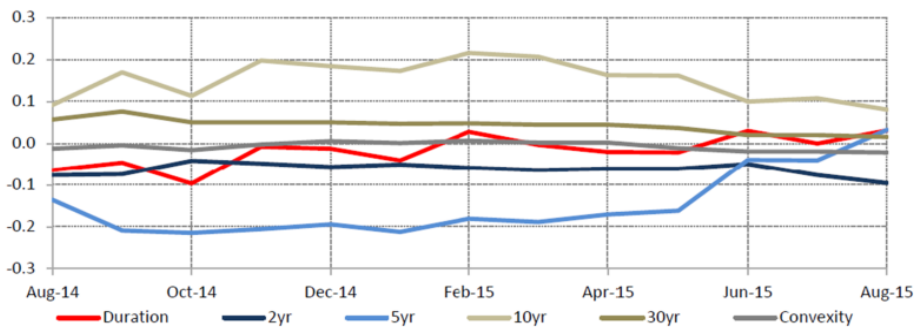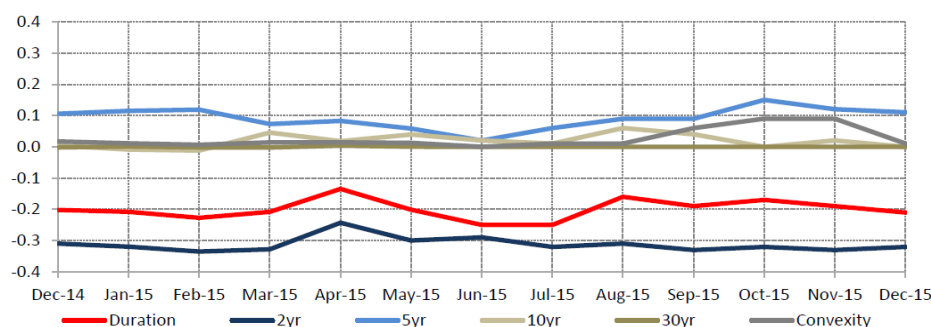

Fig. 3. Active Duration Exposure – Structured Credit USD Strategies

Source: Prepared based on Bloomberg Terminal and BlackRock Aladdin data (2023).

In terms of assessing risk-adjusted performance by Sharpe Ratio, Strategy 3 PF Sharpe Ratio is 0.62 representing the best risk-adjusted performance, then Strategy 1 PF with Sharpe Ratio of 0.61 and Strategy 2 PF Sharpe Ratio is 0.57. Sharpe Ratio of Structured Credit USD Portfolio was 0.60.

In terms of volatility, Structured Credit USD Portfolio's volatility in measured period was 2.07% or if measured by Beta 0.95. The highest volatility was observed on Strategy 2 PF with volatility of 2.16%, beta 0.99. The second highest volatility is calculated for both, Strategy 1 and 3 PF of 2.03% and Beta 0.93 respectively.

When assessing active duration exposure for 2014 and 2015 in Fig. 3, there have not been major deviations as a reaction on change of interest rates due to relatively stable economic environment. Active duration exposure of all types reached identical values in the beginning of measured period in December 2014 and at the end in December 2015. Securities within Structured credit USD Strategies the most sensitive to price drop in case of increase in interest rates are securities with 5 year duration. On the contrary, the opposite case is for securities with 2 year duration whose price will increase as interest rates decrease.

5   Conclusion

This paper analysed selected investment strategies of specific type of investor on financial markets, a reinsurance company. Performance of investment strategies is assessed on 2010-2015 time frame. All investment strategies bet selected benchmarks. Listed Equity Strategy with NAV of 2.774 bil USD, focused with 81.1% of its NAV on USA with 83.6% currency exposure to USD. Its ItD absolute return was 78.4%. This strategy is comprising of three portfolios which form the Listed Equity Strategy. The best performing of them was Local Currency portfolio (ItD absolute return of 110.9%, however small size of only 3.28% Listed Equity's share of NAV with focus on China), US Equity Portfolio Large Cap (ItD absolute retrun of 92.1%, 55.91% share of Listed Equity's NAV), Global Equity Large Cap, (ItD absolute retrun of 62.5%, 40.81% share of Listed Equity's NAV).

In terms of credit investments, reinsurer applies Corporate Credit and Structured Credit strategies. Corporate Credit USD Portfolio with NAV of 7.3 bil USD is 4.35 times bigger than Structured Credit USD Portfolio with NAV of 1.68 bil USD. In terms of performance, both portfolios bet the composite benchmark. The ItD absolute return of Corporate Credit USD Portfolio was 18.8% which achieved higher return than Structured Credit USD Portfolio of 13.0%.

Corporate Credit Strategy's volatility of 3.0% is higher than Structure Credit's volatility of 2.07%. For risk-adjusted performance assessment by Sharpe Ratio we follow the logic the greater a portfolio's Sharpe ratio is, the better its risk-adjusted performance is. In this respect Structured Credit's Sharpe Ratio of 0.6 provides better risk-adjusted performance than Corporate Credit's 0.47.

The traditionally conservative risk profile of reinsurer has been reflected in its investment strategies. From NAV of 11.779 bil USD allocated for investments, 76.45% (9 bil USD) was allocated into credit strategies (for structured credit 14.22% of NAV, 1.647 bil USD; for corporate credit 62.23% of NAV, 7.330 bil USD). Corporate Credit yielded 18.8% and Structured Credit yielded 13.0%. Although more risky Listed Equity strategy reached ItD absolute return was 78.4% which is considerably higher than for both credit strategies (4.17 times more than Corporate Credit USD Strategy and 6.03 times more than Corporate Credit USD Strategy), Listed Equity's share on NAV was only 23.55%.

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Uzbek-Russian Relations: Debt Relief (Case Study)

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Abstract. The purpose of this article is to explore the dynamics of Uzbek-Russian bilateral relations. The topic is covered in the context of historical development but also with respect to current issues that shape international agenda. The paper identifies areas of existing cooperation and defines potential areas for improvement and future developments. We also examine limits and threats to deepening bilateral cooperation. This article employs also a case study approach to examine the impact of the debt relief program with Russia, which was agreed upon in 2014. The case study was conducted using a range of sources, including a review of official documents and news reports to provide a comprehensive analysis. In the article, we point out that Uzbek-Russian relations have been complex over time, with Uzbekistan pursuing a pragmatic approach based on the tradition of political realism. The relations are still dynamically changing and updating due to the need to protect and promote national interests in uncertain times, updates of the country's foreign policy priorities, or global trends reflected by the state leaders also at the bilateral level.

1   Introduction

With the rapidly changing international political landscape, especially against the backdrop of the ongoing conflict in Ukraine, it becomes imperative to explore and understand the dynamics of bilateral relations between nations. One such important relationship that requires closer examination is that between Russia and Uzbekistan. The motivation for this study lies in understanding the historical context of their relations and using it as a basis for making assumptions about the future trajectory of their bilateral relations. This article seeks to provide a comprehensive exploration of the Uzbek-Russian bilateral relationship using a case study with a specific focus on debt relief, offering insights into the potential impact on their relationship and the broader geopolitical implications.

The bilateral cooperation between Russia and Uzbekistan has a history of more than 31 years. After the collapse of the Soviet Union, Uzbekistan launched an independent

foreign policy based on the country's national interests. The neutral country aimed to interact with other post-Soviet states primarily within the CIS framework (MIIT UZ, 2020). However, Uzbekistan was forced to rebuild its diplomatic relations with Russia at a much higher level. In the context of global economic development in the 1990s, Russia quickly became a key partner of the Central Asian country.

Uzbek-Russian relations have remained the most important and highest priority for Uzbek´s political leaders throughout its period of independence. The interaction between countries has been complex and ambiguous. The shared legacy of the Soviet era, as well as various historical, cultural, and economic factors, have shaped a unique dynamic in the relationship between the two countries. However, in recent years, the perception of a shared Soviet past has begun to change, and Uzbekistan's economic and security situation has been significantly changed by Russia's invasion of Ukraine. The war has demonstrated the divergence in the development paths of the two countries and has affected the perspectives of future Uzbek-Russian cooperation (Pannier, 2022).

Despite this, bilateral relations remain stable and continue to develop in many areas, including politics, economics, security, culture, and education.

1.1   Literature Review

A significant amount of literature has been dedicated to the study of the development of bilateral relations between Russia and Uzbekistan over the past few decades. Various authors identify several major factors affecting these relations, primarily including security cooperation and economic ties.

- *Cooperation*: Brzezinski highlights the position of Uzbekistan in the region as being a buffer zone between the Islamic world and Russia. He argues that Uzbekistan has a specific role, particularly in the tensions between the West and Russia over control of the Central Asia region and its resources (Brzezinski, 1997). Monaghan describes Uzbekistan as an important player in Central Asia with a complex relationship with Russia that is characterized by both cooperation and competition, with Uzbekistan at times seeking to distance itself from Russia and pursue a more independent foreign policy (Monagnan, 2011). According to Yakubov, the cooperation between Uzbekistan and Russia has experienced a steady rise and certain breakthroughs, and this is the main difference between the current stage of Uzbek-Russian relations (Yakubov, 2021).

- *Economy*: One key factor driving economic cooperation between Russia and Uzbekistan is their shared energy interests (the construction of railways and gas pipelines). According to Fiona Hill Russia prompts energy ties with Uzbekistan due to the existing export infrastructure for pumping gas (Hill, 2002). Besides, the agriculture sector in Uzbekistan has a high potential. Eurasian Research Institute reports that Russia has shown significant interest in importing Uzbekistan's agricultural products (Eurasian Research Institute, 2020). International Crisis Group points out that Uzbekistan's economic relationship with Russia has been marked by tensions in the past over gas prices and transportation tariffs, and complicated by political factors, such as Uzbekistan's desire to reduce its dependence on Russia and attract FDIs from other countries (International Crisis Group, 2007).

Toktogulov agrees that countries have a longstanding history of economic cooperation but draws attention to the dynamic change in Russia's position, with China becoming the main export partner (Toktogulov, 2022).

- *Security*: Moore notes that Uzbekistan has been an important partner for Russia in combating terrorism and crime in Central Asia after 9/11 as both countries have been particularly concerned with the threat posed by Islamic terrorism in the region (Moore, 2007). According to Karin, the two countries have cooperated on a range of security initiatives, including joint military exercises or support for regional security organizations, with occasional political tensions over issues related to Uzbekistan's participation in Shanghai Cooperation Organization (SCO) and the Russian-led Collective Security Treaty Organization (CSTO), although it never led to serious conflict (Karin, 2012). Luca Anceschi emphasizes the willingness of Uzbekistan to increase defence ties with Russia in the last decade and the change in the security policy under President Mirziyoyev (Anceschi, 2019). Stein argues that Russia has renewed its security partnership with Uzbekistan over the past few years, but that for now, it is not any different than Uzbekistan's other partnerships (Stein, 2021).

1.2   Legal Framework of Bilateral Relations

Diplomatic relations between Uzbekistan and Russia established after the fall of the Soviet Union were strengthened by a series of bilateral agreements and treaties.

The Collective Security Treaty (Tashkent Treaty) signed by the CIS Council of Heads of State launched the CSTO. The Treaty on Foundations of Inter-State Relations and Friendship and Cooperation signed by Uzbekistan's President Islam Karimov and his Russian President Boris Yeltsin laid the legal foundation for Uzbek-Russian bilateral relations. The Agreement on Deepening Economic Cooperation between Uzbekistan and Russia for 1998-2007 provides the basis for the trade regulation and economic ties between Russia and Uzbekistan (UZINFOCOM, 2023).

At the turn of the millennium, a cooling of mutual relations began, which lasted more or less until 2005, when Uzbekistan's relations with the West collapsed following the Andijan massacre. After the indiscriminate killing of hundreds of unarmed people who participated in a massive public protest, the EU imposed sanctions on Karimov´s government (Human Rights Watch, 2005), therefore, the process of rapprochement between Uzbekistan and Russia began. In November 2005, Presidents Vladimir Putin and Islam Karimov signed an Agreement on an alliance taking relations between the two countries to a maximum level of closeness. The agreement unprecedented in the CIS stipulates that an attack on either country will be considered an act of "aggression" against both, it also grants each other the right to use military facilities on the territories of both countries (RFE/RL, 2005).

The period of systematic development of relations followed, with the signing of several bilateral agreements and declarations on the deepening of the (economic) cooperation. Uzbekistan's accession to the CIS Free Trade Area Agreement (CISFTA) in 2013 completed the legal basis of Uzbek-Russian relations (Gadimova, 2014). Uzbekistan and Russia initially started to cooperate closely on economic issues by signing a package of agreements and trade contracts worth billions of USD

(Toktogulov, 2021). A further stimulus for countries to develop their cooperation was provided in 2016 when President Shavkat Mirziyoyev came to power (Bowyer, 2018). In total, more than 200 interstate, intergovernmental, and interdepartmental agreements were concluded, including the agreement on the mutual use of the airspace by military aircraft or the Plan for the defence ministries' cooperation (Irgashev, Galimova, 2018). Against the backdrop of war in Ukraine, Shavkat Mirziyoyev and Vladimir Putin signed the Declaration on Comprehensive Strategic Partnership, as well as a package of new investment agreements worth 4,6 USD bn in mechanical engineering, chemistry, petrochemistry, and geology (President.uz, 2022).

2   The historical evolution of economic relations

The history of relations between Russia and the peoples of Central Asia has roots in ancient times. Attempts to establish diplomatic relations between the Russian state and Central Asia followed the collapse of the Golden Horde. During the early Middle Ages, these connections were carried out indirectly through the nomads and steppe dwellers, who inhabited the "Great Steppe" (Kostetsky, 2008). From artisans and peasants who migrated from Russia, the Uzbek´s local population picked up new, previously unknown methods and skills. The advanced members of the Russian intellectuals contributed significantly to the development of science and culture in Uzbekistan. With the Russian conquest of Central Asia in the 19th century, these territories became a source of raw materials for Russia, especially cotton and silk (Morrison, 2021).

Since the 1990s, Uzbekistan and Russia have been promoting their economic, scientific, and cultural cooperation. In 1996, Russia became Uzbekistan's main export and import trading partner. Before (1992-1995) Uzbekistan traded more with Germany, South Korea, Italy, and Japan. Since 1996, Russia has been in the top 5 of Uzbekistan's partners, but its share is declining in the long term (see Table 1).

Russia had been in the first (max. second) position in exports until 2013, when China replaced it, followed by Switzerland in 2015. In imports, Russia steadily maintained its leading position until 2017. As of 2018, China is Uzbekistan's main import partner. Since then, Russia has been in second position, followed by Kazakhstan, South Korea, and Turkey (OEC, 2022). In terms of export decline, it is worth mentioning that in 2015 Russia's share fell below 10%, to 9.26%. In that year, Russia was the 5th main trading partner (such a decline only once in history), with higher shares achieved by Switzerland (30.4%), China (19.6%), Turkey (11.7%), and Kazakhstan (11.1%).

Table 1. The evolution of Russia as one of Uzbekistan's key trading partners
(average percentage values in 5-year intervals)

	Export	**Import**
1996-2000	28,26 %	20,58 %
2001-2005	20,6 %	24,12 %
2006-2010	21,54 %	23,88 %
2011-2015	17,73 %	21,84 %
2016-2020	13,24 %	20,02 %

Uzbekistan exports to Russia mainly pure cotton yarn which has been the key crop within Uzbek agriculture. Russia exports to Uzbekistan primarily sawn wood, hot-rolled iron, and refined petroleum. While Uzbekistan does not export any services to Russia, in 2021 Russia exported services to Uzbekistan worth more than 700 USD million (OEC, 2022).⸺Following China (2.2 USD bn), Russia (2.1 USD bn) is Uzbekistan's main investment partner. Russia is the leader in the number of foreign enterprises in Uzbekistan Russia accounting for up to a fifth (3,151) of the total of 15 801. In recent years cooperation between countries has grown to an unprecedentedly high level. In 2022, the trade turnover between Uzbekistan and Russia grew by 23 %, reaching 9,3 USD bn (see Table 2). Trade with Russia accounts for 18.6% of Uzbek's total foreign trade turnover (Statistics Agency of Uzbekistan, 2023) and the countries plan to increase bilateral trade to 10 USD bn in 2023.

Table 2. Share of Uzbekistan´s main trade partners in 2022

Export			Import		
Russia	15,9 %	3,1 USD bn	China	20,9 %	6,4 USD bn
China	13 %	2,5 USD bn	Russia	20,2 %	6,2 USD bn
Turkey	7,8 %	1,5 USD bn	Kazakhstan	10,6 %	3,3 USD bn
Kazakhstan	7,1 %	1,4 USD bn	South Korea	7,5 %	2,3 USD bn
Kirgizstan	5,1 %	0,99 USD bn	Turkey	5,6 %	1,7 USD bn

3   Current state

The Ukrainian crisis has left Uzbekistan in an extremely vulnerable position due to its trade dependence with Russia. Uzbekistan supports the independence, sovereignty, and territorial integrity of Ukraine and does not recognize the separatist republics or the annexation of Crimea by Russia (Kamilov, 2022). Uzbekistan's position on the Ukrainian crisis is pragmatic. Supporting Russia's actions in Ukraine does not correspond to the national interests of the country, and such support would threaten Uzbekistan's respected international status (Ismailkhodzhaev, 2022).

Despite these assumptions, cooperation between Uzbekistan and Russia continues at the highest level, including regular calls, attendance of the Uzbek President at Russia's Victory Day military parade on 9 May 2023, and meeting with the Russian president or Russian resolute support for changes to the Constitution of Uzbekistan (President.uz, 2023). The government of Uzbekistan follows Russian authoritarian patterns. Similar narratives are evident, particularly in terms of emphasizing a powerful and decisive leader and stressing that challenging times call for a strong national president capable of guiding the nation.

 Both countries face ongoing challenges, such as the lack of a truly independent electoral commission, the continued dominance of the ruling party, or the difficulty of building a functioning market economy. The most recent Uzbek referendum provides an analogy to the 2020 changes to the Russian constitution guaranteeing Vladimir Putin's rule until 2036. After voters overwhelmingly approved the constitutional changes in a tightly controlled referendum, Uzbek President Shavkat Mirziyoyev will be able to remain in power until 2040 (Reuters, 2023). The referendum was held

at a time when the country deals with the aftermath of a particularly harsh winter characterized by fuel shortages, growing poverty, and rampant corruption. The constitutional changes undermined the already limited democratic process.

3.1 Drivers of cooperation

Russia is an important economic ally, with deep trade and investment connections with Uzbekistan. Providing security aid to Uzbekistan is another important aspect of bilateral cooperation regarding the terrorist threats or the situation in Afghanistan. With Central Asia's role as a crutch for Russia, and with Uzbekistan aware of Russia's role as a critical player in regional politics, it is more pragmatic to keep favourable relations with Moscow. To a large extent, the current level of relations and cooperation also reflects the historical and cultural ties between the states.

The long rule of Islam Kasimov left a controversial legacy in bilateral cooperation, with his relationship with Vladimir Putin reaching a peak of friendliness only in the last years of his rule. The death of President Karimov was followed by substantial warming of Uzbek-Russian relations, with high-level visits (see Table 3.) and the signing of several agreements (President.uz, 2023). The country desperately needed foreign partners to diversify its economy and strengthen its military. China and Russia have engaged in this task. New Uzbek leadership under Shavkat Mirziyoyev has placed a greater emphasis on building mutually beneficial ties with Russia than under Kasimov, whose approach was more cautious and reserved (Hedlund, 2019).

Table 3. Mirziyoyev´s visits to Russia and neighbouring states since taking office

	Russia	Kazakhstan	Turkmenistan	Kyrgyzstan	Tajikistan	Afghanistan
State visit	1	1	1	1	1	-
Working visit	5	6	4	2	2	-

Countering religious extremism and terrorism
Uzbekistan and Russia have both experienced incidents of religious extremism and terrorism in the past, and they continue to face these threats. Uzbekistan has been particularly concerned about the threat of Islamic extremism, which has led the country to pursue a rather isolationist foreign policy.

Over the last few years, however, the country has begun to be more pragmatic on this issue, aware that an effective fight against these threats in the region must be coordinated. There is still a desire to deepen cooperation with Russia in sharing intelligence, anti-money laundering, or strengthening security forces. Also, greater respect for the rule of law and human rights is essential for both countries, as abuses can fuel grievances. As both states are officially secular and guarantee freedom of religion, the differences in religious affiliation between Uzbekistan and Russia have minimal impacts on successful cooperation.

3.2 Potential threats

In the long term, challenges and limitations of cooperation may be posed by Russia's historical dominance in the region, as well as Uzbekistan's effort for greater economic diversification or the competition between Russia and China over greater economic

influence in Uzbekistan and presence in Central Asia. The Uzbek attempts to move away from Russian influence and from being involved in Russian business networks bring more scepticism to the future of bilateral relations.

Since ensuring security in the country is a top priority for the Uzbek government, in the context of the war in Ukraine there is no guarantee that Russia could provide large-scale military assistance to Uzbekistan. Despite the vague political statements, the performance of the Russian military in Ukraine so far has certainly shattered much of the confidence the Uzbek government had in Russia as the most popular ally.

Furthermore, Uzbekistan should remain aware of the instances of Russian chauvinism affecting Uzbekistan's approach towards Russia in the past. Russian President Vladimir Putin at the St. Petersburg International Economic Forum claimed that the former Soviet Union is historical Russia, but he has always respected the processes of sovereignization in the post-Soviet space (Putin, 2022). Kazakh President Kassym-Zhomart Tokayev attending the forum and sitting beside him did not oppose it. This could be used as a model situation for a more comprehensive reflection on the Uzbek approach toward Russia.

4 Debt relief (Case study)

Debt relief was a powerful tool within Uzbek-Russian relations. As it helped to ease financial burdens and promote the economic growth of Uzbekistan by facilitating trade and investments, but at the same time, it also brought tension over terms of treaties and mistrust between countries by attempts to exert control over Uzbekistan´s policy and to increase Russia's influence in Central Asia region.

In 2014, Russia provided debt relief to Uzbekistan forgiving nearly all of the Uzbek debt (864 USD million, 97%). The State Duma passed the law cancelling "mutual financial claims and obligations" between Russia and Uzbekistan in 2016 (Federal Law No. 83-FZ, 2016). This move led to Russia waiving the debt repayment worth around 900 million USD, thus requiring Uzbekistan to only pay 25 USD million to Russia. Furthermore, it prompted Uzbekistan to consider joining a free trade agreement with the Eurasian Economic Union (EEU) under Russian leadership. According to Russian officials, as of 1 November 2014, Uzbekistan´s debt amounted to 889.3 USD million including 500.6 USD million in principal and 388.7 USD million in interest, all of which was overdue (Ozodlik, 2016). Negotiations on mutual financial claims had been ongoing since the end of the millennium and both parties had to make difficult compromises to sign the agreement.

4.1 Aim of the Debt Relief

Against a backdrop of serious challenges for Russia, including the crisis in Ukraine, the free-fall of the ruble, and lower oil prices, the country offered a generous dose of debt forgiveness to keep Uzbekistan close. Russia considered Uzbekistan, the largest country (by population) in Central Asia, as one of its priority partners in the region (Zavrazhin, 2014). Debt relief was aimed to boost the relations between Russia and Uzbekistan with mutual long-term benefits (Sorbello, 2014).

For the poor Central Asian republic, the debt relief was compared to the annual revenue from the sale of its cotton harvest which has long been a strategic centrepiece of Uzbek´s economy. The decision was made in the context of Russia's broader efforts to strengthen its economic ties with Central Asia and to counterbalance West and China's growing influence in the region (Pradhan, 2017). Russia's debt relief may have been an attempt to sway Uzbekistan's decision in favour of closer ties with Russia as well as to promote the formation of the EEU at a time when the EU was also increasingly interested in cooperation with Uzbekistan.

4.2 History of the Debt

The debt relief covered loans from the former Soviet Union, mostly related to infrastructure projects. The history of the debt dates back to the collapse of the Soviet Union when Uzbekistan and other former republics were pushed out of the common ruble zone and received Russian goods and equipment in instalments (Volosevich, 2016). Uzbekistan's parliament decided not to acknowledge the debt as a single public debt, leading to disagreements with Russia.

After the debt reconciliation in the early 2000s, Uzbekistan owed Russia about 550 USD million, and talks of debt restructuring followed. However, Russia demanded that the obligations be fulfilled, leading to Uzbekistan's refusal to pay the bill. Uzbekistan's leadership expected to write off this debt since Russia has already forgiven larger debts to Afghanistan or Angola (Kurtov, 2010).

4.3 Implications

Uzbekistan: The relief of Uzbekistan's debt provided much-needed financial assistance to the country, reducing its external debt burden and freeing up resources for domestic investment and social spending. As a result, there could be an increase in investment in Uzbekistan, improvements in living standards for citizens, and a more stable economy. The debt relief also encouraged more Russian businesses to invest in Uzbekistan, and it opened new lines of credit for the two countries to pursue, including the sale of arms and military technology (TASS, 2014).

For Uzbekistan, the concession was acknowledging obligations for all previously received loans. Before, they only recognized a 43.1 USD million debt and claimed a stake in the former Soviet Union's Diamond Fund, valued at 1-2 USD bn. Uzbekistan also withdrew its claims to the "internal currency debt" of the former USSR (Federal Law No. 83-FZ, 2016). However, it could be argued that Russia sought foreign policy success following its isolation due to its failed policy towards Ukraine. Despite concerns about Uzbekistan's President Karimov being unreliable, Russia met the need to find a new ally.

Russia: The debt relief could be seen as a goodwill gesture that strengthened the ties between the two countries maintained its influence in the region and demonstrated Russian willingness to support its allies. Nevertheless, the debt relief led to a loss of revenue from debt repayment, which was a setback for Russian suppliers of goods and other commodities, who had hoped to one day repay their debts. The amount of debt relief was consistent with the Russian practice of recent years. For example, Vietnam was forgiven most of its debt (9.5 USD bn out of 11 USD bn),

Ethiopia (4.8 USD bn), Mongolia (11 USD bn, Iraq (22 USD bn), and Cuba was forgiven 90 % of its debt (30 USD bn) in 2014 (WSJ, 2014).

Benefits for Russia: At a tough time for Russia's economy, the debt relief provided significant benefits for the country including:

- removal of the obstacle to normalization of the Russian-Uzbek relations
- the elimination of the threat of legal proceedings: Uzbekistan was the only CIS state that officially stated that it would be expedient to take the issue of its financial claims against Russia to court
- the renouncing Uzbekistan´s claims to the assets of the Diamond Fund
- 25 million USD for the Russian budget within a month (Volosevich, 2016)
- improved Russia´s and Putin's images, at least at the regional level

5   Conclusion

Over the past 30 years, relations between Uzbekistan and Russia have gone through several phases of development and countries have maintained a mostly positive relationship. The parties have managed to avoid mutual grievances in the context of shared Soviet past and Russian superiority complex. This approach has facilitated the formation of allied relations and mutually beneficial partnerships, as well as the growth of cooperation in several sectors, from the economy to education.

In academic literature, Russian-Uzbek relations are described as complex, often emphasizing the historical and cultural context in which the Soviet legacy plays a significant role. This article agrees with a certain level of historical interconnectedness but also points to Uzbek´s road to pragmatism. Although the existing literature mainly focuses on close cooperation in areas such as defense, security, and regional stability, and emphasizes the economic interdependence between the two countries, this article highlights the limits of Uzbek's loyalty to Moscow. The war in Ukraine has imposed many constraints and is likely to be a watershed moment in Uzbek-Russian relations. Uzbek´s president views the invasion of Ukraine through the prism of his own interests, the most important of which is the preservation of his own regime. Uzbekistan must prove what is its main priority — to ensure the country's survival by pursuing cautious foreign policy, to accelerate its slip from Russia´s orbit while finding the best place for itself in the international system, or to remain firmly entrenched in Soviet-era linkages.

Further cooperation with Russia will continue as long as it brings benefits to Uzbekistan and does not risk its reputation. Concerning cooperation in the field of energy and transport infrastructure, business networks, or educational programs, both leaders are also keen to maintain the status quo.

The article also demonstrates that even financial support for Uzbekistan does not guarantee Russia's long-term and unproblematic support. It can be assumed that in the long run, Uzbekistan's efforts for greater "independence" not only in the Central Asia region, but also internationally, will increase to secure the country´s interests. Whether and how far Russia will fit into this scenario is questionable.

Although the Soviet stereotypes in the mindset and leadership of the state, which have not yet been overcome, e.g. relation to the opposition, the continuity of the secular state, or the perception of social inequalities in the country (Horak, 2005), may play in favour of maintaining and deepening Uzbek-Russian cooperation, at the same time they do not guarantee the sustainability of pragmatic bilateral relations in the long run.

A collegial relationship with Russia, whose international isolation has deepened markedly in the past months, cannot be based on post-Soviet enthusiasm only but must be constantly driven by the positive results of bilateral cooperation in all strategic sectors. While further Uzbek-Russian cooperation is not a priori impossible, a change in Uzbekistan's position as a regional leader may occur from the moment when Russia demonstrates all its commitments to Uzbekistan only verbally, and in practice, the positive effects of loyalty to Russia begin to fade from the Uzbek economy. At least so long as the current Uzbek and Russian leaderships are in power, it is difficult to see when or whether this moment will come.

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The Current Global Situation of Plastics and Forecast of Plastic Waste

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Abstract. Plastics cause one of the most severe problems tourism operators must face. They are relatively cheap, versatile and have a long-lasting material whose durability exceeds the life of the products made from it. As a result, the production of plastic waste is increasing worldwide. The durability of plastics also means that their uncontrolled disposal is problematic because they can last a very long time in the environment. Plastics pose a threat not only to a healthy environment but also to society. This post will focus on the current state of plastics and plastic waste for the monitored period in selected countries. Our findings point out the distribution of plastic production. We investigated the biggest polluters of global mismanaged plastic waste, polluters of global mismanaged plastic waste by continent, the annual global production of plastics, the rate of decomposition of plastic items, and forecast the expected development of plastics production.

Keywords: Plastics, Pollution, Circular Economy, Biodiversity.

JEL classification: *O10, C53, L65*

1   Introduction

Many governments and organizations are working hard to tackle plastic waste and plastic pollution. The problem is worsening, and efforts to fix it fail to keep up. The solution lies in the production of plastic and its loading. Plastic packaging should be fully reusable, recycled or composted. A circular economy for plastics will also help in the fight against the climate crisis and the loss of biodiversity. At the same time, it will have a positive social and economic impact. Stopping plastic pollution could be initiated by a plastic pollution treaty that brings together governments, producers and

consumers to achieve clear targets for reducing, collecting and recycling plastics and promoting sustainable alternatives. Almost everything around us is made of plastics, and they are synthetic or semi-synthetic polymerization products composed of organic condensation or additive polymers. Plastic waste harms all living things, including humans. Political and financial instruments to support the use of recycled plastics and other ecological alternatives could bring a reduction in plastic production. Waste is generated by each of us, and by sorting and recycling, we save natural resources and energy. In the circular economy, waste is an important raw material. We should not unnecessarily deprive ourselves of material that we can reuse. Plastics are one of the worst recyclable materials and are the biggest burden on our environment, as they appear on the market in many forms and can only be recycled into a lower-quality product. The pollution of water surfaces and the natural environment with plastic waste alarms many ecologically minded people. The success of the invention of plastics in the last century also caused a flood of plastic waste all over the world. We should take more measures to reduce the amount of plastic waste because it is a growing problem. Solutions exist, but they are not without risks. The current pace of plastic production and consumption is unsustainable. In addition to the amount of waste, plastics also increase emissions, and the pace of plastic production is a problem for the whole world. The risks posed by plastics are largely due to unsustainable production and consumption. The pandemic and climate change are increasing public attention to the current plastic crisis. The best option is to move towards a sustainable and circular plastic economy.

2   Theoretical background

Plastics represent a real threat to the environment. The rapid production and consumption of plastic products exceed society's ability to deal with them. The contribution of the author Parker draws attention to the negative effects of plastic pollution, which are the most noticeable in the developing countries of Asia and Africa due to ineffective or non-existent legislation regulating the handling of plastic waste and its disposal (Parker, 2019). However, it should be noted that other countries in the world also have a problem with plastics. According to EPA (2023), plastics represent a growing segment of municipal solid waste; for example, we present the production of plastics in 2018, while the US produced approximately 35.7 million tons of plastics, which was 12.2% of municipal solid waste generation. According to the European Commission (2018), approximately 25.8 million tonnes of plastic waste is produced by Europeans annually, and less than 30% is collected for recycling. In contrast, author Liang et al. (2021) point out China as the world's largest producer and consumer of plastics. In 2019, approximately 27 million tons of plastic waste were produced. For this reason, China has implemented ambitious plans, which their aim is focused on solving this problem. Geneva Environment Network (2023) points out the Global Plastics Outlook statistics, which highlight the world's production of plastic waste in 2019. The world produced 353 million tonnes of plastic waste. In 2020, the number increased, and 367 million metric tons of plastic waste was generated by the world. It is assumed that plastic waste will increase exponentially in the coming years.

In addition to the increasing consumption of plastics and subsequent plastic waste generation, another topic needs attention. Authors Williams and Rangel-Buitrago (2022) consider recycling and the circular economy as key aspects leading to the effective disposal of plastics. According to author Liu et al. (2022), plastic pollution negatively affects outdoor recreational activities. Due to the mentioned pollution, China and the European Union are trying to combat this problem by introducing measures aimed at recycling and reuse. According to the Geneva Environment Network (2023), relying only on recycling is an insufficient solution. The fact remains that currently, 14% of plastic waste is collected for recycling. However, the European Commission has a different point of view. According to the European Commission (2023), in accordance with a European Strategy for Plastics in a Circular Economy (2018), the production of plastics and the incineration of plastic waste contribute to an increase of 400 million tons of CO_2 annually. Using recycled plastics can help reduce the dependence on the extraction of fossil fuels to produce plastics and thus contribute to the minimization of CO_2 emissions. An EU action plan for the circular economy, adopted in December 2015, became an important document for plastic problems within EU member countries. The plan was expanded with a new strategy, i.e. the European Strategy for Plastics in a Circular Economy, which was adopted in 2017 as part of an action plan (European Commission, 2023). As part of the set goal, all plastic packaging should be recyclable by 2030. (A European Strategy for Plastics in a Circular Economy, 2018).

3   Methodology

The main aim of our paper is to identify the current global situation of plastics and plastic waste based on the processing and identification of statistical databases. The methods of deduction, comparison, analysis, deduction, and prediction were used in our paper. For a better presentation of individual data, we used six graphs. The paper is divided into two main parts. In the first part, we present a brief theoretical basis that familiarizes us with the investigated issue. In the second part, we deal more closely with the identification of statistical data. We used various databases such as Statista, Our World in Data, EPA, and Plastic Europe. In this part, we examined the annual global production of plastics in the observed period, the distribution of the global plastics production in 2019, the top 10 polluters of global mismanaged plastic waste in 2019, polluters of global mismanaged plastic waste by continent in 2019 and the rate of decomposition of plastic items of marine litter expressed in years in 2018. In the final part, we present the forecast of the expected development, where we created a structure from time series data by using exponential smoothing models and autoregressive integrated averages. We worked with the most available current data, mainly from 2019 to 2021. Exponential smoothing is one of the oldest and most studied time series forecasting methods. The time series values follow a gradual trend and display seasonal behaviour in which the values follow a repeated cyclical pattern over a given number of time steps. A statistical model is autoregressive because it predicts future values based on past values. This data allows us to expand the research with a larger sample to compare these results.

4 Result

Plastics form an important part of the functioning of the economy. They are found in every sector. Their usability and practicality make them revolutionary inventions that have been used for several decades (Parker, 2019). However, in addition to their usefulness, we encounter several negatives, significantly burdening the environment and affecting biodiversity. Studies from around the world have not shown any particular country or demographic to be the most responsible. It must be noted that society generally creates the most waste. Although the level of pollution in individual countries varies slightly, individual statistical data show different values that move countries to a higher or lower place in the ranking, but in the end, whether it is plastic waste or something else, these facts trouble all countries. It should not be forgotten that not all countries report all statistical data. (Moore, 2023). In this part of our paper, we graphically point out the current situation of plastics based on the identification of data from statistical databases.
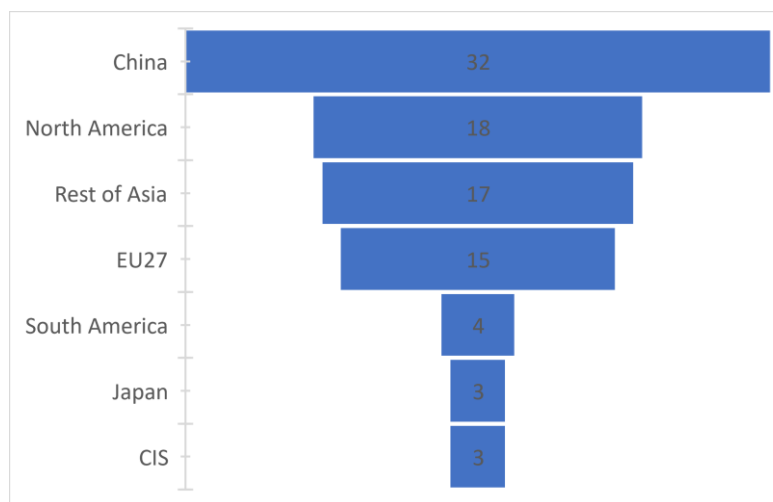
Graph no.1 Distribution of the global plastics production, 2021 (%)
Source: own processed based on data retrieved from Plastic Europe, 2022

The graph no. 1 shows the distribution of global plastics production, including plastics production from polymerisation and production of mechanically recycled plastics for the observed period in 2021. The graph compares selected countries. The values are expressed in percentages. In 2021, the total of produced plastics reached 390.7 million tonnes (Plastic Europe, 2022). The graph shows that in 2021, China reached almost one-third of the world's plastic production, which is 32%, North America reached 18% and the rest of Asia 17%. The European Union had a share of 15% of plastic production. CIS countries representing the Commonwealth of Independent Countries, such as Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, and Ukraine, have reached 3% of plastic production. If we take Asian countries into account, they reached approximately 55% of the total

production of plastics. North and South America 22% in total. The following graph no. 2 shows the top 10 polluters of global mismanaged plastic waste in 2019.

Graph no. 2 shows the top 10 largest global mismanaged plastic waste polluters in 2019. The values are expressed in percentages. Mismanaged plastic waste represents plastic that is either littered or inadequately disposed of. It does not include waste that is exported overseas, where it may be mishandled. In 2019, China and India reached the highest percentage, China 21.04%, and India 19.87%.
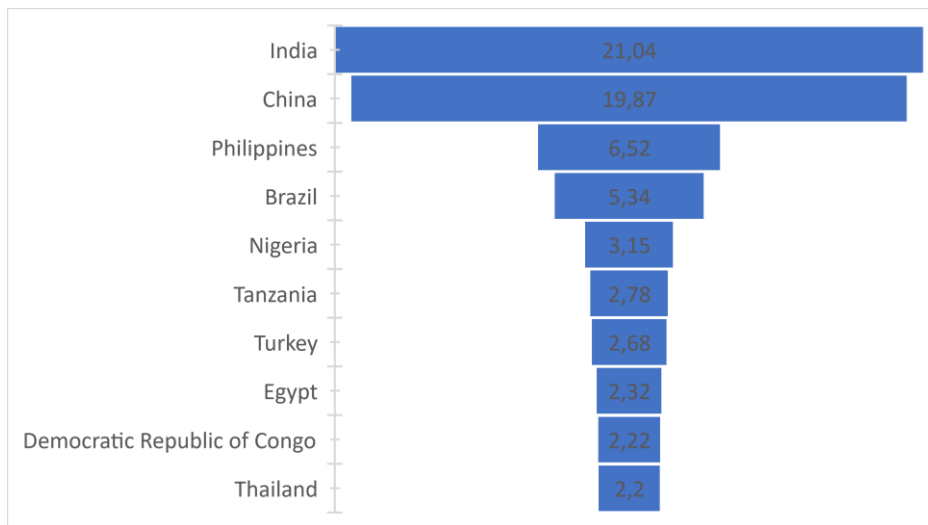
Graph no.2 Top 10 polluters of global mismanaged plastic waste, 2019 (%)
Source: own processed based on data retrieved from Our World in Data 2021

Raking of the top 10 also includes countries such as the Philippines, Brazil, Nigeria, Tanzania, Turkey, and Egypt. Democratic Republic of Congo and Thailand closed the list of the top 10 largest global mismanaged plastic waste polluters. They reached approximately 2%. These countries are on this list because they do not have sufficient legislation to regulate how waste should be properly treated and, subsequently, how it should be disposed of. In the case of individual continents, we can draw attention to the following data in graph no. 3.
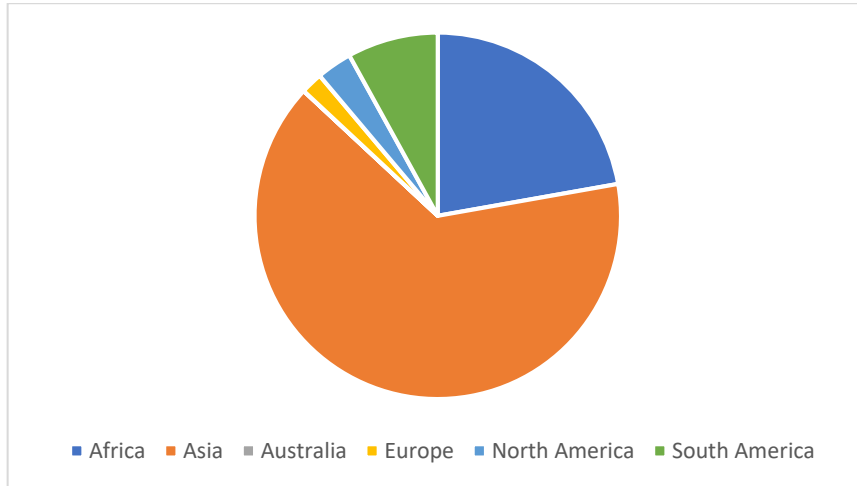
Graph no. 3 Polluters of global mismanaged plastic waste by continent, 2019 (%)
Source: own processed based on data retrieved from Our World in Data, 2019

Graph no. 3 shows the percentage of polluters of global mismanaged plastic waste in 2019. The graph shows that Asia's biggest polluter reached approximately 65%. Africa came in second place and reached 22%. Lower percentages were reached by continents such as South America 8%, North America 3.12%, and Europe 1,91%. The best results were achieved by Australia, which reached only 0.1%. The results confirmed the necessity of introducing effective regulations addressing how to properly handle and dispose of plastic waste. The best results were achieved in continents where government officials or other competent actors work on different strategies, regulations or legislation regulating plastic issues. However, this still does not mean that the problem of plastic waste is solved.

The graph no. 4 shows the increase of global plastic production. The obtained data is measured in million metric tonnes annually in the observed period from 1950 to 2020. As we can identify the data from the graph, the production of plastics has been growing rapidly since 1950; during this period, 2 million plastic wastes were produced. The biggest increase was observed in the 1970s when production reached up to 35 million tonnes. Since 1990, the production of plastics has exceeded a three-digit number, i.e., 120 million tons. In 2000, production reached 213 million tonnes. Since 2010, there has been an increase of 100 million tonnes; in 2020, it reached a value of 367 million tonnes. According to the statistical databases Statista, Our World in Data and One Planet network, the graph shows the annual global production of plastics. Plastic production refers to the annual production of polymer resin and fibres.
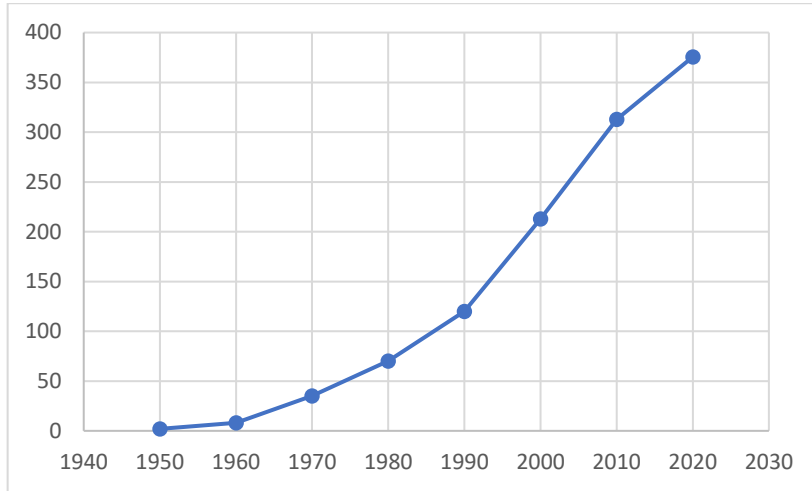
Graph no. 4 Annual global production of plastics in the observed period
Source: own processed based on data retrieved from Statista 2023 and Our World in Data 2019

Data are expressed in million metric tonnes in the observed period 1950 to 2020. More current data for the years 2021 to 2023 are not yet available. The following graph no. 6 shows the rate of decomposition of plastic items of marine litter expressed in years.
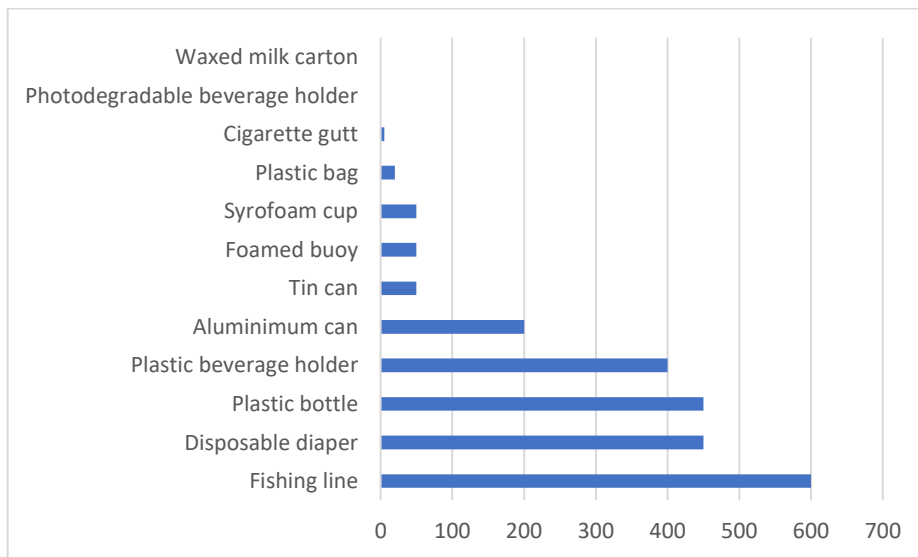
Graph no. 5 The rate of decomposition of plastic items of marine litter expressed in years
Source: own processed based on data retrieved from Our World Data, 2018

The graph no. 5 shows the rate of decomposition of marine litter items expressed in years. The available data is from 2018. From the graph, we can identify the seriousness of the problem of plastic waste. Each of them spans several years. The waxed milk

carton decomposes the fastest, i.e., 0.25 years. Plastic bags for up to 50 years. An even more serious situation occurs when a plastic drink holder, plastic bottle or disposable diaper breaks down. This type of waste has been decomposing for over 200 years. In the case of the fishing line, we are talking about 600 years. Based on statistical data, we can evaluate the severity of the problem. The long-term decomposition of individual plastic waste causes the death of animals because toxic chemical substances can get into their bodies. However, it should be remembered that this problem does not only concern aquatic animals but also humans. Fishing is one of the popular activities that provide various tasty specialities. Toxic substances from fish also enter the human body, which can cause serious health problems.

Table 4. Forecast values

Year	Forecast	Lower bounds	Upper bounds
2022	404,3	395,4	413,2
2023	415,8	406,8	424,8

Given the fact that data for 2022 is not yet available, we have predicted possible developments for 2022 and 2023 using SPSS Statistics. The values reflect the development in the graph below.
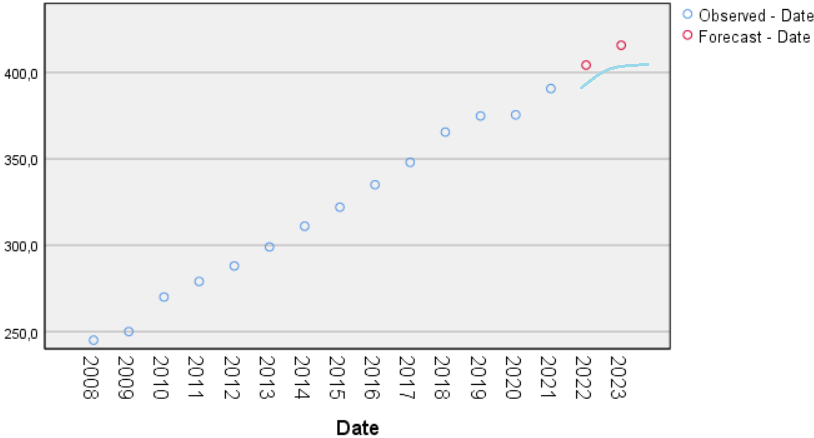
Graph no. 6 Forecast of the expected development of plastics production
Source: own processed based on data retrieved from Statista, 2023

The graph no. 6 shows the forecast of the expected development, where we created a structure from time series data while we used exponential smoothing models and autoregressive integrated average. The table shows the expected development values, where our global effort should be closer to the lower bound of the predictions, considering the company's sustainable goals, contracts and plans.

5 Conclusion

Plastics play an irreplaceable role in modern society. The increased use of plastic aids in recent years led to an increase in plastic waste, which was also contributed to by the more intensive use of packaging when delivering food or other products. In addition to plastic waste, plastics also cause a carbon footprint. The current way of producing, using, and disposing of plastic is fundamentally flawed because this system lacks accountability, leading to ever-increasing plastic pollution of the environment. Most plastics do not break down naturally in any meaningful way, so the plastics we've already made will be with us for thousands of years; millions of metric tons of plastic are produced around the world every year. Half of the plastic waste is currently recycled, incinerated or thrown into landfills, but a large part also ends up in our oceans or nature. In 2021, countries produced approximately 390.7 million tonnes globally. Asian countries reached approximately 55% of the total production of plastics, and North and South America 22% in total. Plastics are one of the seven key areas that the European Commission considers essential for achieving a circular economy. However, it is also challenging for other countries to introduce effective strategies or plans to solve plastic issues.

6 Acknowledgements

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Home Office as a Result of the Covid-19 Pandemic and Its Implications for the Sales Strategies of the German Hospitality Industry

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Abstract. Based on a publication in the *Handelsblatt*, this paper analyses the significance and consequences of the home office obligation in Germany as a strategy to prevent the COVID-19 pandemic. For this purpose, the first relevant publications are analysed for findings and evidence using the method of a systematic literature review. New knowledge will be contrasted and examined for research gaps. In the current discussion, there is interdisciplinary agreement that the hospitality industry will be one of the most negatively affected. Another disruptive trend has been identified. Home office workplaces will continue to exist in the future and will have a lasting impact on our working world. Therefore, restaurants have to reach or replace the lunch business and the business customers by means of new sales strategies. Here, mainly take-away solutions and digital sales by means of software-optimised processes are under discussion. Omni-channel distribution for take-away and pick-up meals is the future. The current research on digital distribution comes mainly from Asia and must be derived for the European market, especially the German market, and its compatibility confirmed.

Keywords: COVID-19 Pandemics, German Hospitality Industry, Home Office.

JEL classification: *G33, O44, Z3*

1 Introduction

The COVID-19 pandemic is considered already the most serious economic threat to tourism since the Great Recession of the 1920s. [1–8] Current research identifies a variety of drivers for disruptive processes within the tourism industry. Predominantly, a trend towards even more sustainable and radically ecological measures is identified. The debate is going so far that there is even discussion of a war over the future of tourism. Leading scientists argue about the question of growth and responsibility for destinations and their ecological and social environment. [9–14] Another issue in the current discussion is the impact on the future challenges in tourism and its subordinate economic sectors, such as gastronomy. [15–19] How do measures to contain the pandemic, including long-term behavioural changes on the part of consumers, affect the hospitality industry and restaurants? The starting point for these considerations is a recent article in the Handelsblatt. There, a survey of the 40 largest DAX companies and 10 large family businesses is conducted to find out how the companies intends to continue to handle the home office. The result: despite the end of the legal home office obligation, most offices remain closed. Among the reasons given were the high infection rates. [20] Following on from the thesis that homeworking will remain a long-term trend even after the pandemic and that it will merely serve as a catalyst, several questions arise for the future of urban restaurant businesses. What impact does the absence of business customers have on the lunch business and what sales strategies can be used to counteract this? How will value creation in restaurants develop in the future in relation to the takeaway and delivery business and which strategic approaches pursued during the pandemic are also relevant for the post-COVID-19 years?

2 Literature review – the current status of science and practice

2.1 Home office as a result of pandemic response

The significance of the home office and its consequences for the catering industry are controversially discussed. In the public media as well as in the first scientific studies, there are expected positive as well as negative externalities that affect the market. The observations and discussions are correspondingly contrary. In their study on the long-term consequences of the COVID-19 pandemic for the German economy commissioned by the IAB, [21] show positive developments for home offices and video conferences. However, they interpret the development for the hospitality industry in general and in the long term up to 2040 critically and identify here the sector most negatively affected. The first reports of the consulting firm pwc, especially for England, but also for Germany, show negative economic developments due to the home office regulations.[22, 21, 23, 24] The pwc study by [22] is one of the first papers to address the topic under investigation. It originates from England and analyses the economic consequences of the home office in the United Kingdom with the use of a survey and secondary statistical data from public offices. The authors conclude that the British GDP would be 15.3 billion pounds lower with the continued use of home office jobs. One scenario with and one without home office is simulated. A distinction is made

between direct effects and indirect effects. In the case of direct effects, the gastronomy and stationary retail trade are affected, among others, which have to accept a loss of turnover due to the absence of business customers. Implied consequences, according to the study, could be a migration of gastronomy and stationary retail to the residential areas of large cities. Based on the data situation and the subject of the study, it applies to large cities and the ecosystems defined here that have formed around the large office complexes.[22] The fact that initial reports and press releases refer to this study and derive direct effects for the German market must therefore be viewed even more critically.[25, 24] It is undisputed that there can be negative effects, especially in the urban areas. However, to derive the same expectations directly from the English study must be considered critical. The fact that there has been a push towards digitalisation is seen as positive. In their Ifo Institute research, [26] describe the pandemic-driven shift from face-to-face work to home office as "...involuntarily one of the most extensive social experiments...".[26] As in the public media, reference is made of survey results evidencing a general majority satisfaction with the home office in this case. [24, 26, 20, 27, 23, 25] The first papers listed in Q1 journals have also been published in this research field. For example,[28] examine how home office use affects the relationship between couples with children. For this purpose, they distinguish between married and unmarried couples and the age of the children. Ultimately, the results of the study are along the same lines as those of [21] who examined the German labour market regarding home office and its consequences. Both studies assume a long-term trend that will define the hybrid working world. In contrast to the studies of pwc, [28] also show the consequences of working at home for relationships, whereas the positive effects outweigh the negative ones.[28, 21, 22] Similar results have already been published by US researchers. In their survey of 50,000 working Americans, they concluded that they would not like to give up their home office. After all, six percent would quit directly if they gave up home office working hours and look for an alternative job with a home office offer. Another 36 per cent of the recipients would continue to work, but at the same time look for a new job with home office possibilities.[29] Thus, the study is cited in the first papers as an initial trend and is also partially confirmed. There are currently no scientific surveys or evaluations of the extent to which German employees would change their employer if the home office were abolished. Only the most important German business newspaper, the Handelsblatt, has conducted a survey on home office among the 40 DAX companies and 10 large family businesses. The findings show that many will cautiously open their offices and that home office will continue to be possible for all of them. The research also assumes that a more than 25 percent of all future workplaces will be in hybrid form. The authors thus quote and confirm the current Ifo study on home office.[20]

Regarding the first papers found, it should be mentioned that the papers, as well as the press reports, refer to the first study on home office effects by the consulting firm pwc from 2020.[30–32, 22, 23, 27, 25] This study by [22] will be followed by a more recent one in 2021 that refers specifically to the German market. Evidence is also given here according to a correlation in terms of results, structure, and interpretation. [23] also find an increasing willingness and demand for more home office and an emerging shift towards a hybrid working environment. An increase in weekly home office time

from two to three days is assumed. In the survey, 78 percent of the recipients state that they want to spend more time in the home office.[22–24]

2.2 Sales strategies in the current discussion

In the current discussion, working from home is seen as a driver for digital communication and new sales channels between restaurants and customers. In addition to distribution channels via multi-channel distribution, the first studies analyse packaging issues from an ecological and economic point of view and the communication of hygiene standards as sales-promoting measures.[33, 34] The study concludes that there is a significant correlation between the number of menus sold with and without a hygiene label. In the take-out business, the study found that communicating sustainable and regular cleaning and disinfection measures increased sales by around 45 units per day, and in the delivery business, sales increased by around 30 per cent.[35] Also from South Korea is the research by [16], which analyses the omnichannel distribution of restaurants for the takeaway and delivery business and proposes a multichannel strategy that is optimised by applying a software solution (API). Both papers show that for the South Korean market, multi-channel distribution and sophisticated digital solutions are the only way forward. In this context, ordering, payment, and communication must be bundled into digital applications and packaged in the most user-friendly way possible. The biggest risks for the companies in both works are the high costs, once of the packaging and once of the ordering via third-party providers, so-called sales partners, who charge fees for their services. There is also an ongoing increase in the take-away business and there is a growing demand for digital delivery, communication, and payment services. One prominent representative to be mentioned here as a third-party provider or platform is *"Delivery-Hero"*. [4–7, 35, 22, 23, 31, 17] Scholars analyses that with the help of API, the costs of sales platforms can be reduced if it is possible to encourage customers to sell directly, i.e. if it is possible to encourage regular customers in particular to order and pay via their own platform (website or app).[16] Another study that confirms the increasing demand for online food ordering and delivery and refers to the Chinese market using game-theoretic approaches (Stackelberg model), they analyse the question of choosing the optimal distribution strategy from the restaurant's point of view.[34] The paper does not directly address the home office issue, but indirectly through the analysis of the approach of online food ordering and the increasing delivery business that has already been elaborated here. Especially the question of whether it makes more sense from the provider's point of view to use the delivery service of the third-party provider or to organise it himself is an elementary part of the corporate strategy. A distinction is made in this case between the *Self-Logistic-Strategy (SS)* and the *Platform-Logistic-Strategy (PS)*. With the SS, the restaurant delivers itself after purchase and payment processing via the platform, and with the PS, this is handled as a service of the platform, but at higher costs. In addition to the costs, it is also about the negative environmental impact that the delivery business demonstrably exerts. Additional negative environmental impacts are exerted by the packaging materials, and these are to be avoided from the point of view of the environment and the customers. [34, 16] The finding of the work is that both platform providers and restaurants influence each other's prices.

Another recent paper examining restaurant survival strategies during and after the COVID-19 pandemic is that of [33] which looks at the US market using analysis of the *Darden Restaurants group* of restaurants and derives strategies accordingly. From this, the authors derive the survival strategies, which can be summarised as follows:

- **&Stabilise the operating business:** This is defined as focusing on the online take-out business and limiting advertising expenditure for the in-house business to avoid overcrowding when reopening.
- **Financial recovery:** Reduction in capital investment and marketing expenditure. Due to the reduced number of competitors and consumers' pent-up demand, a positive outlook can be expected.
- **Revenue generation:** Focus on optimising the take-away business and the social distances in the dining rooms that will remain in the future.
- **Staff and employment structure:** Pay cuts for senior staff and benefits for staff to limit migration and have sufficient staff ready for reopening.
- **Marketing:** Decline of classic TV advertising. New marketing mix with stronger focus on social media.[33]

The deduced strategies of the *Darden restaurants* can be compared with other results and thus serve as a basis for future research. A further work found on this is a study by the consulting firm *McKinsey & Company*. Scholars have identified the following future sales strategies and trends for the European restaurant industry:

- **Changing customer behaviour in terms of food and lifestyle:** negative effects of the home office, especially for urban restaurants in metropolitan areas. However, these can also include opportunities, such as the increased demand for take-away food, especially via online ordering. These show an 80 per cent increase in Europe for lunch in April, May and June 2020.

- **Growing digital orders and delivery business:** This study also identifies a long-term trend like the work above.[33–35, 17]

- **Improving the dining experience:** In-house guest stays will be driven by a greater need for space (social distancing) in the future. Private guest areas and higher service quality are seen as future drivers. The source used for this by [17] is an Open Table evaluation.
- **Optimised food offering:** Vegan and sustainable products are the future. However, this statement needs to be critically examined. Papers considered above has shown that companies put profitability in the supply business before sustainability.[17, 34]
- **Added value for the money paid:** According to the McKinsey study, customers in Germany and Spain will expect a higher level of service and corresponding added value for the money they pay.
- **Increasing interest for meal kits:** Another trend identified by the study and influencing restaurant sales are so-called meal kits. These are self-prepared menus that are prepared in a self-explanatory way and sent in compact boxes including cooking instructions.
- **Dark kitchens:** Also known as "delivery-only kitchens", this concept is characterised by a pure kitchen. It prepares food for takeaway or delivery for

several different restaurant concepts. All of them originate from one kitchen and can be distributed via different websites or brands. This way, the customer can order several different concepts from one kitchen (which does not appear itself) without knowing it. These concepts are less staff-intensive and make efficient use of the kitchen's capacity.[17]

The findings of [17] are consistent in most aspects with the studies from Asia and the USA, as discussed above. The work of [36] can help to verify the findings. In a representative survey conducted between Julie and October 2020, they asked 7,613 US-American recipients about their changed behavioural patterns due to the influence of the COVID-19 pandemic and the expectation that they would continue to do so after the pandemic. Among other things, they are asked about the areas of home office and dining out. The most important finding of the work is the increase in home office or teleworking. In this case, 26 percent of the respondents say that they expect this in future. A full 70 per cent of the recipients for whom teleworking is a new experience report the same or even increased productivity. Therefore, the work confirms the trend towards home office like the previously cited surveys. Restaurants are seen as being among the most affected, which also confirms the previous statements. For example, the respondents state that they will reduce their planned turnover in restaurants (measured by planned visits) by 20 per cent. Unfortunately, it is not clear from the study whether this is compensated for by deliveries or take-away sales. Only the increasing demand for online grocery shopping in general suggests this.[36]

3 Principles and objectives

The clear formulation of a work objective based on the research question is one of the basic requirements for applying an SLR.[37, 38] The author derives the research question from a first representative study by the *Handelsblatt* for the home office application in Germany. Here it is stated that a large proportion of the DAX corporations and largest family businesses surveyed will retain this working model despite the end of the home office obligation.[20] This circumstance raises the question for the author:

(RQ)   How is the increased use of home office workplaces as a measure of the COVID-19 pandemic changing the daily business of German restaurants and their sales strategies for the lunch business?

The following sub questions can be identified based on the current discussion:

(RQ 1.1) How is the willingness of employees to continue to work from home after the crisis? Is it desired and should it be defined as a long-term development?

(RQ 1.2) How are the German restaurants reacting to this development and which specific sales strategies are being used?

(RQ 1.3)   How successful are these strategies at the present time?

These serve to answer the research question in a structured and step-by-step manner. In addition, corresponding research gaps should be revealed and inspire future work. In the following, the research question and the sub questions will be delimited to apply a methodologically permissible SLR.

The objective of the paper is to provide a structured overview of scientific results already published in leading journals and recognised German studies on the German restaurant and hotel market. The effects for the German market are specifically sought and critically discussed with the aim of uncovering further research gaps and deriving recommendations for action for science and practice. The overriding research question is: *how the sales strategies for the German restaurant industry will adapt or change because of the increasing use of home offices as a measure to control the COVID-19 pandemic?* In the chosen approach of the SLR, it is of elementary importance to define the research objectives concretely and to align them according to the methodology of the research. The following objectives are pursued and considered in the research:

1. Critical presentation of the public discussion and significance of the topic.
2. Structured analysis of the scientific literature on the subject and its presentation.
3. Identify gaps in research based on the literature analysis.
4. Derive initial recommendations for science and practice from the literature identified.

The four research objectives listed here address the chosen methodology of SLR.[39]

4   Methodology – systematic literature review

This paper follows the approach of SLR, as does previously cited work on research within the hospitality industry.[15, 40–42] Although this process is predefined and defined as an ongoing process. Keywords are adapted and the results are expanded using backward and forward search and targeted searches are carried out for findings.[37] In the first step, the search engine *google.de* is searched for the terms: *„Homeoffice und Restaurants“*, *„Homeoffice und COVID-19 Pandemie”* and *“Homeoffice Pflicht”*. Also via the science site *google.scholar.de* for the English-language terms: *„home office and hospitality“*, *„home office and restaurant“* and *„home office and sales strategy for restaurants”*. The first procedure serves as an approximation of the terminology and a general overview of the topic before searching the scientific database web of science with targeted and defined keywords.[43] In total, the first narrative search on the free web produced 15 articles. The first stage of the search produced the following keywords for the following downstream search in web of science*: „home office and hospitality“, „home office and restaurant“, „home office and sales strategy for restaurants”* and, *“remote work and hospitality (restaurant; sales strategy for restaurants)”*. The work of pwc is found using backward search from the citations of the press reports.[43, 38, 37] Similarly, for identified papers, the Forward Search is also used to search for further papers by the authors or institutions that could be relevant to the topic. In the case of the pwc publication on the English market from 2020 (which was found with the backward search), this leads to the hit on the latest work by pwc, on the German market.[22, 23, 27, 24] The following table shows the results of the second stage of the SLR review process.

Table 5. Web of Sience results list by keywords.

No.	Keywords	Results	Relevance for further review	Relevant papers minus previously found papers	Search date
1	home office and hospitality	11	1	1	21.04.2022
2	home office and restaurant	22	2	2	21.04.2022
3	home office and sales strategy for restaurants	0	0	0	21.04.2022
4	remote work and hospitality	3	2	2	21.04.2022
5	remote work and restaurant	3	3	2	21.04.2022
6	remote work and sales strategy for restaurants	0	0	0	21.04.2022
7	sales strategy for restaurants	31	5	5	21.04.2022
8	home office or remote work	12.464	2	2	21.04.2022
9	home office or remote work (hospitality)	22	3	0	21.04.2022
10	home office or remote work (restaurant)	3	1	0	21.04.2022
	Total	**12.559**	**19**	**14**	

With the limitation to the publication periods from 2020 to 2022, 31 hits were generated. Five of these remain for further analysis. In sub-section number seven, the search term is accordingly limited to "home office or remote work" and generalised. This generated 12,464 hits. However, this must be further categorised as too large as a sample.[37] Therefore, the search is refined by the keyword's "hospitality" and "restaurant" in the extended filter (numbers nine and ten).[43, 38] The results found, however, are already recorded in the previous searches and thus do not add to the sum of results. A total of 14 papers enters the third stage of the search. Then these are analysed for their qualitative significance in answering the research question.[37] According to Figure one, the 14 abstracts of the papers found now have to be analysed and their relevance for the further evidence-based analysis of the content examined.
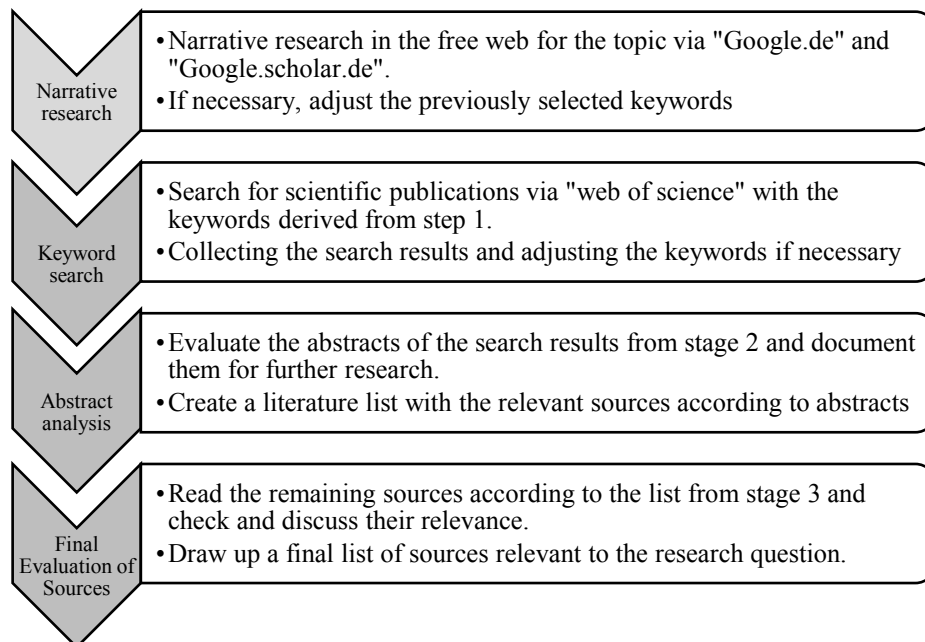
Fig. 7. Research design SLR.

5 Results

5.1 Home office as a long-term post-pandemic trend and influencing factor for the hospitality industry

The literature found in the current discussion is consensual in the sense that home office as a working model of the future is a durable consequence of the COVID-19 pandemic. [26, 21, 23, 36, 20, 29] It can also be assumed that the hybrid working world will emerge from the pandemic as an all-encompassing trend.[36, 21, 44] Initial work and surveys from the USA also show that employees are aggressively demanding a hybrid working world. For example, only 58 per cent are willing to return to work completely and forego telework without resistance. Slightly more than six percent want to quit directly if hybrid work is not possible after the pandemic and almost 36 percent would look for a new job with a corresponding work model in the medium term.[29] The extent to which these results, which are representative of the USA, can also be applied to the German labour market must be viewed critically. However, the first current studies found here show similar tendencies. In particular, the study by pwc highlights that the new hybrid working world and at least two to three days of home office per working week can also be expected in Germany.[23] The studies are consistent across all areas of investigation, whether in the USA, the UK or Germany - the hospitality industry, along with the stationary retail trade and transport companies, is the most negatively affected. Thus, the first sub-question of the research question posed is:

(RQ 1.1) How is the willingness of employees to continue to work from home after the crisis? Is it desired and should it be defined as a long-term development?
to be answered clearly in the affirmative. Both practice and the first scientific papers and statistical figures from the federal offices and labour market research show that the home office will remain in the long term. This applies to the European market as well as the American and English markets. Sub-questions RQ 1.2 and RQ 1.3 are answered below. These refer specifically to the sales strategies of the restaurants. Finally, the research question is addressed.

5.2   Sales strategy after the home office compulsory

How will the sales strategies of restaurants change after the end of the home office obligation in Germany (19.03.2022) [45] and what long-term measures and strategies remain for the sector? Accordingly, the following research question can only be answered to a limited degree. *(RQ 1.2): How are the German restaurants reacting to this development and which specific sales strategies are being used?* The literature found has a wide range of results around the digitalisation of distribution and the use of take-away business models up to the delivery business. The first Q1 publications analyse the topic on the market in South Korea. In summary, the following strategies can be derived from the initial work:

- Increasing use of API software to enable smart and cost-reducing multi-channel distribution of meals via online platforms.[16]

- Use of online platforms for distribution and their delivery services, as well as broad supply management across as many suppliers as possible to reach a large proportion of potential customers.[34]

- Visible and transparent communication of sustainable hygiene measures in restaurant operations on the food packaging. As well as the use of ecological packaging materials and reusable packaging.[34, 35]

In general, it can be observed that, due to the hybrid work models, the take-away and delivery business will be an integral part of future sales strategies, especially in urban areas.[34–36, 33, 16] The extent to which these are promising for German companies and how they are elaborated in detail can only be derived from the works cited here. Only the *McKinsey* study has worked out initial approaches, but these must first be examined for their representativeness. In addition to the measures found above, the following trends can be derived from the study:

- Increasing importance of so-called ghost kitchen concepts: These can function as independent businesses or expand existing restaurants and thus show an additional sales channel and utilise the existing kitchen infrastructure.[17]

- More space and privacy for the guests on location: Due to social distancing, customers will continue to place more value on space and privacy in on-site restaurants in the future.[17, 36, 33]

- Eating habits and consumer behaviour will increasingly focus on sustainable, organic, and vegan products. The range of products on offer must expand in quality and variety to this end.[33, 17]

- The use of social media advertising will gain in importance.[33, 17]

Regarding the last sub-question *RQ 1.3 (How successful are these strategies at the present time?)*, the present study is not able to elicit any results. No studies have been published on this yet. Thus, another research gap for future work can be pointed out here. Finally, the research question asked *(How is the increased use of home office workplaces as a measure of the COVID-19 pandemic changing the daily business of German restaurants and their sales strategies for the lunch business?)* can be answered in the steps taken above. Only the success of the sales strategies identified and their general validity for the German market cannot be answered based on current research. This identifies a further research gap, which is the central task of an SLR.[37]

6   Discussion, conclusion, and recommendations

This paper aims to review the current scientific discussion and public perception on the topic of home office after the COVID-19 pandemic and the implied consequences for the German restaurant industry and its sales strategies. For this purpose, the SLR is used to search for initial findings in a methodical, structured, and evidence-based manner.[37, 46, 43, 38] Due to the novelty of the topic and the relevance of the COVID-19 pandemic, which at the time of writing is in its fifth epidemic wave and is overshadowed by the emerging Ukrainian conflict, the current public press will also be included in the analysis. It is becoming evident that home office workplaces will remain in the long term even after the pandemic and that the new hybrid working world will prevail on the German and international labour markets.[26, 21, 36, 23, 29] One consequence of the pandemic and the increase in home working is the growing demand for takeaway food, both for self-pick-up and delivery. The first detailed work on these issues deals with the South Korean and Chinese markets. The extent to which these results also apply to Germany now needs to be investigated further. Initial studies by consulting firms confirm the results from Asia for the German and European markets. The success of such sales models and software solutions cannot yet be determined for the German market. There are only the cited studies from Asia and the USA. However, there are some similarities.[16, 34, 23, 17]

Further research is needed to elaborate on the findings and to gain corresponding insights for the German and European market. With the help of the research question three future fields of research can be identified:

1. Are the identified sales strategies from the Asian and American studies redundant for the German market and what are the differences?

2. What positive and negative effects will the hybrid working world have for urban gastronomy in Germany?

3. Which success factors can be identified for the German restaurant industry in the strategies presented?

In addition, the differentiated opinions on opportunities and threats of the home office working world and its implied consequences for the hospitality industry become clear. Besides the currently observed negative effects, experts see increasing positive externalities of the development, especially on the future digital distribution and the pick-up and delivery business.[45, 31, 20, 32, 23] In order to critically classify the method used, it should be noted that, as with all literature research, no completeness can be guaranteed. Particularly in the case of new research topics and questions, new knowledge can be published within a very short time and may supplement or even refute the knowledge gained.[43, 37] The number of relevant papers found is also very low compared to leading reviews of the research field, at five papers. This may be due, among other things, to the novelty and topicality of the topic. The chosen structured approach of the SLR method can enable subsequent work to build on this.[39, 46]

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Digitization and Enterprise Efficiency in Selected EU Countries

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Abstract. Digitization of enterprises becomes very popular recently. Companies should invest in digital transformation of their business processes to reach better efficiency level in order to stay competitive. My study analyses digital transformation on an enterprise level done for Denmark, Netherlands, Finland, Poland, Slovak Republic and Hungary, as well as the impact of digitization on enterprise efficiency in these countries. The results show a large digital gap between selected EU member states. Regarding results obtained, Denmark, Finland and Netherlands have a high level of digitization of both public and private sector. On the other hand, Slovakia, Hungary and Poland have significantly lower level of digitization. We can assume that reasons for such a digital gap observed are the low level of accessibility of digital infrastructure, lack of investments in the integration of digital technology, lack of training of personnel for developing the necessary human capital and the absence of the required business culture in Hungary, Slovakia and Poland. To accelerate the digital transformation of the private sector, Hungary, Slovakia, and Poland will need to make significant investments to improve access to digital infrastructure and enhance people's ICT skills. Results from the panel data fixed effects regression analysis showed that digital transformation of the private sector, especially regarding skilled human capital and successful integration of digital technology, supported by a high level of digital public services, is the way to improve labor and capital productivity in the country.

Keywords: Digitization, Enterprise Efficiency, Digital Divide.

JEL classification: *D22, O57, O33*

1 Introduction

The transformation from a traditional economy to a digital economy comes to the forefront when the country's conventional growth factors, such as natural resources, low labour costs, and foreign investments reach their limits. Considering the new realities of the modern world, many countries develop policies and action plans for stimulating investments in innovation and new technologies (Boris et al., 2018; Pianta et al., 2020; Sara, 2001; Hadad, 2017). On the other hand, to stay competitive in a global world where digitisation is a common trend, companies must invest in the digital transformation of their business processes to reach a better efficiency level, as digitisation provides a lot of opportunities to improve the production and business processes (Lv & Xiong, 2022). There are several aspects in which digitisation enables potential in production, such as optimisation of the business processes, including data-driven optimisation of the planning and production phases (Mortal & Schill, 2018).

The recent COVID-19 pandemic highlighted the urgency of following the path of digital transformation of economic activities and business processes to stay competitive (Gavrila & Ancillo, 2021).

The EU has developed policies, action plans and analytical documents to encourage a faster digital transformation in the member states of the economic union (EC, 2020; EIB, 2020; EC, 2021). However, the research reveals a significant digital divide between the European Union member states (Cruz-Jesus et al., 2011, 2012; Hayriye & Fatma, 2020). The goal of the current study is to make a comparative analysis of the current state of enterprise digitisation to explore the factors leading to a better and slower digital transformation in the selected countries of the European Union (Denmark, Netherlands, Finland, Slovakia, Poland and Hungary).

The modernisation of the Slovak, Polish and Hungarian economies, successful implementation of ICT and digital transformation of the private sector are essential sources for economic growth and development as their comparative advantages, such as low labour costs, are reaching their limits. To explore the missed opportunities of the countries with relatively lower digitisation of the private sector, we must examine the influence of enterprise digital transformation on the efficiency of business processes, business performance and the industry in general. The current research aims to reveal the impact of digitisation on the efficiency of enterprises in European Union (EU) member states. In the framework of the current study, the concept of digitisation is as follows: the automation of business processes by converting the information from a physical format into a digital format.

2 Literature review

In the framework of the current study, we consider the following definition of digitisation: "the social transformation triggered by the massive adoption of digital technologies to generate, process, share and transact information" (Katz et al., 2013). In the modern world, Information and Communication Technology (ICT) influences all areas of economic activity, including businesses, government and society. Despite the

low affordability of ICT during the first years of their implementation, the rapid diffusion of technology decreased their prices and enabled accessibility for the broader community.

Various studies argue that the digital transformation of the private sector largely contributes to the economic development and productivity growth in the country (Kuzmina et al., 2021; Li et al., 2022; Liu et al., 2022). The impact of digitisation on the companies' business processes goes through the following channels: human capital (Blizkiy et al., 2021; Bonci et al., 2022; Konovalova et al., 2021) and labour productivity (Aly, 2022), finance (Liu et al., 2022), technological innovation (Liu et al., 2022), business risks reduction (Liu et al., 2022).

Aly (2022) examined the relationship between digital transformation, economic development and productivity growth in developing countries, coming to a conclusion about a strong "positive relationship between the digital transformation index and economic development, labour productivity and job employment."

The literature review shows a lack of research on digital transformation on an enterprise level done for Poland, Slovak Republic and Hungary, as well as in the field of comparative analysis between the countries with high and low levels of digitisation. The current study aims to close this gap.

3   Methodology

The study will apply the following quantitative research methods: statistical, graphical and econometric analysis and secondary data collection and analysis. Methods of deduction and logical assumptions will complement the quantitative analysis. The secondary information will be collected from the following sources: the Eurostat database, the World Development Indicators database, the database of the European Commission on Digital Economy and relevant national statistical databases and survey results. The analysis will be done for the following countries: Denmark, Netherlands, Finland, Slovakia, Poland and Hungary.

The main research questions are as follows:

1   What is the current state of digitisation in the selected countries (Denmark, Netherlands, Finland, Slovakia, Poland and Hungary)?

2   How the digitisation influences the efficiency of enterprises in the selected countries?

3   What should be the policy of the countries with unfavourable digitisation conditions?

As the research hypothesis, we assume that digital transformation has a significant positive influence on the business processes efficiency; however, some EU member states' private sectors lack investments in the digitisation of enterprises, leading to less favourable competitiveness of their national companies in a globalised world.

The efficiency of the business processes will be measured through the capital and labour productivity indicators, which show the production material intensity. A lower material intensity indicates that one unit of production factor (capital and labour) provides more output; hence the company's business processes are more efficient.

The digitisation is measured using data from several indices and reliable survey results. The first indicator is the Digital Economy and Society Index (DESI) with its four components – human capital, connectivity, integration of digital technology and digital public services. Also, the following data from Eurostat is used: the number of enterprises that provided training to their personnel to develop/upgrade their ICT skills, the number of ICT specialists, and digital intensity. Also, the following data from the EIB Investment Survey will be analysed: access to digital infrastructure and implementation of digital technologies.

4   Results

4.1. Digitisation and productivity in the selected EU member states

Digital Economy and Society Index (DESI)

We are considering the DESI index through its four dimensions: human capital, connectivity, integration of digital technology and digital public services. Figure 1 presents the index and its components for Denmark, Netherlands, Finland, Slovakia, Poland and Hungary in 2021 and 2022.
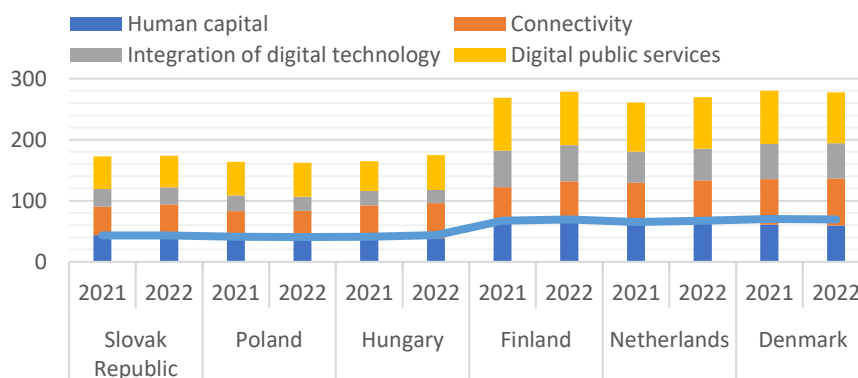
Figure 1. Digital Economy and Society Index (DESI) and its components, 2021-2022, *Source: European Commission Database*

It is evident from Figure 1 that there is a considerable digital gap between different EU member states. Slovakia, Poland and Hungary lack behind Finland, Netherlands and Denmark regarding all the DESI components. The highest gap is tracked in the case of digital public services, integration of digital technology and human capital. Concerning the digitalisation and effectiveness of the private sector, we should highlight the importance of the high level of digitisation of public services, as it would considerably decrease the transaction costs and time losses for the enterprises in the

countries. On the other hand, the low level of integration of digital technology indicates the low level of digital transformation in business processes. However, a successful digital transformation also requires a cultural change in the companies. The latter can happen only if the companies have the human capital with the necessary skills. However, the low level of the human capital component of the DESI index indicates the challenging nature of digital transformation in the Slovak Republic, Poland and Hungary.

EIB Investment Survey

Investments are the primary source for business development and the modernisation of business processes. In general, access to digital infrastructure can be a significant obstacle to investments. Figure 2 presents whether the enterprises of the selected EU member states consider access to digital infrastructure an obstacle.
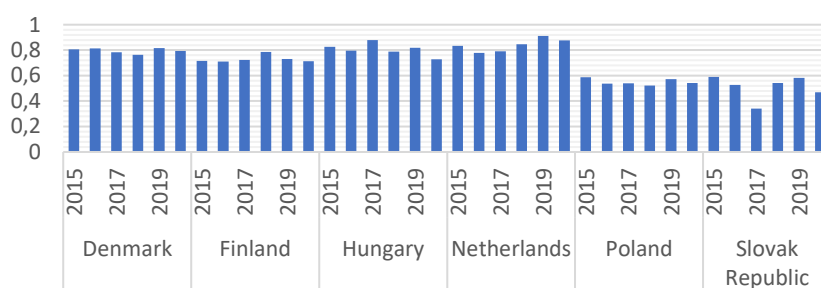
Figure 2. Access to digital infrastructure (no obstacle), 2015-2020
Source: EIBIS 2016, EIBIS 2017, EIBIS 2018, EIBIS 2019, EIBIS 2020, EIBIS 2021

Figure 2 shows a large gap between Poland and Slovakia and the other selected countries. In the case of Poland and Slovakia, a relatively low share of enterprises considers that there is no obstacle to accessing the digital infrastructure in their countries. Without the accessibility of digital infrastructure, the digital transformation of companies becomes very difficult.

Another important indicator is the share of companies implementing single or multiple digital technologies (Figure 3). Here we can see that the Slovak Republic experienced considerable development in 2020, reaching the level of Finland, the Netherlands and Denmark. While at the same time, Poland and Hungary considerably lack behind.
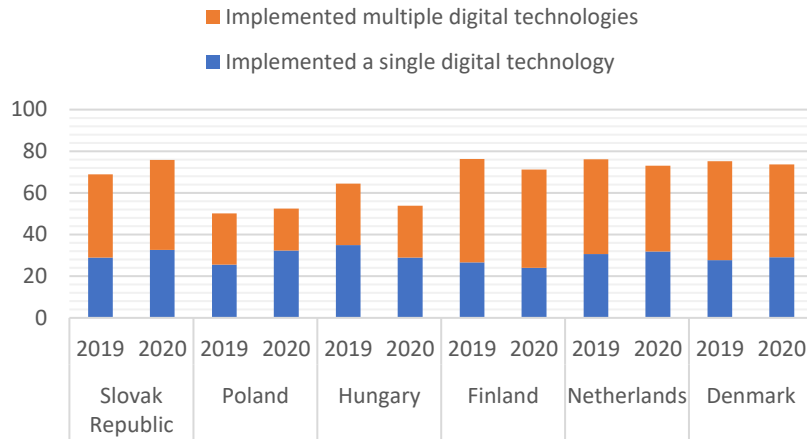
Figure 3. Implementation of digital technologies, 2019-2020
Source: EIBIS 2020, EIBIS 2021

Enterprise digitisation indicators

In 2021 the EU started calculating the digital intensity index for EU member states. The digital intensity shows how digitalised European enterprises are. Figure 4 presents the digital intensity index for the selected EU countries. The digital gap between the enterprises operating in Slovakia, Poland and Hungary and those operating in Finland, Netherlands and Denmark is considerably large. 56% of Slovak enterprises, 58% of Polish enterprises and 64% of Hungarian enterprises have a very low digital intensity index. At the same time, only 18%, 24% and 20% of enterprises operating in Finland, Netherlands, and Denmark, respectively, have a very low Digital intensity index.
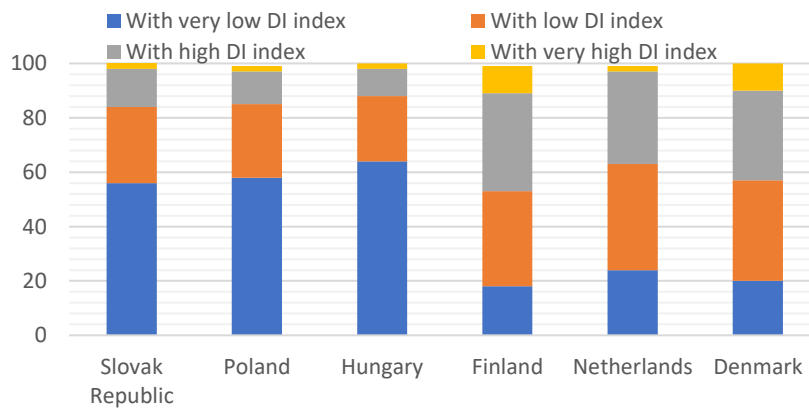
Figure 4. Digital intensity, 2021, *Source: Eurostat*

There are also considerable differences in the share of ICT specialists in total employment in the selected countries (Figure 5). Here we can see that the COVID-19 pandemic has accelerated the digital transformation in some countries leading to an

increase in the share of employed ICT specialists and enterprises that employ ICT specialists. In Poland, the percentage of enterprises that employ ICT specialists reached 25% in 2020; in Hungary, 29%; and in Finland, 28%. However, in this regard, Slovakia lacks behind all the selected countries, with only 17% of enterprises employing ICT specialists as of 2020.
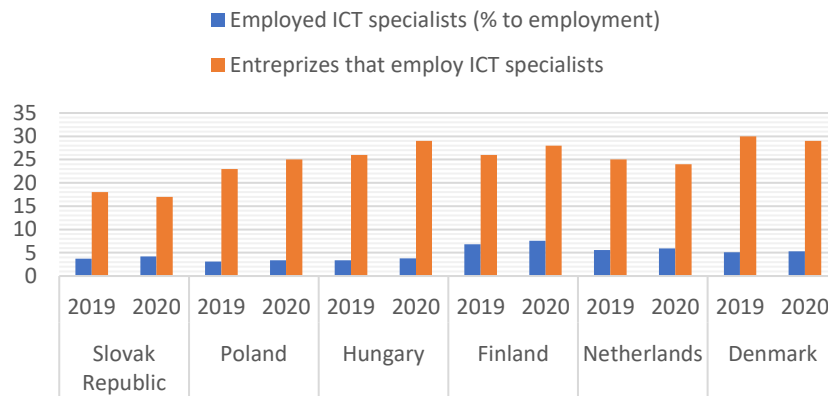
Figure 5. Employed ICT specialists (% to employment), enterprises that employ ICT specialists (share of all enterprises, without financial sector), 2019-2020
Source: Eurostat

The last indicator considered within the framework of the current research is the training enterprises provide for employees to develop their ICT skills. In the case of this indicator, again, we can see that a relatively low number of enterprises operating in Hungary, Poland and Slovakia provide ICT training for their personnel. We can link this back to the low level of the human capital component of the DESI index.
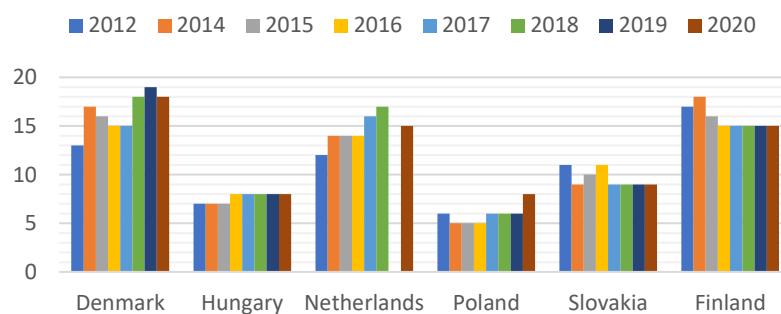
Figure 6. Enterprises that provided training to develop/upgrade the ICT skills of their personnel, 2012-2020
Source: Eurostat

After analysing the indicators of digital transformation of enterprises in the Slovak Republic, Poland, Hungary, Denmark, Finland and Netherlands, we should highlight the large digital gap between these countries. The reasons for the existing digital gap

are the low level of accessibility of digital infrastructure, lack of investments in the integration of digital technology, lack of training of personnel for developing the necessary human capital and the absence of the required business culture in Hungary, Slovakia and Poland.

Production efficiency

In the framework of the current study, production efficiency is estimated by the indicators of labour productivity and capital productivity which show the level of material intensity of production. These indicators are calculated based on the data on GDP, capital input and labour input. Capital productivity shows how much output is produced with a unit of capital stock, while labour productivity shows how much output is produced with a unit of labour input.

4.2. The influence of digitisation on the productivity of enterprises

To estimate the influence of digitisation on enterprise efficiency, we have conducted a panel data regression analysis. The dependent variable is the production efficiency measured by capital and labour productivity. The independent variables will be the components of DESI and the share of ICT specialists in total employment. All the variables are taken as the percentage change against the previous period. The time series have a normal distribution, are stationary and don't have seasonality. The study is done for the period from 2015 to 2019 for the following countries: Denmark, Netherlands, Finland, Slovakia, Poland and Hungary. The estimations of the panel data regression models were done using the econometric package EViews 10. Equations (1) and (2) present the models for estimating the significance of the influence of digitisation on productivity.

$$LP_{it} = C + \alpha HC_{it} + \beta Con_{it} + \gamma Int_{it} + \delta DPS_{it} + \tau Emp_{it} + u_i + \varepsilon_{it} \, , \qquad (1)$$

$$CP_{it} = C + \alpha HC_{it} + \beta Con_{it} + \gamma Int_{it} + \delta DPS_{it} + \tau Emp_{it} + u_i + \varepsilon_{it} \, . \qquad (2)$$

Where i = 1, …, N represent the selected EU member states; t = 1, …, T represent the corresponding periods from 2015 to 2020; HC_{it} represents a vector of time-varying explanatory variables for the human capital component of DESI across the selected EU member-states; Con_{it} represents a vector of time-varying explanatory variables for the connectivity component of DESI across the selected EU member states; Int_{it} represents a vector of time-varying explanatory variables for the integration of the digital technology component of DESI across the selected EU member states; DPS_{it} represents a vector of time-varying explanatory variables for the digital public services component of DESI across the selected EU member states; Emp_{it} represents a vector of time-varying explanatory variables for the share of employed ICT specialists in total employment across the selected EU member-states; LP_{it} and CP_{it} are the dependent variables; ε_{it} is the error term. The panels are balanced with a total number of observations equal to 36.

We have considered three possible panel data models: pooled OLS, Fixed effects and Random effects. For both models, the fixed effects method was chosen as it was the best fitting model for estimating the coefficients in equation (1) and equation (2) according to the Lagrange multiplier (LM) test for comparing pooled-OLS and Random

Effects estimation methods, and Hausman test for comparing the appropriateness of random effects and fixed effects methods. Table 1 presents the estimation results for equation (1) and equation (2) with a fixed effects model.

Table 1. Estimation results for unemployment

Regressor	Labor Productivity (Equation 1)			Capital Productivity (Equation 1)		
	Coeff.	t-Statistic	Prob.	Coeff.	t-Statistic	Prob.
HC	**13.53**	1.945	**0.0631**	-1.08	-0.14	0.8895
Con	3.02	0.799	0.4314	0.94	0.226	0.8229
Int	**8.42**	2.633	**0.0143**	**14.6**	4.144	**0.0003**
DPS	**6.74**	1.921	**0.0661**	**9.36**	2.424	**0.0229**
Emp	-0.41	-0.226	0.823	-2.04	-1.024	0.3156
C	0.2	0.334	0.7413	-0.57	-0.857	0.3993
R-square	0.57678			0.66792		
R^2 adj.	0.40749			0.53509		
F-statistic	3.40709			5.0284		
Prob(F-statistic)	0.00622			0.0005		
Durbin-Watson stat	2.22129			2.341		

Source: Author's calculations based on the Eurostat database and DESI country reports.

The adjusted R-square is 0.407 for the model (1), indicating that the regressors can explain 40.7% of the changes in the dependent variable. At the same time, according to the same indicator, the regressors can explain 53.5% of changes in capital productivity. The probability of the F-statistic is lower than 0.05. Hence, we can assume that model (1) and model (2) fit the data better than a model without HC, Con, Int, DPS and Emp as independent variables. The Durbin-Watson statistic shows no autocorrelation of residual values in the case of both models.

Equations (3) and (4) show the estimated fixed effects model for labor productivity and capital productivity for the selected EU member states.

$$LP_{it} = 0.2 + 13.53HC_{it} + 3.02Con_{it} + 8.42Int_{it} + 6.74DPS_{it} - 0.41Emp_{it}, \quad (1)$$

$$CP_{it} = -0.57 - 1.08HC_{it} + 0.94Con_{it} + 14.6Int_{it} + 9.36DPS_{it} - 2.04Emp_{it}. \quad (2)$$

The estimated coefficients of human capital, integration of digital technology and digital public services components of DESI have a p-value lower than 0.1; hence we can reject the null hypothesis of the coefficients being equal to zero and consider these indicators significant for labour productivity at a 10% significance level. On the other hand, estimated coefficients of integration of digital technology and digital public services components of DESI have a p-value lower than 0.05; hence we can reject the null hypothesis of the coefficients being equal to zero and consider these indicators as significant for capital productivity at a 5% significance level.

For labour productivity, we have the following results:

- A 1% change in the human capital score of DESI leads to an increase in labour productivity by 13.53%.
- A 1% change in the integration of the digital technology score of DESI leads to an increase in labour productivity by 8.42%.
- A 1% change in the digital public services score of DESI leads to an increase in labour productivity by 6.74%.

For capital productivity, we have the following results:

- A 1% change in the integration of the digital technology score of DESI leads to an increase in labour productivity by 14.6%.
- A 1% change in the digital public services score of DESI leads to an increase in labour productivity by 9.36%.

5   Conclusion

The study showed a large digital gap between the selected EU member states. While Denmark, Finland and Netherlands have a high level of digitisation of public and private sectors, the Slovak Republic, Poland and Hungary significantly lag behind. According to the analysis presented above, we can assume that the main reasons for such a digital gap are the low level of accessibility of digital infrastructure, lack of investments in the integration of digital technology, lack of training of personnel for developing the necessary human capital and the absence of the required business culture in Hungary, Slovakia and Poland. These countries will need an excellent digital transformation strategy to transform the business culture in the private sector with the support of the digitisation of public services to reduce transaction costs and time for enterprises. To accelerate the digital transformation of the private sector, Hungary, Slovakia, and Poland will need to make significant investments to improve access to digital infrastructure and enhance people's ICT skills.

The panel data fixed effects regression analysis showed that digital transformation of the private sector, especially regarding skilled human capital and successful integration of digital technology, supported by a high level of digital public services, is the way to improve labour and capital productivity in the country.

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How the Fiscal Council Rules Influence the Fiscal Stability

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Abstract. Fiscal councils were established in many European Union countries to promote fiscal discipline and stability. However, fiscal instability persists in the EU. This study analyses the role of fiscal councils in achieving fiscal stability in the EU from 2011-2021 using panel data and the LSDV model. The results indicate a strong causal relationship between fiscal councils and improved fiscal performance. Fiscal councils with legal independence, adequate staffing, budget protections, and fiscal rule monitoring authority demonstrated the greatest impact. However, the effectiveness of fiscal councils may be limited by their recent establishment. While fiscal councils enhance fiscal stability prospects, external crises like COVID-19 can still undermine fiscal policy. The study contributes to understanding fiscal councils' evolving role in the EU. It uses a broad sample of EU members over an extended period. Further research could examine councils' performance across different country-specific contexts. Overall, well-designed fiscal councils are beneficial but not sufficient for enduring fiscal stability. Complementary institutions and policy adjustments may be needed, especially during crises.

Keywords: Fiscal Councils, Economic Stability, Fiscal Policy, Fiscal Stability, Public Debt.

JEL classification: *B22, E6, H61*

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1   Introduction

Fiscal councils have emerged as a key component of the budgetary framework in the European Union (EU) over the past decade. Established in many EU member states, fiscal councils are independent public institutions that provide oversight and analysis of fiscal policy. Their primary aim is to strengthen budget discipline and promote sustainable public finances. This reflects growing recognition of the need for independent fiscal oversight.

Short-term political pressures often lead policymakers to pursue suboptimal fiscal policies that worsen economic fluctuations and undermine stability. Deficit spending and rising debts may boost growth in the short run but prove destabilizing over time. The global financial crisis and European sovereign debt crisis underscored these risks. Lax fiscal policies left many EU governments ill-prepared to respond effectively. In response, the EU enacted stricter fiscal rules like deficit and debt limits under the Stability and Growth Pact. However, most evidence indicates the rules were insufficient to constrain policymakers. Creative accounting and over-optimistic forecasting were used to circumvent the rules. This highlighted the need for independent fiscal oversight. Fiscal councils thus emerged as a complementary tool to strengthen budget discipline and transparency. The first wave of EU fiscal councils was established in the mid-2000s. However, most proliferated after 2010 as the crisis underscored gaps in fiscal governance. These independent bodies were given mandates to critically evaluate fiscal plans and hold governments accountable. This study examines the evolving role and efficacy of fiscal councils in promoting fiscal stability in the EU from 2011-2021. Fiscal stability is defined as maintaining prudent public debt levels and budgetary positions that ensure fiscal sustainability over the economic cycle. The analysis utilizes panel data on institutional features of fiscal councils and budgetary outcomes. It employs the LSDV model to estimate the causal relationship between council characteristics and improved fiscal performance.

The results provide strong evidence that well-designed fiscal councils have a positive impact on fiscal discipline. Key features like legal independence, adequate resources, multi-year budget protections and fiscal rule monitoring authority are associated with improved budgetary outcomes. Fiscal council assessments, economic forecasts and policy recommendations appear to enhance fiscal accountability. However, the findings also indicate limitations in effectiveness, as many fiscal councils were only recently established. Their track records remain relatively short, particularly in managing major crises like COVID-19. This highlights that while beneficial, fiscal councils alone may be insufficient to ensure enduring fiscal stability. Complementary institutions and policy adjustments appear necessary, especially during times of severe economic stress. This study contributes an extensive empirical analysis of fiscal councils utilizing panel data on council features and budgetary performance across 28 EU members over a critical ten-year period. It points to the evolving and increasingly important role of fiscal councils in the EU's fiscal framework. Further research could provide more nuanced analysis of how council design and performance relate to country-specific contexts. Overall, well-structured fiscal councils can support fiscal discipline but likely need to be buttressed by broader fiscal reforms for lasting stability.

2 Literature review

Fiscal councils typically have a variety of functions, including fiscal policy oversight, compliance monitoring of fiscal rules and targets, evaluation of government budgets and forecast assumptions, provision of macroeconomic and fiscal policy analysis, assessment of economic and budgetary impacts of policy proposals, research on tax issues, and issuance of public reports and recommendations [3]. Previous studies show that the specific mandates and powers of fiscal councils can vary substantially across countries depending on national circumstances, legal frameworks and political factors. However, some common characteristics of effective fiscal councils include independence from political pressure, clear legal mandates, adequate resources, transparency, and technical expertise in fiscal analysis [5].

Fiscal councils are seen as valuable institutions for strengthening fiscal governance and budgetary outcomes, though they face challenges in maintaining independence and ensuring policymakers heed their analysis and advice [4]. Additionally, well-structured fiscal councils can positively impact budgetary performance through promoting transparency, accountability and prudent fiscal policies [6]. The existing literature suggests that fiscal councils can enhance fiscal performance via several channels [14]. First, provision of independent expert analysis helps ensure policies are grounded in objective economic analysis rather than political expediency, supporting better-informed decisions and effective implementation [13]. Second, monitoring of fiscal rules and public reporting assists in reducing risks of imbalances or excessive debts that undermine performance [1]. Third, enhancing transparency around fiscal policy helps build trust and accountability while preventing unanticipated fiscal shocks [7]. Fourth, encouraging independent fiscal oversight bodies improves the quality and credibility of fiscal policy by reducing risks of short-termism, bias and inadequate analysis [4]. Fifth, public assessments and recommendations can strengthen fiscal discipline by incentivizing government compliance with fiscal rules and sound budgetary practices, while also increasing public scrutiny [4].

A crucial consideration in evaluating fiscal councils is their capacity to make objective assessments of fiscal policy unaffected by political pressures or biases [13]. Accordingly, fiscal rules and outcomes should be examined in terms of serving the public interest and achieving sustainable fiscal goals. Such analysis can help councils portray fiscal policymakers' performance in a nonpartisan manner [10]. Thus, voters can then judge policymakers' efficacy, re-electing or removing them accordingly [2]. Furthermore, fiscal councils provide useful oversight and can leverage legislative or public pressure against choices seen as fiscally imprudent [11]. In this context, previous studies show that a council's efficacy depends on serving as a reliable, unbiased source of information on fiscal policy issues and an effective check on policymakers acting in self-interest [9]. This requires demonstrating non-partisanship in analysis and establishing itself as a tool for oversight, evaluation and monitoring, not just control of policymakers. Thus, efficacy relies heavily on independence and lack of bias [8]. As for independence and efficacy of fiscal councils, previous studies argue that there is variation among councils [5]. Some are fully autonomous institutions while others are part of the legislative or executive branches [12]. Early examples of legislative budget offices as fiscal councils were seen in South Korea and the United States, while

executive councils emerged in Belgium and the Netherlands. More recently established councils, like in the Czech Republic and Slovakia, tend to be independent entities with broad fiscal oversight powers [2]. These independent fiscal councils have made valuable contributions around objective understanding of fiscal issues, forecasting, and identifying biases in policymaking or expenditure projections [9]. They have played constructive roles in fiscal policy development, correction of missteps by officials, and provision of unbiased policy assessments focused on the overall economy [15]. Additionally, the COVID-19 pandemic led to relaxed enforcement of fiscal rules given the need for emergency support, highlighting fiscal councils' importance in proposing rule changes or introductions to maintain flexibility while achieving fiscal goals and sustainability [1]. Therefore, councils' efficacy stems from abilities to assess potential expenditure under spending plans and alignment with revenues [8]. This was evidenced by involvement of councils in analysing crisis fiscal implications, cost estimation, and vetting emergency measures [7].

3   Methodology

This study examines the effectiveness of fiscal councils in promoting fiscal stability in the European Union (EU) from 2011-2021 using panel data analysis. The sample covers EU countries with advanced or emerging economies that had established fiscal councils during this period. Fiscal stability is measured based on key budgetary outcomes including debt levels, budget balances, and structural deficits. The analysis utilizes panel data on institutional features of fiscal councils as well as budgetary data. The characteristics of fiscal councils are obtained from the International Monetary Fund's Fiscal Council dataset. This provides information on factors such as legal independence, budget protections, staff resources, and fiscal rule monitoring authority. Annual debt and deficit data are drawn from IMF and Eurostat statistics.

The study employs a fixed effects panel model to estimate the impact of fiscal council characteristics on fiscal performance. The model specification is:

$$\triangle PB_{i,t} = PB_{i,t-1} + \beta_1 \triangle D + \beta_2 \triangle OG + \beta_3 \triangle FRI + \beta_4 \triangle FC + \beta_5 \triangle LI + \beta_6 SOB + \beta_7 SN + \beta_8 FRM + \beta_9 T + \varepsilon_{i,t} \quad (1)$$

Where:

PB: Primary balance
D: Public debt
OG: Output gap
FRI: The index of fiscal rules
FC: Index of Fiscal Institutions,
LI: Legal independent
SOB: Safeguards On budget
SN: Staff number (high Level)
FRM: Fiscal rule monitoring
T: Time (if country over average 1 otherwise 0)
$\varepsilon_{i,t}$: random error

The model includes country fixed effects (a_i) to control for unobserved heterogeneity

across countries. Standard errors are clustered at the country level to account for serial correlation. Key fiscal council variables include legal independence, budget protections, staff resources, fiscal rule monitoring, forecasting practices, and research/analysis functions. Control variables such as economic growth, interest rates, and inflation are included to isolate the effect of councils on fiscal outcomes. These fixed effects approach helps establish the causal relationship between fiscal council characteristics and fiscal performance by analysing changes within countries over time. The extensive sample period from 2011-2021, encompassing 28 EU countries, provides sufficient data for robust statistical analysis. By estimating which features of fiscal councils have the greatest impact on budgetary outcomes, the results can highlight the institutional design elements that enhance councils' effectiveness in promoting fiscal discipline. This will help guide reforms aimed at strengthening the role of fiscal councils in the EU fiscal framework.

3.1 Variables Description

This analysis examines the impact of fiscal council characteristics on the primary fiscal balance as the key measure of fiscal performance and dependent variable. Primary balance, excluding interest payments, indicates the underlying strength of a country's fiscal position. The main independent variables of interest are institutional design features of fiscal councils that may influence their effectiveness. These include binary indicators for legal independence from political influence, budgetary autonomy from executive interference, staff resources, fiscal rule monitoring mandates, economic forecasting roles, policy costing functions, and fiscal policy analysis/research capabilities. Additional control variables are incorporated to account for general economic conditions that can affect fiscal outcomes. These include real GDP growth to control for cyclical fluctuations, central bank interest rates to reflect borrowing costs, inflation as an indicator of macroeconomic stability, and debt levels to account for prior debt overhang. The institutional characteristics aim to assess which specific facets of council design bear the most influence on budget balances, while the controls net out effects of the broader economic environment.

The variables are selected based on data availability from the IMF Fiscal Council dataset regarding council institutional features, as well as theoretical relevance based on the literature examining drivers of fiscal performance. The use of binary indicators for the institutional characteristics allows for clear identification of which council capabilities are most impactful. By isolating the effects of fiscal council attributes on primary balances, the analysis can delineate which design elements and functions strengthen council effectiveness in promoting fiscal discipline.

4 Results and Discussion

The empirical analysis yields several key findings regarding the impacts of fiscal council design and capabilities on budgetary outcomes in the European Union during 2011-2021. First, the results provide evidence that fiscal councils with legal guarantees of independence from political influence and interference are associated with stronger primary balances and lower debt levels. The coefficients on the legal independence variable are positively signed and statistically significant. This suggests councils are

more effective at promoting fiscal discipline when their autonomy is formally insured through legislative statutes or contractual provisions.

Second, fiscal councils with explicit mandates to monitor compliance with numerical fiscal rules also exhibit a positive relationship with stronger fiscal performance. This highlights the importance of enforcement capabilities in adding teeth to councils' oversight. Councils that can track observance of budget balance or debt limit requirements and call out violations appear able to exert greater pressure on governments for fiscal rectitude.

Third, councils that undertake analysis of economic forecasts and provide independent projections tend to have a positive impact on budgetary outcomes. By scrutinizing the plausibility of official forecasts and providing unbiased alternative scenarios, councils can counteract tendencies toward over-optimism and anchor expectations. Likewise, councils that formally estimate the budgetary costs and impact of major policy proposals help compel greater fiscal realism and prudence in planning.

Fourth, adequate staff resources and protected funding allocations are associated with fiscal councils that have exhibited effectiveness. Guaranteed budgets through specified appropriations or independent revenue sources appear to bolster councils' capacity. Likewise, sufficient personnel resources allow councils to fully execute their analytical, oversight and reporting duties. Under-resourcing seems to undermine efficacy.

While the results indicate fiscal councils generally exert a positive influence on budgetary performance, those equipped with greater independence, analytical capabilities, and financial support demonstrate the clearest impacts. However, effects vary based on specific country contexts and the breadth of individual councils' mandates. Gaps in the data for newer councils also provide challenges for assessment. Additional years of evidence may be required to fully discern their contributions. But overall, well-designed councils emerge as beneficial for fiscal discipline and sustainability. As the EU continues reforming its fiscal framework, the findings suggest merit in strengthening councils' autonomy through legal safeguards, refining their mandates by providing enforcement tools like fiscal rule monitoring, expanding their analytical capacities, and ensuring adequate, protected funding. While not a panacea, well-equipped fiscal councils can provide valuable independent oversight and analysis to support sound, sustainable long-term fiscal policy.

5 Conclusion

This study analysed the role and efficacy of fiscal councils in promoting fiscal discipline in the European Union over the period 2011-2021. Using panel data on council design features and budgetary outcomes across 28 EU countries, it found that fiscal councils with certain characteristics have a statistically significant positive impact on fiscal performance.

The results indicate that councils with legal guarantees of independence, adequate staffing resources, protected budgets, and explicit mandates to monitor compliance with fiscal rules demonstrated the clearest effects in strengthening primary balances and containing public debts. Councils that engage in independent economic forecasting, policy costing analysis, and fiscal research also contributed to improved budgetary outcomes. These findings highlight that while all fiscal councils can support

sound fiscal policy, those equipped with sufficient autonomy, analytical capabilities, financial resources and enforcement authority are generally the most effective. This suggests that as the EU continues reforming its fiscal framework, investing in councils' independence, analytical roles, budget protections and monitoring capacities could substantially strengthen their oversight contributions. However, the results also indicate limitations in the effectiveness of fiscal councils established thus far, as their track records remain relatively short amidst major crises like COVID-19. While beneficial, fiscal councils alone appear insufficient to ensure fiscal stability without complementary institutions and policies. Further research could provide more nuanced analysis of how council design relates to country-specific contexts.

Overall, well-structured fiscal councils emerge as valuable tools for fostering fiscal discipline, though not panaceas. Their efficacy seems contingent on sufficient independence, resources, analytical expertise and enforcement authority. As the EU continues developing its fiscal governance architecture, these findings can help guide reforms aimed at enhancing the role and impact of fiscal councils in promoting sustainable fiscal policy.

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6   Appendix

Table 1. Correlation Matrix

Variables	Primary Balance (t-1)	Debt (t-1)	Output Gap (t-1)	Fiscal Rules Index (FRI)	Fiscal Council	Legal independent	Safeg. On budget	Staff number (High level)	Fiscal rule monitoring
Primary Balance (t-1)	1								
Debt(t-1)	0.82*	1							
Output Gap (t-1)	0.45*	0.86*	1						
Fiscal Rules Index (FRI)	0.71*	0.49*	0.51*	1					
Fiscal Council	0.34*	0.31*	0.54*	0.31*	1				
Legal independent	0.52*	0.53*	0.42*	0.64*	0.14*	1			
Safeguards. On budget	0.63*	0.48*	0.23*	0.46*	0.37*	0.65*	1		
Staff number (High level)	0.49*	0.37*	0.17*	0.34*	0.29*	0.23*	0.28*	1	
Fiscal rule monitoring	0.23*	0.42*	0.39*	0.20*	0.33*	0.21*	0.48*	0,18*	1

Source: Own calculations, based on the STATA output.
*Significant at 90%; ** significant at 95%; *** significant at 99%.

Table 2: Fiscal Councils and Fiscal Performance
Bias LSDV Dynamic Panel Model

Primary Balance (t-1)	0.628**	0.219**	0.276**	0.631**	0.549**
	(1.21)	(1.87)	(1.65)	(1.34)	(1.41)
Debt (t-1)	0.009**	0.004***	0.010**	0.008**	0.003**
	(2.21)	(3.72)	(1.98)	(2.12)	(1.92)
Output Gap (t-1)	-0.003**	0.017***	0.012**	0.003***	-0.098***
	(1.92)	(2.91)	(1.32)	(1.74)	(3.17)
Fiscal Rules Index (FRI)	0.572**	0.431**	0.491**	0.249**	0.232*
	(1.47)	(1:23)	(1.69)	(2.26)	(2.27)
Fiscal Council	0.218*				
	(1.20)				
Legal independent		0.549**			
		(1.95)			
Safeg. On budget			0.470*		
			(0.43)		
Staff number (High level)				0.174**	
				(1.93)	
Fiscal rule monitoring					1.524***
					(3.29)
Time dummies	Yes	Yes	Yes	Yes	Yes
Observations	280	280	280	280	280
Countries	28	28	28	28	28
R2	0.43	0.49	0.31	0.56	0.37

Source: Own calculations, based on the STATA output.
Absolute bootstrapped t-statistics in parentheses.
*Significant at 90%; ** significant at 95%; *** significant at 99%.

Table 3. List of Fiscal Councils in the Dataset

Country name	Region	Name of the Fiscal Council	Acronym	Start of activity (Year)	Year of Major Changes to Mandate/Institutional Setup	Coverage
Austria	EUR	Fiscal Advisory Council	FISK	1970	2002, 2013	General Government
Belgium	EUR	High Council of Finance - Public Sector Borrowing Section	HRF/CSF	1989	2006, 2018	General Government
Bulgaria	EUR	Fiscal Council	FC	2015		General Government

Croatia	EUR	Fiscal Policy Commission	FPC	2013	2019	General Government
Cyprus	EUR	Fiscal Council		2014	2014	General Government
Czech Republic	EUR	The Czech Fiscal Council	UNRR	2017		General Government
Denmark	EUR	Danish Economic Council		1962		General Government
Estonia	EUR	Fiscal Council		2014		General Government
Finland	EUR	National Audit Office of Finland	NAO	2013		General Government
France	EUR	High Council of Public Finance	HPCF	2013		General Government
Germany	EUR	Independent Advisory Board to the German Stability Council	IAB	2013		General government
Greece	EUR	Parliamentary Budget Office	HPBO	2010	2013	General Government
Hungary	EUR	Fiscal Council	FC	2009	2010	General Government
Iceland	EUR	Fiscal Council	FSC	2016		General Government
Ireland	EUR	Irish Fiscal Advisory Council	IFAC	2011	2012	General Government
Italy	EUR	Parliamentary Budget Office		2014		General Government
Latvia	EUR	Fiscal Discipline Council	FDC	2014		General Government
Lithuania	EUR	National Audit Office	NAOL	2015		General Government
Luxembourg	EUR	National Council of Public Finance	CNFP	2014		General Government
Netherlands	EUR	Netherlands Bureau for Economic Policy Analysis	CPB	1945		General Government
Netherlands	EUR	Raad van State		2014		General Government
Portugal	EUR	Portuguese Public Finance Council	CFP	2012	2011	General government + PPPs

Romania	EUR	Fiscal Council		2010		General Government
Serbia	EUR	Fiscal Council		2011	2011	General Government
Slovak Republic	EUR	Council for Budget Responsibility	CBR	2012		General Government
Slovenia	EUR	Fiscal Council		2015	2019	General Government
Spain	EUR	Independent Authority of Fiscal Responsibility	AIReF	2014		General Government
Sweden	EUR	Swedish Fiscal Policy Council	FPC	2007		General Government

Source: IMF Fiscal council dataset 2021. Note : PPP is public private partnerships

Data-driven Marketing and E-tailing in Retail Management

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Abstract. One area that has changed significantly in recent years is marketing. New information technologies are starting to be applied more and more effectively in marketing. They enable companies to obtain a lot of data about their customers, they can obtain relevant data in real time. This digital marketing has also found its application in the retail industry. Mobile phones with Internet access, the Covid-19 pandemic and other factors have accelerated the transition of consumers to the digital space to a greater extent. In this issue, we relied on the knowledge of domestic and international authors. We conducted a digital marketing analysis on the retailer Native Studio, which offers services in the cosmetics industry. We based our results on the data provided by the Native Studio salon on the digital platforms it uses, such as Mitto, Mail Komplet, Google AdWords and Google Analytics. We analyzed the given findings and subsequently interpreted them for email marketing, sms marketing, search and banner advertising carried out in the Google search engine, as well as available data from its website nativestudio.sk. For businesses and brands that want to keep up with the competition these days, their presence in the digital space is essential.

Keywords: Retail Marketing, Retail, Digital Marketing.

JEL classification: *M 3, L 81*

1   Introduction

Emerging markets largely influence the development and changes in retail. It is also influenced by constantly changing trends in the market, among consumers, emerging forms of marketing and various other factors. Thanks to retail marketing, the company addresses consumers, persuades them to buy products or services and transforms them into its customers. Nowadays, marketing communication is absolutely necessary for the success of companies, it concerns all companies and even if it is not exact, it affects the position of companies on the market and their economic results.

1.1 Retail Marketing

Satisfying the needs, wishes and desires of customers is one of the main goals of retail. It includes the sale of products and services to consumers who use them for personal consumption. It is the sale of small quantities of products or services to consumers. Using the Internet, it is possible to sell retail goods electronically. This electronic sales is called E-tailing. Retailer sells products in small quantities and we do not classify purchases from businesses that consume goods for business, commercial or even industrial use as retail operations. With the help of the supply network, the interaction between the retailer and the end consumer is carried out. (Vankatesh, 2017).

The combination of individual elements of the 5E model, namely Education, Excitement, Engagement, Experience and Entrepreneurial, innovative and customer-centric mindset is the basis for innovative retail marketing management. For the correct interpretation of this model, it is necessary to understand the meaning of the individual 5Es, namely:

1. Education – continuous education of retailers and employees brings the desired benefit to customers in the form of better knowledge of the selected segment, expertise, current trends and approach to customers. Therefore, educational activities should not be neglected in any retail, if the company wants to progress.
2. Excitement – the customer expects added value from the retail offer. It should interest him and its attractiveness should convince him to buy products or services and thus receive an adequate consideration.
3. Engagement – building long-term relationships with customers strengthens brand perception among consumers and thus the company's position in the market. Customer segmentation and targeted communication to selected segments is strategically effective. This is served by the increasingly common loyalty card programs offered by retailers, which reward the best and most loyal customers with points or discounts.
4. Experience – integrated brand experiences enhance the customer experience. Through appropriately chosen communication channels that target customers with varying intensity, they provide a positive experience for customers.
5. Entrepreneurial, innovative and customer-centric mindset – innovative sellers are constantly trying to improve their entrepreneurial mindset and share it with existing and potential customers. This customer-oriented focus creates subsequent satisfaction and increasing loyalty among customers (Grewal, 2018).

The appropriate combination of a marketing agency and internal marketing employees significantly contributes to the market success of a company. One of the most significant factors for success in the market is utilizing the strategic potential of the brand, which not only maintains market share but also helps the company gain additional share. Over the past half-century, consumers have transformed into customers due to a wide range of factors. Technological advancements, which led to

the decline of traditional marketing communication, and changes in people's lifestyles are among the factors that have caused this transformation. New forms of marketing communication related to the digitization of society have come to the forefront. These include marketing conducted on social networks, mobile marketing, guerrilla marketing, and various other forms of marketing primarily facilitated through the internet. As a result, target groups are increasingly segmented into more specific fragments. (Berman, Evans, Chatterjee, 2018). The retail marketing mix was created by supplementing the classic 4P marketing mix with presentation, personnel and staffing.

6P of the retail marketing mix:
1. Product – it is necessary to perceive the product in a wider context. It is not just the core of the product that makes up the given product or service. Consumer expectations are also fulfilled by other factors that influence the consumer in different intensity. Among these factors we include the product range, the quality of the products offered or the services provided, warranty and post-warranty service, design processing, the quality and attractiveness of the packaging,
2. Place – the location of the offer of products and services associated with their sale are closely linked not only with sales, but also with distribution channels, such as transportation and supply.
3. Pricing strategy and tactics – includes obligations arising from consumer protection laws, purchase in installments, various discounts and promotions, time and conditions of payment. It is a monetary expression of the value of the goods sold or the service offered.
4. Personnel and staffing – the creation and implementation of the company's marketing strategy requires qualified personnel. Emphasis is placed on personal characteristics, practical experience, pro-customer approach, intelligence, ability to make decisions and act in crisis situations and take personal responsibility for the subsequent outcome. Company culture and the financial and non-financial motivation of employees is important for the proper functioning and progress of the company. Therefore, competent management plays an important role.
5. Promotion – of products and services mainly consists in marketing communication of the company or brand. Potential customers and existing customers will thus learn news and information about products, their properties, current trends and, for example, ongoing promotions. Classic and digital advertising, sales support, direct sales and various other forms of marketing are used for promotion.
6. Presentation – can influence the purchasing behavior of consumers. Packaging, suitable placement on the sales area, communication and others are suitable ways ways to present the product or service in the market and thus influence customer opinions (Bárta, Pátik, 2009).

1.2 Digital marketing communication, its influence and current trends

The marketing department in a business entity should be managed by a manager who participates in the creation of a marketing plan, provides market research, monitors consumer demand and, accordingly, manages individual marketing tools and their use. In retailing, the company has a smaller number of employees than in larger companies, therefore it is often more advantageous for the retailer to outsource marketing services to marketing agencies, which will ensure marketing activities more efficiently due to their qualified employees in marketing (Čihovská, Matušovičová, Hvizdová, 2012). Sales and purchase activities on the Internet are conducted through E-commerce. E-marketing refers to activities related to sales, while e-purchasing refers to activities related to purchasing. E-marketing takes place in a virtual environment and serves as a sales tool for businesses to showcase their products or services, allowing customers to obtain desired information about the products and place orders online (Zamazalová, 2008). Global and domestic experts perceive significant reserves of corporate and integrated corporate communication (Foret, 2018). Marketing 4.0 is an approach that combines online and offline interactions between businesses and customers. It helps build brand awareness and strengthens customer engagement based on the principles of machine-to-machine with human-to-human touch. It has redefined key marketing concepts and assists companies in transitioning to the digital economy. The goal of Marketing 4.0 is to gain customer support by integrating digital and traditional marketing. Digital marketing is not meant to replace traditional marketing but rather complement it (Kotler, Kartajaya, Setiawan, 2016). Significant attention is being paid to marketing in the digital era. E-marketing includes the online marketing mix, the role of the online consumer, and the platforms and tools used for online marketing activities. Utilizing social media platforms such as Facebook or Instagram, video channels like YouTube, live chat on websites, customer reviews presented in a suitable manner to promote the business, text messages, and WhatsApp as SMS marketing, email marketing, and paid advertising through the Google AdWords platform in the Google search engine are among the trends in online marketing (Ahuja, 2015). Marketing communication is predominantly controlled by online marketing channels. Its benefits include affordability, efficiency, measurable results, and quick implementation. Online marketing communication encompasses various types of digital promotion, including advertising on Google, email marketing, SEO techniques, advertising on social networks, and more. Google AdWords advertising, in particular, promotes businesses, their products, and services in the Google search engine and places them in prominent positions through paid placements. It has four forms: search advertising on Google, display or banner advertising on partner websites, video advertising on the social network YouTube, and shopping campaigns on Google Shopping. Search and shopping campaigns focus on performance, i.e., effective sales, while banner and video campaigns primarily serve branding and building awareness. This form of online promotion, also known as PPC (Pay-Per-Click), targets internet users based on historical data, allowing for targeting specific locations, demographics, age groups, interests, and other parameters (Performics, 2021). SMS marketing is a suitable way to reach mobile phone owners and provide them with information about news and ongoing business activities. It allows for non-intrusive communication with consumers and

achieves nearly full message open rates within a short time. When properly planned, SMS marketing can be an effective marketing tool for promotional messages. Limitations include the character limit in SMS messages and the advertiser's budget since this form of marketing allows reaching every mobile phone owner through telecommunications operators' databases. Businesses also use their own databases of phone contacts to target their customers with SMS marketing (Khalid, Siddiquie, 2014). Emailing allows a business to effectively distribute information in the online space. It is among the most cost-effective marketing tools. There are many platforms available for conducting email marketing. Mailerlite and Mailchimp are among the most well-known and widely used platforms worldwide. Email campaigns can be easily created in these platforms, scheduled for a specific date, time, and recipient group. They can be prepared, improved, and subsequently sent to email contacts automatically. These platforms enable businesses to create professional email designs. The email subject line should grab the recipient's attention to ensure its subsequent opening, and the email content should include images, text, and clickable buttons. The content should be concise, engaging, and provide valuable information. It is recommended to send these campaigns from a verified and professionally designed business email to ensure credibility and avoid automatic spam filtering by the recipient's email inbox (Gunelius, 2018). Data-driven marketing is based on data analysis, which can help a business increase sales through effectively optimized promotion using available data. With this type of marketing, marketers can identify sales trends, predict customer loyalty, segment customers based on their buying behavior for better targeting, and create smarter marketing campaigns. The business works with all the data available to it, aiming to achieve greater customer satisfaction, sell more effectively to its most important customers, and reach out to new customers. Data is acquired through interactions with customers and third parties. Companies can use statistics from quality data to improve and customize the customer experience. The main benefits of data-driven marketing include more effective customer targeting, improving the performance and efficiency of the business, its promotion, and sales (Semmelroth, 2013). E-tailing is an abbreviation for Electronic Retailing. It takes place online using various platforms, and retailers strive to have the best websites that attract customers and convert them into buyers. Products are purchased online without physical inspection. Logistics and distribution play a significant role in e-tailing to ensure customers receive their purchases in the shortest possible time. This fosters customer satisfaction with the online purchases from a particular retailer and increases the likelihood that satisfied customers will continue shopping with them in the future. The difference between e-tailing and ecommerce is that e-tailing focuses on retail goods and services, while ecommerce encompasses a broader range of activities, including the online sale of retail products, as well as online transactions, digital marketing, mCommerce, and more (Pantano, 2016).

2   Results

This part of the article is dedicated to Native Studio, a company operating in the field of cosmetic services in Prešov. It focuses on Native Studio's digital marketing activities in the areas of email marketing, SMS marketing, search advertising, and banner advertising on Google and its website. These online marketing efforts are carried out using platforms such as Mitto, Mail Komplet, Google AdWords, and Google Analytics.

2.1   Email marketing

Email marketing and the distribution of visually appealing design newsletters are among the marketing activities of Native Studio. These captivating emails are created and sent using the Mail Komplet platform. They chose this platform over the world's most widely used email marketing platforms, such as MailerLite and Mailchimp, because its user interface is in the Czech language. This activity informs customers about the offered treatments, ongoing promotions, news, and overall updates in the salon. The design of the email is in line with Native Studio's branding, with a predominant pink color scheme. The email consists of a logo, a header containing buttons with URL links to various selected subpages of the Native Studio website, such as classical cosmetics and aesthetic cosmetics. It also includes captivating images related to the content of the email campaign, engaging information about a selected service or treatment and of course the option to click through the email to the website nativestudio.sk or directly reserve an appointment in Native Studio's reservation system on the Reservio platform. This newsletter is sent to 3,766 clients in the salon's email database. Each of these clients has consented to receiving these newsletters from the salon but also has the option to unsubscribe from receiving the newsletter in each email. This unsubscribe option is a regulatory requirement and must be included in every email sent as a newsletter to contacts in the database. The email from which the newsletter campaigns are sent is verified and authenticated, so the sent emails do not automatically end up in clients' spam folders. The newsletter campaigns of Native Studio are prepared in advance with a set time and date for sending. The salon sends one campaign to contacts in its database at the beginning of each week. This activity brings fewer results in terms of bookings in Reservio compared to other digital activities of Native Studio. However, it serves as a reminder to clients and directs them to the website, including its blog section, where they can find additional information about the treatments. Table 1. provides data on the last four newsletter campaigns of Native Studio along with the achieved results.

Table 6. Native Studio's email marketing via the Mail Komplet platform.

Campaign	Openrate	Click through	Unsubsribed	Bounce
New BB-Glow skin treatment	36.29%	4.27%	0.66%	0.16%
Action HYDRA treatment	28.13%	2.94%	1.70%	6.77%

| Action eyebrow microblading | 24.48% | 2.74% | 0.16% | 0.80% |
| Action oxygen skin treatment | 25.08% | 2.57% | 0.32% | 1.11% |

Source: own processing from the Native Studio profile on the Mail Komplet email platform

The best results were achieved by the latest newsletter campaign "New BB-Glow skin treatment," indicating that the word "new" grabs the attention of clients more than the word "action". According to the available data, the sent email of this campaign was opened by 1,364 recipients. The newsletter failed to be sent to 6 contacts, and 25 contacts unsubscribed from receiving the newsletter. In the opened emails, there were a total of 58 URL clicks, with 46 directing to the website nativestudio.sk and 12 leading to treatment reservations on the Reservio platform. However, it should be noted that the 12 clicks on reservations do not necessarily mean that the treatment was actually booked 12 times. It could have been a mistaken click or the client decided not to proceed with the reservation during the booking phase. Based on the ratio of email campaign open rates and click-through rates, we conclude that this marketing activity is suitable for reminding customers and building brand awareness, as evidenced by the email open rates. However, in terms of clicks on the website or treatment reservations on Reservio, we find that the ratio of open rates to click-through rates in the newsletter campaign is not as effective in guiding the customer further through the URL provided in the email.

2.2 SMS marketing

SMS marketing is also part of Native Studio's promotional retail marketing mix. It is conducted using the Mitto platform. The database of phone numbers primarily consists of women. The salon obtained these phone contacts from various sources, including the reservation form for booking treatments on the Reservio platform, personal contact with clients, phone calls made by clients to the salon, social media profiles, and email communications. This marketing activity can be performed for all acquired phone numbers in the database since clients were individually informed and provided consent for its use. Through this channel, the salon can remind its clients at any time. It primarily informs them about ongoing promotions but also about any beneficial news. In terms of the ratio of orders to the invested funds in SMS marketing, this form of marketing communication is effective for the salon as clients respond positively to promotional SMS messages, resulting in additional treatment reservations on the Reservio platform. The limited character count in an SMS message is constraining, but it still contains a link that allows the client to easily navigate to the promoted treatment. The link does not directly lead to booking a treatment on Reservio since its URL contains a large number of characters. Instead, it directs the client to the specific treatment page on the salon's website, where they can obtain additional information about the treatment. Through a button placed within the text, the client is redirected to the Reservio platform, where they can book the treatment for a specific date and time. Native Studio sends these promotional SMS messages on Thursdays or Fridays to fill as many vacant slots as possible in the reservation calendar for the following week. To expand the limited number of clients in the phone number database, Native Studio could consider

partnering with mobile operators that offer SMS marketing and can target women in Prešov, with whom the salon does not have direct contact. Table 2. provides data on the delivery rates and costs for the phone numbers of various mobile operators for the last three SMS campaigns conducted by Native Studio on the Mitto platform.

Table 2. Native Studio's SMS marketing via the Mitto platform.

Operator name	Delivery count	Delivery rate	Volume	Cost (€)
Orange (SVK)	1,242	90.52%	1,372	37.04
O2 (SVK)	1,207	94.15%	1,282	38.46
T-Mobile (SVK)	595	94.44%	630	15.75
SWAN (SVK)	217	91.18%	238	7.14

Source: own processing from Native Studio profile on the SMS platform Mitto

During the three SMS campaigns, a total of 3,522 SMS messages were sent, with a combined cost of €98.39 and an average delivery rate of 92.59%. Out of these, 3,261 SMS messages were successfully delivered, resulting in an average cost of €0.03 per SMS message. Among the mobile operators, T-Mobile (SVK) had the highest delivery rate of 94.44%, with an average cost of €0.026 per SMS message. The highest number of successfully delivered messages was on phone numbers associated with the mobile operator Orange (SVK), with a total of 1,242 messages delivered.

2.3 Google AdWords

Salon Salon Native Studio also utilized the Google AdWords platform for its digital promotion, which allowed them to display ads in prominent positions in Google search results for a fee. This marketing campaign ran from 1/14/2023 to 2/24/2023, specifically advertising through search and banner ads. However, a pre-prepared video format for the social media platform YouTube was not promoted. With a set budget of €9 per day, the campaign achieved the following results, as shown in Table 3. for search ads with a budget of €6 per day, and in Table 4. for banner ads with a budget of €3 per day.

Table 3. Native Studio's PPC search campaigns via the Google AdWords platform.

Campaign	Views	CTR	Clicks	Cost (€)	Average cost per click (€)
Eyebrow microblading	2,914	17.60%	513	95.37	0.19
Mesotherapy	1,192	16.28%	194	35.42	0.18
Chemical peeling	1,031	15.81%	163	33.26	0.20
BB Glow	629	20.51%	129	25.19	0.20
Removing marks	743	14.40%	107	14.67	0.14
Face massage	766	8.75%	67	15.17	0.23
Deep cleaning of the skin	396	12.44%	48	11.31	0.24
Lash lifting of eyelashes	373	12.60%	47	9.58	0.20

Permanent Makeup for lips	175	24.57%	43	7.96	0.19
Diamond microdermabrasion	72	26.39%	19	2.79	0.15
Competition	1234	6.81%	84	27.95	0.33

Source: own processing from Native Studio profile on the Google AdWords platform

During the observed period, the search ads achieved a total of 9,515 views and 1,414 clicks on the specific URL of the website nativestudio.sk, with an average click-through rate (CTR) of 14.86%. The total cost of these ads was €278.67, with an average cost per click of €0.20 across all campaigns. The campaign that received the most views (2,914) and clicks (513) was the "Eyebrow microblading " campaign, with the highest cost among the campaigns €95.37, but with an average cost per click of €0.19, which is lower than the overall average of €0.20 per click. The campaign with the highest click-through rate 26.39% was the " Diamond microdermabrasion" campaign, and the campaign with the lowest average cost per click €0.14 was the " Removing marks" campaign. From this, we can conclude that potential clients were most interested in eyebrow microblading and mesotherapy treatments, but the campaigns for diamond microdermabrasion and permanent makeup for lips had the highest click-through rates relative to the number of ad impressions.

Table 4. Native Studio's PPC banner campaigns via the Google AdWords platform.

Campaign	Views	CTR	Clicks	Cost (€)	Average cost per click (€)
Mesotherapy	46,361	0.96%	445	45.39	0.10
Eyebrow microblading	47,229	0.96%	453	45.03	0.10
Removing marks	19,339	0.85%	164	8.10	0.05

Source: own processing from Native Studio profile on the Google AdWords platform

Overall, content ads, also known as banners, achieved a total of 112,929 views during the observed period, with 1,062 clicks on the specific URL of the website nativestudio.sk, resulting in an average click-through rate (CTR) of 0.94%. The total cost of these ads was €98.52, with an average cost per click of €0.09 across all campaigns. The campaign that received the highest number of impressions, 47,229, and the most clicks was the "Eyebrow microblading " campaign, which cost €45.03, with an average cost per click of €0.10. The campaign for "Removing marks" had the lowest average cost per click at €0.05. From these results, we can conclude that potential clients were most interested in the banner ad for eyebrow microblading and mesotherapy.

During the observed period, Native Studio reached users of the internet 122,446 times through search and banner ads, at a cost of €377.19. Using specific URLs in the ads, there were 2,476 clicks to specific sections of the nativestudio.sk website. The search campaigns resulted in a total of 35 conversions, with the highest number of conversions (12) coming from the "Removing marks " campaign. The banner ad only generated one conversion. Based on these results, we evaluate that banner advertising is ideal for Native Studio's branding activities, as it reached internet users 112,929 times

at a cost of €98.52. However, for performance marketing and subsequent treatment bookings, search advertising is definitely more suitable, as it achieved 35 conversions with a total cost of €278.67.

2.4   Website

Native Studio uses the website nativestudio.sk for promoting its services, which is quite extensive. The menu includes categories such as "About Us," "Promotions," "Loyalty Program," "Top Treatments," "Price List of Treatments," "Plastic and Aesthetic Surgery," "Blog," "Photo Gallery," "Reviews," and "Contact." It also has separate subpages for classical, aesthetic and medical cosmetics. The blog consists of 22 articles that provide detailed descriptions of selected treatments. The blog is divided into four categories: classical, aesthetic, medical cosmetics and surgical treatments. The website is responsive, meaning it is displayed properly on computers, mobile phones and tablets. It is also optimized for search engines SEO and ranks on the first page of Google search results for queries like "beauty salon" and "beauty salon Prešov." The SEO quality is evident from the analysis data, which show identical best practices scores of 92% for both desktop and mobile devices, as well as a perfect score of 100% for SEO. The website is supported not only by profiles on social media platforms like Facebook and Instagram but also by Google My Business, where the salon regularly updates its information. Users can find selected salon photos, opening hours, website, phone contact, basic salon information, address and more on Google My Business. The website has a heatmap tool enabled, which shows a graphical representation of visitors' clicks on the website. Based on available data from April 2023, the heatmap tool recorded the most clicks on the "Price List" button, totaling 158 clicks, which corresponds to approximately every fifth or sixth visitor. In the April 2023 price list, the treatments with the most clicks were deep skin cleansing (91 clicks), eyebrow coloring and shaping (67 clicks), juvederm ultra 3 (55 clicks), and complete skin treatment (52 clicks). Using the Native Studio account on the Google Analytics platform, which is linked to the nativestudio.sk website, the salon obtains information about website traffic and user actions. More detailed information for the months of January to April 2023 is provided in Table 5..

Table 5. Data of the nativestudio.sk website via the Google Analytics platform.

Month (yr. 2023)	Visits	Number of pages per session	Bounce rate	Average session duration (min.)
January	1,337	2.12	60.74%	02:01
February	2,053	1.93	65.56%	01:45
March	1,109	2.38	48.18%	02:25
April	865	2.43	45.48%	02:12

Source: own processing from Native Studio profile on the Google Analytics platform

The highest number of website visits during the analyzed period of nativestudio.sk was recorded in February 2023, with a total of 2,053 visits. However, it was also

observed that February had the highest bounce rate after one session, reaching 65.56%. The average number of pages per session was 1.93, and the average session duration was 1 minute and 45 seconds. These high levels of website traffic and bounce rate can be partly attributed to the advertising campaigns run through Google AdWords. Typically, the website receives around 1,000 visits per month, with an average session duration of over 2 minutes, more than 2 pages per session and an immediate bounce rate below 50%.

3   Conclusion

Retailers are facing increasing challenges in terms of market competition and new technologies. The retail marketing mix consists of the 6Ps: product, price, place, promotion, people, and presentation. Traditional marketing should not be replaced by digital marketing but rather complemented by it. Digital marketing has transformed the perception of marketing and has become a dominant form of marketing. The internet offers extensive opportunities for business promotion through online marketing communication on platforms such as Google AdWords, Mailerlite, Mailchimp for email marketing, and various others. Companies utilizing data-driven marketing can increase their sales through efficiently optimized promotion based on consumer data analysis. E-tailing facilitates the sale of goods and services to retailers online, allowing customers to make purchases without physically inspecting the products. Quality logistics and distribution play a significant role in this process.

We demonstrated online retail promotion using the example of Native Studio, a retailer in the cosmetic services industry, and the platforms they utilize for online promotion based on the data provided to us. Email marketing conducted through the Mail Komplet platform does not yield significant success in terms of service orders despite having an extensive contact database. Therefore, it serves more as a branding activity for the business, being part of their digital promotion strategy. SMS marketing is employed using the company's phone contact database, and it discreetly reaches out to customers with promotional SMS messages, which bring the desired results in the form of reservations for the promoted treatments in the Reservio reservation system. The company also utilizes promotion on Google through the Google AdWords platform, specifically through search and banner ads targeted based on selected parameters such as gender, specifically targeting females. According to our results, we evaluate search advertising as a performance tool for service sales, while banner advertising, at an acceptable cost, achieves a high number of views by internet users, making it suitable for the branding promotion of the business. The nativestudio.sk website has quality SEO, a blog section where visitors can find more comprehensive information about treatments, and overall, it is the main pillar of the business in the online environment, with an average monthly traffic of 1,000 visits.

4 Acknowledgement

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Analyzing Automation Technologies and Their Tasks in Patent Texts Using Natural Language Processing

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Abstract. Technological advances have changed the labor market, and automation technology is a major factor affecting jobs. To study its impact, it's important to accurately measure automation technologies. Patent text is a novel approach to understanding technological progress and identifying the tasks that different automation technologies can perform. The paper uses a dictionary-based approach to identify automation technologies from patent text and categorizes them into three groups: Robots, Software, and Artificial Intelligence. We find that the number of patents related to these groups has grown exponentially since 1980, with AI patents growing the fastest since the 1990s. Most patents are in the Physics (G) patent family. The tasks performed by the different groups of automation technologies vary, with robots focusing on assembly tasks, software on information processing, and AI on higher cognitive tasks. Almost all technologies aim to improve efficiency and reduce costs, according to the patent description.

Keywords: Automation Technologies, Natural Language Processing (NLP), Tasks.

JEL classification: *J23, O33, O34*

1   Introduction

Over the years, technological advancements have significantly changed the job market. Automation technology is one such advancement that has the potential to significantly impact the labor market (Frey and Osborne, 2017). Technology can automate routine and repetitive tasks, leading to increased efficiency and productivity, but it also poses a threat to certain jobs (Acemoglu and Restrepo, 2018). Therefore, it is essential to study the impact of new technologies on the labor market. To assess the impact of these new technologies on the labor market, it is necessary to properly measure the content of technologies that can displace labor. Much of the literature uses different proxies for automation technologies, such as the share of routine tasks in job descriptions within an industry as a proxy for computerization amenability (Autor et al,

2003; Goos and Manning, 2007), firm-level surveys on the use of computers in the workplace or investments in computer capital (Autor et al., 2003; Beaudry et al., 2010), and finally Graetz and Michaels (2018); Acemoglu and Restrepo (2020); Lábaj and Vitáloš (2021) count the number of robots used in production. The smaller part of the literature uses patent metadata or patent grant text related to automation per se (Mann and Püttmann, 2018) or directly to automation or labor augmentation with reference to the job description (Webb, 2019; Autor et al., 2022). As pointed out by Mann and Püttmann (2018), measuring the adoption and impact of automation technologies is often problematic. However, as Mann and Püttmann (2018) show measuring new technologies directly from patent text provides a novel and somewhat a better approach to understanding technological progress which is less industry biased towards manufacturing sector than the most common approach such as counts of the robots across industries.

In this paper, we follow the pioneering work of Mann and Puttman, (2018), Webb (2020), and Autor et al. (2022) and identify automation technologies using a dictionary-based approach similar to Webb, (2019) and Dechezleprêtre (2021) on almost a universe of granted patents. We differentiate among three broad groups of automation technologies: robotics, software, and artificial intelligence (AI). First we provide a descriptive analysis of patents occurrences labeled by different technology over time and across broad patent families. The main advantage of using patent text as a measure of technological progress embodying automation technologies is that the patent text contains a description of what the technology is capable of. This approach could allow one to calculate the exposure of different tasks performed within different occupations to each particular technology. In the following section, we present the time evolution of patenting activities that embody automation technologies. In addition, we construct, Sankey diagrams of the most common noun-verb pairs (tasks) performed within identified broader groups of automation technologies.

Main findings of this paper could be summarized as follows:

All automation technologies have experienced rapid expansion since 1980, with the appearance of robots technologies in patenting activity dating back to 1940, followed by software technologies two decades later, and the significant development of AI technologies in 1990, which have experienced faster than exponential growth in the last two decades.

The majority of patents were invented within the Physics (G) patent family of the Cooperative Patent Classification (CPC) system. In addition, the tasks performed by different groups of automation technologies vary qualitatively. Robots technology is mainly used to augment or automate assembly tasks, while software technology is used for information processing tasks, and AI technology is capable of performing higher cognitive tasks.

All automation technologies share two common characteristics: improving efficiency and reducing costs. It is important to note that these tasks are capabilities that the technologies can perform and are not a complete representation of their potential and, more importantly, their implemented functionalities in the production process over time.

First, we extract all patents from the Google Patents Public Dataset including their assigned code, date of first issue, broader patent family classification and title and abstract text. To label our patent text with particular technology (robots, software, and AI) we followed the approach suggested by Webb (2019) and searched for relevant keywords in patent titles and abstracts, which have a high signal-to-noise ratio compared to other text fields. In particular robots technology was identified using the regular expression [robot*|mechatroni(c|cs)|cyber-physical|systems|computer|vision|control systems|sensors], yielding a total of 3,078,364 patents. Software technology was extracted using the regular expression [software|algorithm|computer program|data structure], yielding 2,971,376 patents. Finally, AI technology was identified using the regular expression [artificial intelligence|machine learning|neural network|deep learning], yielding 958,653 patents. We restricted our sample to patents filed between 1940 and 2022, excluding 2023 because a large proportion of patents are currently in the application process and not yet available. Figure 1 shows the total number of patents related to the all groups of technologies grew exponentially over time. In the right panel of Figure 1, the growth rates of robot and software patents appear to resemble linear curves, indicating approximately exponential growth in all time periods. In contrast, the number of patents related to AI technology showed faster than exponential growth since the 1990s.
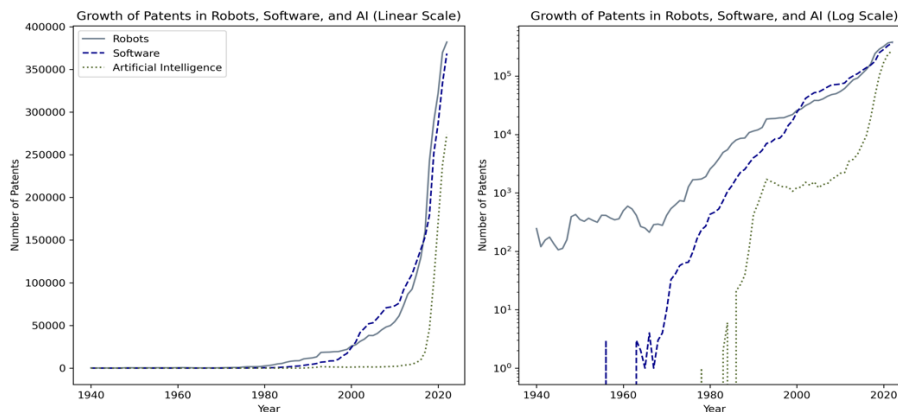
Fig. 8. Total number of patents related to robots, software, AI technology. Source: Autor's elaboration based on Google Patent Public Dataset

Figure 2 shows the relative shares of patents across Cooperative Patent Classification (CPC) invention families for all patents. More detailed decompositions for each technology are shown in Figures A1-A3 in the Appendix. The majority of patents are assigned to the patent family Physics (G), which includes patents from the natural sciences such as computer technologies, optical technologies and biotechnologies. Notably, the second most productive patent family differs across technologies. In robotics, the Performing operation; transporting (B) and Human necessities (A) patent families have experienced significant growth in the relative number of patents granted in recent decades. In software technology, the Electricity (H) patent family has a significant and time-invariant share of all patents. Within AI technology, almost 80%

of all patents are concentrated within the Physics (G) family, and the remaining patents fall into the Cross sectional technologies (Y) family, which is a general tagging of CPC for new technological developments that span several sections of the International Patent Classification (IPC).

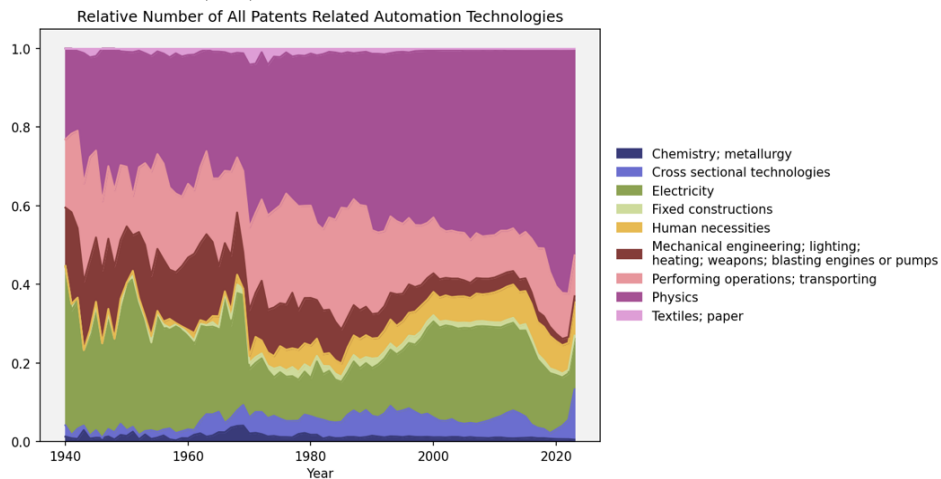**Fig. 2.** Flow of all patents over broad CPC patent families in the world. Source: Autor's elaboration based on Google Patent Public Dataset

2 Extracting Capabilities: NLP Analysis of Patents Reveals the Tasks Robots, Software, and AI Can Perform

To illustrate the automation potential of these technologies we have to identify the common tasks performed by these technologies. We employed traditional natural language processing (NLP) techniques on a subsample of patents randomly selected from the entire patent text universe as described in Section 2. Due to computational limitations, we limited our analysis to a random selection of 3,000 patents per robots, software, and AI technology. To test the robustness of our subsamples, we randomly selected 10,000 patents and manually checked whether the most common tasks performed by a particular group of technologies remained largely unchanged. Therefore, we believe that these subsamples of the patent text are representative for identifying patent features of interest that are aggregated tasks performed by the technology, mainly due to the high level of aggregation. Subsequently, we keep only patent titles published in English language, which represents about 80% of all patents published worldwide. As is common practice in NLP literature, we removed all punctuation and stop words from the patent titles. We used dependency parsing algorithm developed by Honnibal and Montanni (2017) to extract all verb-noun pairs from the text of each title, which are commonly considered as proxy for tasks performed by the technological group of patents (see, e.g., Webb, 2019, and Autor et al., 2022).

Next, we tokenized and lemmatized.[19] all verb-noun pairs to obtain normalized spellings, tenses, and different forms of individual tokens. To construct the most common tasks and make the results of our analysis readable, we selected the 80 most frequent task pairs and removed the first 10 most frequent pairs, which typically contain verb-noun pairs that are semantically related to the patent process rather than the various tasks that patents perform at their core [e.g., disclose ↦ method, invention, system; comprise ↦ method, invention, system; provide ↦ method, invention, system]. Figures 3, 4, and 5 show the Sankey diagrams of 70 combinations of the most common tasks that robots, software, and AI technologies appear to be able to perform. The color intensity shows the relative number of the same tasks across multiple patents, ranging from dark blue for frequently recurring tasks across the group to white blue for tasks that are less common across the analyzed sample, but are still part of the most important tasks that each group of patents can perform. From the same analysis shown in this paper, but on an abstract text, only one fact becomes quite convincing. All automation technologies have two features in common: improving efficiency and saving costs. In fact, the efficiency-improving and cost-saving feature is the most representative characteristic across all patent abstracts. Looking at the figures below from a broad perspective, we can see that robot, software, and AI technologies differ significantly in terms of the tasks they typically perform. Figure 3 shows that tasks that we intuitively ascribe to robots, such as [move, balance, contain, monitor, palletize, assemble, collect, clamp, drive, use, operate ↦ arm, environment, part, object, image, locate, manipulate] are indeed captured in the patent text. We will can call this set of tasks assembling in the production process.

Fig. 3. The most common combinations of tasks carried out by Robots technology. Source: Autor's elaboration based on Google Patent Public Dataset

[19] For example, we might use a lemmatization to convert "communicate," "communication," and "communicating" to the base form "communicate."

In Figure 4 we plot most common tasks performed by Software technology. What is a common denominator of depicted tasks is their relation to the creation, manipulation, transferring, or storing of information. One could immediately create a mental map, that closely resembles the tasks of software technology as we experience it daily, such as [provide, track, use, have, realize, learn, support, select, augment, manage, load, measure, store, route, comprise, bear, face ↦ datum (note: lemmatized expression of data, database, dataset etc.), message, object, parameter, resource, communication, screen, game, function, vision, network, access].
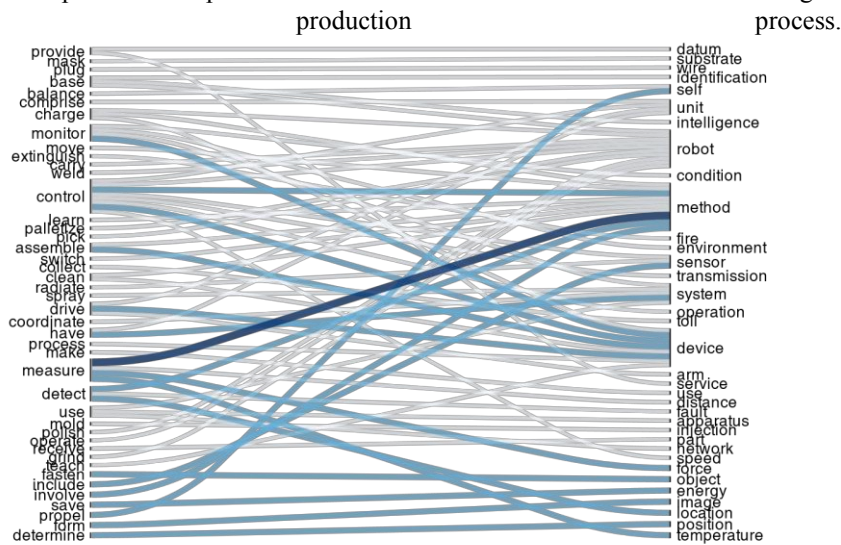

Fig. 4. The most common combinations of tasks carried out by Software technology. Source: Autor's elaboration based on Google Patent Public Dataset

Last figure illustrating tasks that AI technologies perform the most is truly fascinating, cause they are mostly oriented to simulate higher cognitive functions that (to this time only) have humans possessed. As stated by Acemoglu (2021): 'To many commentators, artificial intelligence is the most exciting technology of our age, promising the development of intelligent machines that can surpass humans in various tasks, create new products, services and capabilities, and even build machines that can improve themselves, perhaps eventually beyond all human capabilities.' It is striking to observe that the most common tasks AI is capable of being completely in line with the previous idea [use ↦ intelligence], [learn ↦ system] or [predict ↦ behavior]. Although the vast impact of AI on production and distribution systems is beyond the scope of this paper, we highly recommend further reading on this topic, which can be found in Acemoglu (2021).
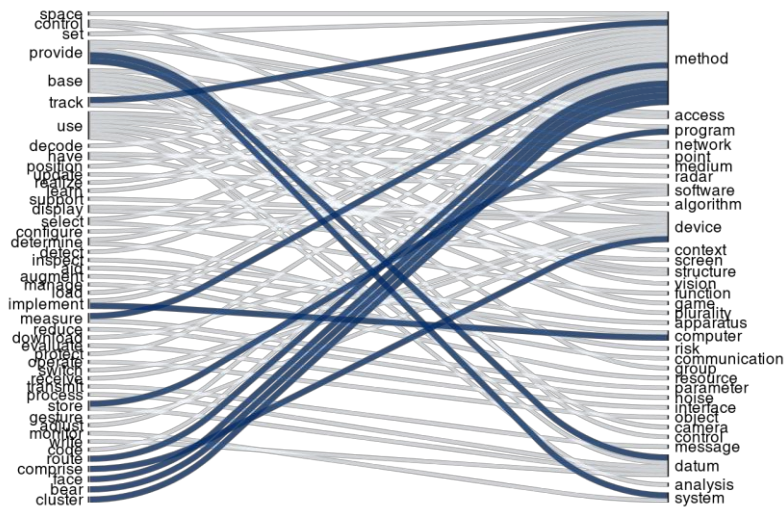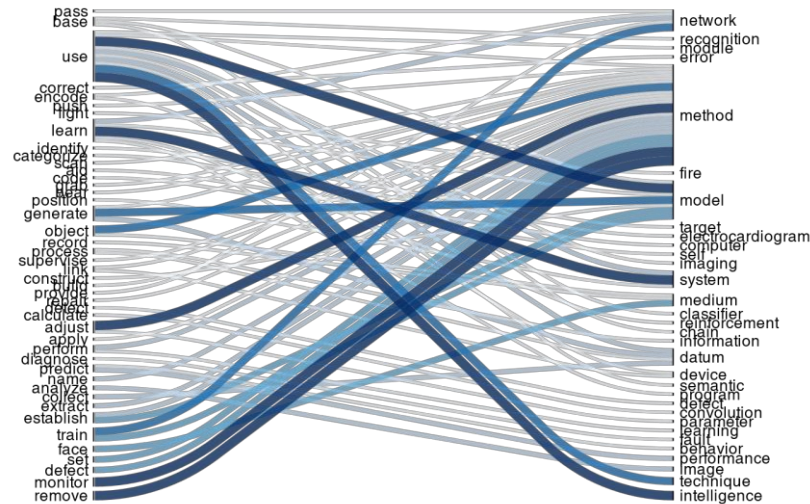
Fig. 5. The most common combinations of tasks carried out by AI technology. Source: Autor's elaboration based on Google Patent Public Dataset

3   Conclusions

In summary, automation technologies, including robots, software, and artificial intelligence, have grown exponentially in recent years and may have the potential to significantly impact the labor market. While these technologies can improve efficiency and productivity, they may also pose a threat to certain jobs. Properly measuring automation technologies is essential to assessing their impact on the labor market, and patent text provides a novel approach to understanding technological progress. Specifically, this paper uses a dictionary-based approach to identify automation technologies from patent text and finds that these technologies vary in the tasks they perform and are mainly developed in the natural sciences, stemming from the broad family of physics patents. Over time, all automation technologies (measured here in three technological groups: robots, software, and AI) experienced rapid expansion since 1980, with the appearance of robot technologies in patenting activity dating back to 1940, followed by software technologies two decades later, and the significant development of AI technologies in 1990, which experienced faster than exponential growth in the last two decades. We focused on identifying the most common tasks that each technology can perform. We documented that robots are mainly used to augment or automate assembly tasks, while software technology is used for information processing tasks, and AI technology is capable of higher cognitive tasks.

4   Acknowledgement

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Appendix
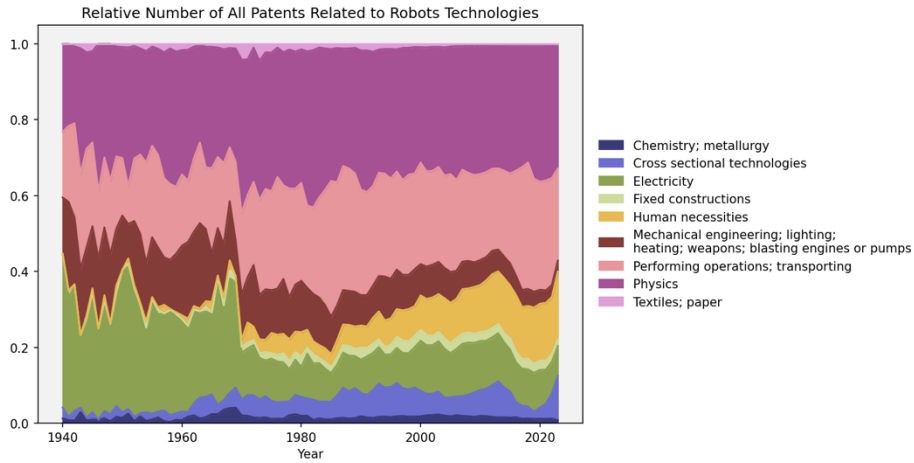
Fig. A1. Flow of patents related to robots technology over broad CPC patent families in the world between 1940 and 2022 period. Source: Autor's elaboration based on Google Patent Public Dataset
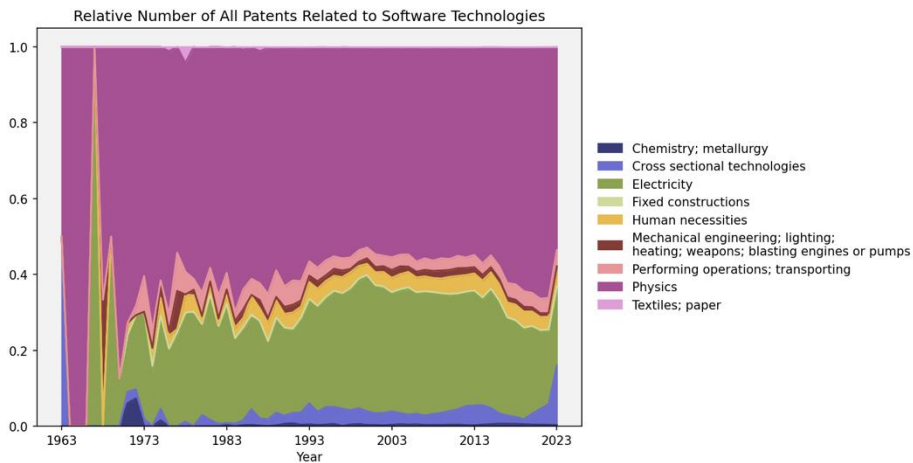
Source: Autor's elaboration based on Google Patent Public Dataset

Fig. A2. Flow of patents related to software technology over broad CPC patent families in the world between 1940 and 2022 period. Source: Autor's elaboration based on Google Patent Public Dataset
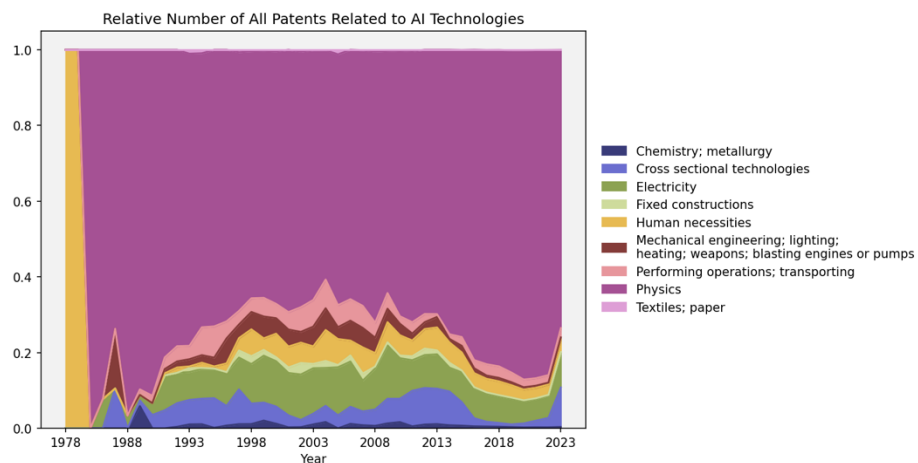
Fig. A3. Flow of patents related to AI technology over broad CPC patent families in the world between 1940 and 2022 period. Source: Autor's elaboration based on Google Patent Public Dataset

The Euro as a Store of Value

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Abstract. Money has accompanied humankind throughout the long history of development and has continued to this day. This development took place along the lines of maintaining two basic functions - money as a medium of exchange and money as a store of value. The second mentioned function is in our focus because as a financial asset, money has a significant place in the structure of personal financial assets (PFA) of households. Historical experience proves that the preservation of value of money was often a challenge. Goal of this paper is to look at whether money nowadays fulfill the function of preserving values. We state hypothesis that ECB is successful in protecting the value of Euro. We gradually compare the Euro with other assets, either from the foreign exchange or the commodity market. We also observe how the value of the purchasing power of the Euro is effected by the HICP inflation index. Our results indicate that the Euro manages to keep its value in the monitored period only against the US dollar. All other observations ended with the decrease of value of the Euro. The result of the investigation is the finding that the topic of decrease of the value of Euro is relevant in the Eurozone today as well.

Keywords: Money, Value of Money, Euro.

JEL classification: *E21, E41, E58*

1   Introduction

Savings in the form of deposit products are a popular way of creating a wealth. When managing personal finances, they are a tool to accomplish various goals. Households use them as a financial reserve in case of loss of income. From the perspective of managing the personal finances this is the main goal how to use money. When you create an investment portfolio you need to have knowledge and experiences. Moreover you need to be able to bear a market risks. There is number of instruments suitable for this purpose, like mutual funds, ETF, certificates, pension funds, single equities or bonds. However entities that are more conservative tend to use money in the form of deposit products as part of a portfolio to fulfill long-term goals. If we compare popularity of deposit products, we do not find a financial instrument that is used as much as this product group. It is therefore essential that the central banks, institutions which are responsible for managing a monetary stability, develop and implement a policies that money retain its value.

Our analysis focuses at whether money fulfill the function of storing values in present times. We state hypothesis that ECB is successful in protecting the value of Euro. The importance of this paper is that it is not common for households to monitor the share of deposit products within the framework of personal finance management. These are often low-interest or even non-interest bearing products. The question of preserving the value of Euro itself is therefore an important topic.

Our motivation comes from historical experience that holding financial assets in the form of money carries with it the risk of decreasing the value. With the existence of money, we can deduce its functions. In the paper, we focus on money as a store of value. However the past brings us many examples of money having difficulty to retain its value. The minting of metallic coins was often abused by reducing the proportion of precious metals in the coins without their formal value being reduced accordingly. A significant decrease in the value of money occurred in Europe in the 16th century, when it was caused by the import of a huge amount of precious metals from the colonies in America, especially by the Spanish. In the 17th century, paper money in the true sense of the word began to be systematically printed in Europe what opened the door for manipulations with the growth of money supply.

Our results have implications for practice. They underline the risk of decreasing the value of savings in present times in case the households depend too much on deposit products.

This paper is organized as follows. Section 2 approaches the views of key schools of economic thought in the analysis of the money supply and in the analysis of demand for money which are connected to the value of money. Section 3 describes the methodology of observations. Section 4 describes the results. Section 5 concludes.

2 Relationship to the literature

Theories define the features of the demand for money and are largely empirical in nature. When we look back at the previous hundred years, we see two schools of economic thought that significantly influenced the development of theory in economics in general, but also in the field of monetary theory. These two theoretical approaches are known as neoclassical and Keynesian.

The most prominent representatives of the neoclassical school come from the monetarists (Chicago school of economics), represented by the winner of the Alfred Nobel Prize for Economic Sciences, Milton Friedman. In the article "The optimum quantity of money" (1969), Friedman comes up with the idea of a stable growth of the money supply at the level of 5%. This article is based on a hypothetically simplified world. It describes the reasons for the demand for money as a means of payment, as a tool for creating a financial reserve. It explores a scenarios like dropping additional money supply from a helicopter, observing what will happen when the population saves the money, when they spend it, when the state imposes taxes, when lending starts. The literature looks for a "trade off" between inflation and the level of employment or economic growth. Friedman defines expected inflation, claiming that expected inflation does not cause changes in relationships in society (transfer of property from creditors to debtors), as he claims that creditors include expected inflation in the price. "Policy fairly close to optimum" should, with economic growth of 3-4% per year, lead to a growth of the money supply of 5% (he perceived this as a short-term goal of monetary policy). Such an approach would stabilize the prices of goods (while the prices of services continue to rise. Subsequently, in the article "The quantitative theory of money, a Restatement" (1956), Friedman admits that, after further analyzes in the framework of the University of Chicago, he considers the 5% rule to be a short-term monetary goal. From a medium and long-term point of view, he leans towards the 2% rule. These approaches define the route how to keep the value of money. In the case of supplying the money supply at the level of 2%, the prices of services would stabilize when the prices of goods fall. Even though Friedman came up with the 5% rule and then after further analyzes with the 2% rule, he adds in one breath that the most important thing is to deliver the growth of the money supply at a stable pace anyway.

Friedman registers that Keynes moved the quantitative theory of money from the analysis from the point of view of monetary theory (from the point of view of the money supply), to the analysis from the point of view of the theory of savings - the analysis of household assets and liabilities (money as part of the portfolio analysis). However, Friedman enriches it with other types of assets as alternatives to holding money. He thus drives attention to the fact what happens when the value of money is not stable. How difficult it will be to adjust "household balance sheets" to an excessive increase in the money supply. How household consumption behavior will change, what will be the effect on absolute and relative prices. What subsequent waves and time lags will this creates in finding a new macroeconomic equilibrium. He thus supports his perception that central banks should move from monitoring credit conditions to monitoring monetary conditions at the level of quantitative criteria of money supply growth in the

performance of their policies. The "Great Depression" of 1929-1933, when the FED reduced the money supply by a third, would not happened.

With the crash of the stock exchange in New York in 1929, a crisis began in the USA, which gradually spread to Europe. It is not surprising that at that time the self-healing ability of the market took a back seat. General skepticism declared that what is the use of a theory that says that there will be full employment again when the timeframe for achieving it is not politically and socially sustainable. Keynesianism comes to the fore.

John Keynes, who created a theory to justify the need for state intervention in the market economy, represents this stream. If we called the previous stream monetarism, then this stream of thought should be fiscalism. Keynes denies the general validity of Say's theorem, according to which supply creates demand, and argues that rather effective demand determines the level of output. According to this theory, the role of the state is to ensure the growth of effective demand with the help of the state budget and influencing the amount of money in circulation. In this way, he wants to influence the overall level of employment, production and gross domestic product.

Keynes develops a view of analyzing the money supply. In his book "The General Theory of Employment, Interest and Money" (1936), hereinafter General Theory, Monetary policy in the Keynesian model promotes the growth of the money supply, which stimulates demand. As a result, the price level rises, which must at some point be curbed by increasing interest rates. The demand curve returns to its original position, thus creating a new equilibrium, which differs from the previous one by an increase in the money supply and an increased price level. Unfortunately, this process devalues the currency. By increasing the money supply, Keynes is able to stimulate demand at the level of examining the money supply.

What seemed wishful thinking to Keynes has become a reality today in the tools used by the central bank. He wished there was a way to "focus" on making money when necessary. He saw the only limits to increased "money production" in the uncertainty that might come with such an increased volume of money. He expressed concern about inflation and the devaluation of money in the future.

In current period, this approach of money production represents Modern Monetary Theory (MMT). They support the growth of the money supply to support the economic growth of the country (even with the consequence of deficit management of the state), as long as inflationary pressure does not arise. This should be a signal of overheating of the economy. Stephanie Kelton (2020), as a voice of MMT, considers deficit management of the state to be standard, as the state can print money unlike households. For this theory, the manifestation of excessive spending is inflation. Therefore, as long as deficit management does not create inflation, such an approach to the management of public finances is in order for this economic current, and no correction is expected from the central banks (monetary policy therefore plays the role of a supporter of the state's deficit management).

3   Design of observations

We look at the extent to which the ECB manages to protect the value of the currency, so we focus on the Euro. We observe how the value of Euro develops against the selected assets. For simplification reason, tracked assets do not generate interest. It is a situation comparable to depositing funds in a current account, without incurring market or liquidity risks. We do not take into account transaction costs. We choose assets that, either nowadays or in the past, were perceived as a safe haven for saving the population's savings. The observations indicate the amount of asset what is possible to acquire for the amount of EUR 10,000. We monitor the development of the value in the periods indicated in the results for each observation. Generally, this is the period between the years 2003 - 2022. We compare the final value with the initial value (in this case, it is the average value of the first and last monitored month). In addition, we compare the maximum, minimum and average value with the initial value (the average value of the first month). This becomes the set of trend indicators. We enrich all charts with development of year on year change which helps understand development of trend indicators. We make 4 observations. We begin by comparing Euro (EUR) against the US dollar (USD), the main global reserve currency. As an alternative comparison from foreign exchange market, we use a comparison with the Swiss franc (CHF), which is perceived as a "safe haven currency". We use daily data in these observations. Next, we look at the development of Euro against asset that have been seen as a safe haven for centuries, namely gold. In this case, we use monthly data. Finally, we look at the development of the value of Euro from the point of view of the development of its purchasing power effected by the HICP inflation index. In this case, we also use monthly data. We use reliable publicly available sources as a database for constructing the analytical part. For elaboration, we use the graphic method of data processing enriched with analytical and descriptive processing of results.

4   Results

We start the research by observing the development of the value of EUR against other currencies. In the first observation, we chose the main reserve currency USD.

Fig. 1. Development of 10 000 EUR against USD during period 2003 – 2022 (lhs: blue line) and y/y change (rhs: red columns), data source: finance.yahoo.com

Figure 1 shows the development of the amount of USD that the subject can exchange for EUR 10,000. The monitored period is December 1, 2003 to December 31, 2022. In this case we use daily data. We see that these two key reserve currencies are more or less holding the same value. Over the past 20 years, the EUR has lost approximately 15% in the value against the USD. However, there are periods, as in the years 2007-2010, when the EUR strengthened against the USD, while the appreciation exceeded 29% from the initial value. If we compare the average value for the entire monitored period with the initial value, the EUR recorded a slight appreciation of 1.2%. This shows that two major central banks develop their monetary policies in similar way.

Table 1. Descriptive statistics for development of 10 000 EUR against USD

initial value in USD	closing value in USD	max value in USD	min value in USD	average value in USD
12 314	10 572	15 988	9 596	12 462
	-14,1%	29,8%	-22,1%	1,2%

In the second observation, we make an alternative observation from foreign exchange markets by following the development of the EUR against another currency, in this case the CHF.
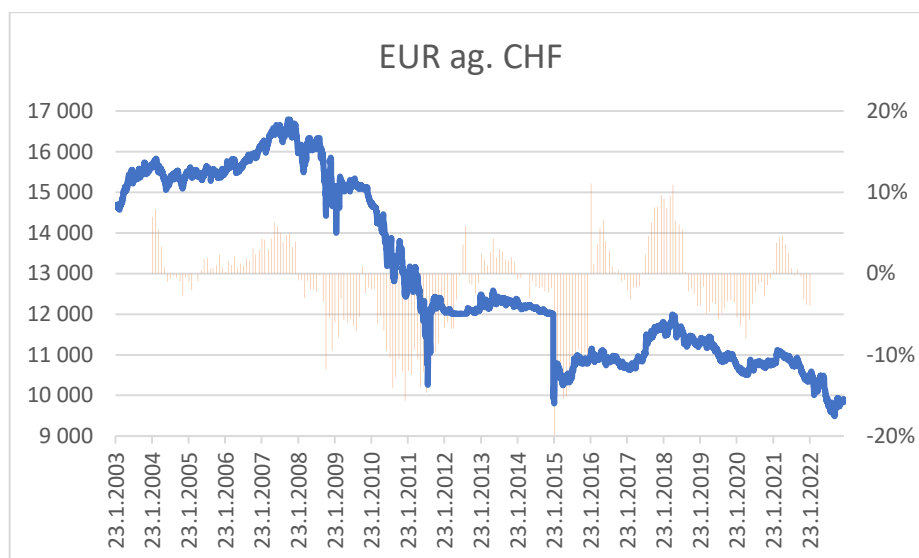
Fig. 2. Development of 10 000 EUR against CHF during period 2003 – 2022 (lhs: blue line) and y/y change (rhs: red columns), data source: finance.yahoo.com

On figure 2, we can see how the value of the EUR continuously falls against the CHF. The monitored period is January 23, 2003 to December 29, 2022. In this study, we use daily data. Over a period of 20 years, the EUR has lost more than 30% of its value. Although the first years in the monitored period develops in favor of the EUR, when it appreciates more than 10%, the trend of EUR depreciation is obvious. On average, the EUR depreciates against the CHF by more than 11%.

Table 2. Descriptive statistics for development of 10 000 EUR against CHF

initial value in CHF	closing value in CHF	max value in CHF	min value in CHF	average value in CHF
14 666	9 868	16 795	9 490	12 937
	-32,7%	14,5%	-35,3%	-11,8%

Subsequently, we see how the value of the EUR develops against precious metals. In the third observation, we look at the development of the EUR against gold.
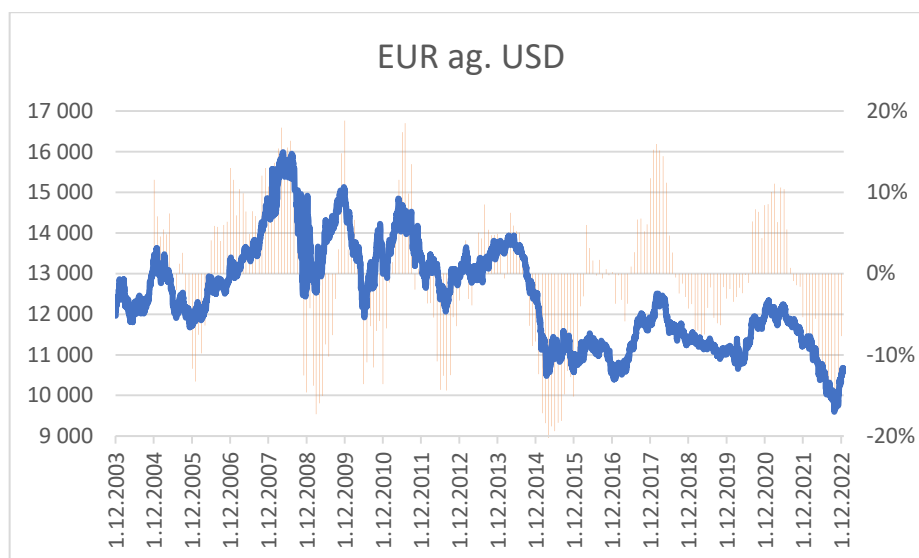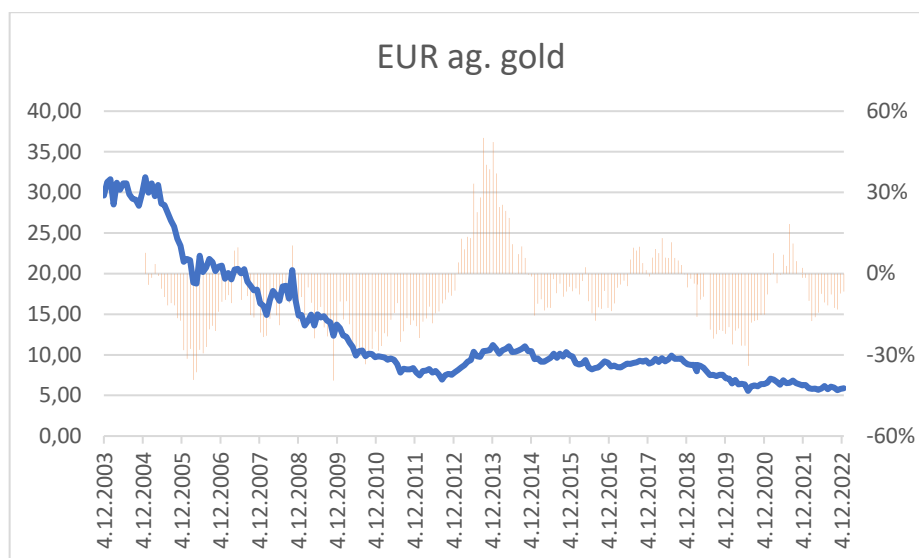
Fig. 3. Development of 10 000 EUR against gold (in troy ounce) during period 2003 – 2022 (lhs: blue line) and y/y change (rhs: red columns), data source: bulionvault.com

Figure 3 shows the development of the amount of troy ounces of gold that a subject can exchange from EUR 10,000 over the last 20 years. The monitored period is December 4, 2003 to December 24, 2022. In this study, we use monthly data. We see that the EUR is continuously depreciating against gold. Over the past 20 years, the EUR has lost 80% of its value against gold. At the beginning of the observed period, we can register that the EUR strengthens against gold, but the devaluation trend is obvious. If we compare the average value for the entire monitored period to initial value, the EUR experiences a depreciation of 57%.

Table 3. Descriptive statistics for development of 10 000 EUR against gold

initial value	closing value	max value	min value	average value
in t oz	in t oz	in t oz	in t oz	in t oz
29,59	5,87	31,87	5,55	12,73
	-80,2%	7,7%	-81,2%	-57,0%

We make the last fourth observation from the perspective of examining how index HICP for inflation affects the purchasing power of the EUR.
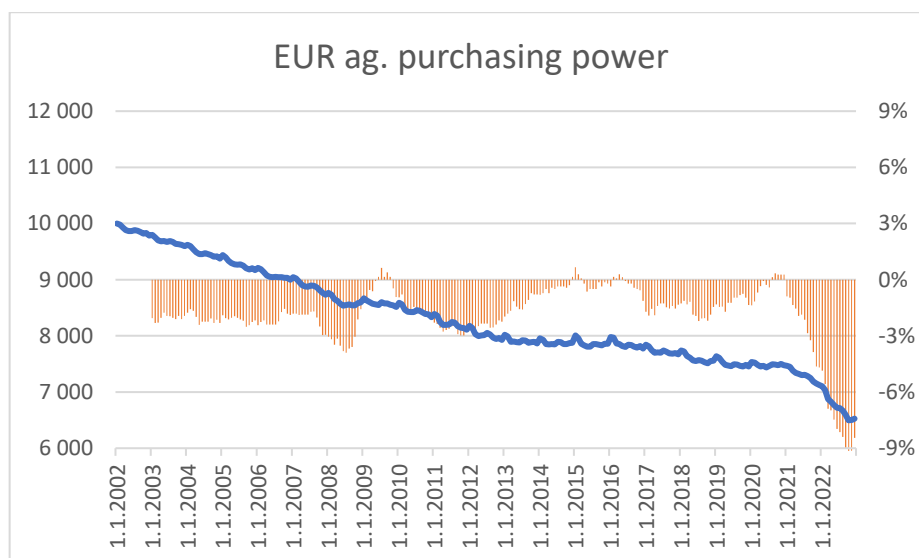
Fig. 4. Development of purchasing power of 10 000 EUR measured by HICP index during period 2002 – 2022 (lhs: blue line) and y/y change (rhs: red columns), data source: Eurostat

Figure 4 shows the development of the value of EUR 10,000 effected by HICP inflation index for the Eurozone. The observed period is January 1, 2002 to December 31, 2022. The ECB declares its inflation target at 2%, so it is not surprise that following this policy, the value of the initial €10,000 decreases by 35% over the observed period. From this point of view, the highest value of money are in the initial phase. We see that the EUR has been continuously decreasing the value since the creation of the common currency. In this way, every entity that keeps its savings in cash or on an non-interest bearing accounts ends up with decreased value of its money according to the chart. In years 2009, 2015 and 2020 we can observe a very small increase of value of Euro. These were periods of deflation during economic downturns. ECB used very quickly its monetary tools to return to its inflation target, thus these periods were a temporary.

Table 4. Results of development of purchasing power of 10 000 EUR measured by HICP index

initial value	closing value	max value	min value	average value
10 000	6 524	10 000	6 497	8 285
	-34,8%	0,0%	-35,0%	-17,2%

5   Concluding remarks

In the observations we try to find out whether money, in our case the Euro, fulfills the function of storing value. We enter this paper with the hypothesis that the central bank is successful in protecting the value of the Euro. We gradually compared the Euro with other assets, either from the foreign exchange or the commodity market. The first two studies focus on comparisons with the US dollar and the Swiss franc. Subsequently, we chose precious metals – gold. In the last survey, we observe how the value of the purchasing power of the Euro is effected by the HICP inflation index.

Our results indicate that the Euro manages to keep its value in the monitored period only against the US dollar (coming from average values). All other observations ended with the decrease of value of the Euro. The highest decrease of value comes from comparison against the gold. On the ECB's website, under the objectives of monetary policy, it is mentioned: "Our main objective at the ECB is price stability. We serve the people living in the Eurozone to protect the value of the Euro." It looks that ECB is more successful in price stability than in protecting the value of Euro. Just as the decrease of value of the currency was a topic in the past, we see that it is the same topic today. However, it is necessary to carry out further analyzes in order to conclude that the ECB is failing to protect the value of the Euro.

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Defining the Current Issues Preventing Natural Transition to Electric Vehicles (EVs)

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Abstract. This paper analysis the most important obstacles that are preventing more effective and faster transition to alternative means of transportation, while focusing on specific case of electric vehicles (EVs). As subject of transport emissions gains more attention, it is required to look for viable and economically and environmentally rational solutions towards transition to green road transport. First it evaluates, whether such transition is necessary and required, pointing out the current state of CO_2 emissions for which transport sector is responsible. Key issues preventing natural transition from internal combustion engine vehicles (ICEs) are then analyzed from consumer perspective. Paper evaluates and defines significance of each of the selected issues, reviews the most common assumptions and possible misconceptions. Several surveys data is analyzed and synthesized, providing a coherent answer applicable for most regions. Three key issues are defined and analyzed based on results, stating their relevance and solution possibility. The discussion then defines the current and future potential of EVs globally, as a potential successor of ICEs, based on information concluded, and provides summarized results of analyzed subject. Results points out to three major issues; range, price, and charging, while partially confirming their relevance, which is closely analyzed in individual parts of the paper. However, despite the fact, that the issues were confirmed to be still present, data proves a significant growth in demand for alternative transportation, specifically EVs. This trend could be expected to continue (even hasten) in short future due to gradual removal of given problems as perceived by consumers based on technological advance.

Keywords: Transport, Electric Vehicles, Technology, Climate Change.

JEL classification: *R 41, Q 56, O 33*

1   Introduction

Current modern transportation possibilities provide much more options for even a regular consumer, than means of transportation available in 20th century. Although some options, that are getting more popular these days were, from technological development point, available along with most common internal combustion engine vehicles (ICEs; or ICEVs) even before, their potential of effective transportation was very limited. As ICEs got more effective, affordable, and therefore very popular and easy to use, research in alternative transportation wasn't as necessary and was stagnating, since it appeared to be way too difficult and expensive.

Although the debates regarding human activity damaging nature were ongoing throughout the whole 20th century, the amount of attention they received was very limited until there were enough researchers pointing out to the same problem. By the end of the century, humanity started to strongly realize the impact of unlimited manufacture practices, transportation problems and other activities, which were producing massive emissions of greenhouse gases. This proves the later establishment of panels and conferences on various problems regarding climate change, which are to this day observing and organizing a regular meetups with representatives of countries from the whole world.

Many countries and organizations are calling for a more strict and faster global policy adaptation in the sphere of transportation, which proved to be a significant part of air pollution and emissions of greenhouse gasses. Out of whole transportation sector, road transport (including passenger vehicles such as cars, motorcycles, buses along with freight vehicles such as trucks) was responsible for almost 77% of CO_2 emissions, while nominal value from whole transport sector was totaling at 7,7 Gt of CO_2 in 2021 (for sub-sector distribution see Fig. 1.).[20] Globally speaking, road transport was responsible for 17% of all *(human-caused)* greenhouse gases ("GHG" or "hcGHG") emitted in 2019, placing it at the second place, after electricity/heat production sector, which was responsible for 32% of global GHG released. Looking solely at CO_2, it contributed with 22% share of global CO_2 emissions in the same year.[21]

This paper will focus on a potential of electric vehicles in combating a climate change and evaluate the most common obstacles that are preventing from a natural adaptation to less carbon demanding transport alternatives. The result will indicate whether electric vehicles are a viable and more importantly realistic alternative to current means of transport. Additionally, individual chapters will test the relevance of most common problems (of EVs) as perceived by consumers, in order to decide whether the concerns are justified.

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[20] International Energy Agency – Jacob, T.: Transport - Sectoral overview, (2022)
[21] World Resources Institute – ClimateWatch: Historical GHG Emissions
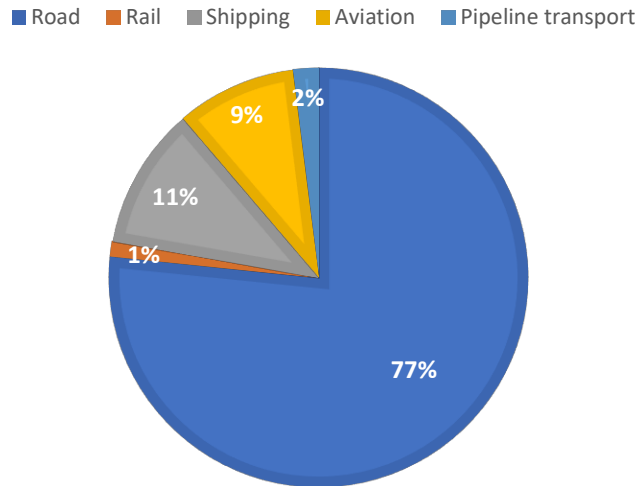
Fig. 1. Global CO2 emissions from transport by sub-sector (2021)

With regard to rapid technological development in energy storage, increasing number of calls for green transformation of global economy, successful marketing strategies and other factors, one of the most viable alternatives at the beginning of 21st century to ICEVs turned out to be electric vehicles (EVs), specifically speaking battery electric vehicles (BEVs). A great example of efforts would be a recent policy adopted by European Union (EU) which states, that all new cars and vans registered in Europe will be "zero-emission" by 2035. To help reach this goal, intermediary step was also defined, stating that the new CO2 standards will also require average emissions of new cars to come down by 55% by 2030, and new vans by 50% by 2030. European Parliament and Council proposed and agreed to such policy with regard to policy of "Fit for 55".[22] Overall it is very clear, that the trend for support of EVs can be seen in most developed (but also developing) countries, looking at the incentives and subsidies of this sector. Most common way they are doing it (or have been), is by providing a large amount of financial subsidy to consumers, when they reach for electric vehicle instead of vehicle with combustion engine. The subsidies can occur also on the manufacturer side, when countries provide a subsidies to each sold

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[22] European Comission: Zero emission vehicles: first 'Fit for 55' deal will end the sale of new CO2 emitting cars in Europe by 2035, (2022)

EV, in order to boost sales but also attract investors.[23] This applies to all regions.[24,25,26] At the same time, targeted year of full transformation of manufacturing processes by EU, for such a diverse consumer market consisting of 27 countries with different level of development, could appear to be quite bold. There are several questions that appear to remain unanswered before the whole sector transformation could occur, which seems to be taken by policy makers as "problem of the future and not present". Although currently the EVs still comprise rather small percentage of global fleet in comparison with ICEs (although the share in automobiles sales was drastically increasing for past 3 years, with 4% in 2020 to 14% in 2022.[27,28]), the future where domination of EVs is present could bring several more issues.

2   Methodology

Given problematic is examined by analyzing most recent available statistical and empirical data. We use the official websites of manufacturers with statistical databases but also look at the empirical evidence provided by consumers. Key focus of the paper is to clarify the most common issues of electric vehicles from consumer perspective. With regard to that, our base question is, whether this mean of transportation at the current state, is viable alternative to current combustion engine vehicles and possible solution to large carbon footprint of passenger vehicles. A comparison of two is therefore made, to point out the differences and positive and negative attributes. Although more issues could be present, we focus on the most important ones, that are likely to have the biggest impact on consumers behavior. Additionally, consumer surveys from various sources and regions are processed, by analyzing each individual results, to determine the key issues preventing from increase in demand for such vehicles. After determining the most common individual problems by observing the overlap in results in analyzed surveys, we can define their presence for most regions and consequently test their relevance. Relevance is tested by comparison with statistical and empirical evidence as well as most recent literature focusing on batteries and effectivity of EVs for each individual problem mentioned. The discussion then synthesizes information, define the current state, and evaluates the potential solutions.

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[23] Reuters - Bernadette C. M., Fransiska N.: Indonesia to provide incentives to boost EV sales, attract investment, (2023)

[24] MHSR: MH SR zverejnilo podmienky poskytnutia dotácie na elektromobily, (2019)

[25] Reuters - Gleb S., Anastasia L., Darya K.: Russia plans to subsidise electric cars to spur demand, (2021)

[26] Reuters - Philip B.: Factbox: How U.S. electric vehicle subsidy rules impact Europe (2023)

[27] CNBC - Anmar F.: Electric car sales surged by 55% last year to surpass 10 million, and China led the way: IEA, (2023)

[28] International Energy Agency - Leonardo P.: Electric Vehicles, (2022)

3 Defining the key issues from consumers perspective

To better understand the key issues as perceived by consumers, we analyze the surveys held by several agencies conducted in different regions (to minimize the potential deviation effect caused by different economic development stages) and synthesize them into a coherent data. By doing so, it is then possible to examine the perceived issues and state their relevance.

Although most surveys point out an increase in interest towards buying electric vehicles (which is also proven by previously stated statistic of increasing share of EVs in car sales), this does not mean, that the final consumption curve would be parallel in growth. Currently, on average at least 50% surveyed individuals do consider buying an electric vehicle as their upcoming purchase of automobile, which could be considered a trend for most developed countries. A positive exception here, appears to be a China, where 87% asked considered purchase or already purchased electric vehicle.[29] The statistics also suggest the difference, between the priority issues discouraging consumers from buying an electric vehicle, based on country economic development stage. We can expect that stage of economic development would influence the priorities of consumers, which is partially also shown in results of the surveys, leading to a fact, that price could potentially be perceived as more important issue in countries with lower average income. Up to 78% respondents from USA stated that they would not prefer an electric vehicle because of the shorter driving range than with the gas-powered one. Since range is directly obtained from recharging, 73% finds it difficult to plan or look for charging stations.[30] Globally speaking, consumers are the most concerned about range (54%), cost (51%) and charging possibilities (43%).

Based on these results, we can clearly state that there are three key issues of electric vehicles, from which other smaller ones are derived, that are preventing the increase of demand for such transportation; consumers are skeptical about the range, which they consider insufficient; initial purchase costs are noticeably higher even in similar or same vehicle categories, making them less affordable and attractive to lower and even middle-income part of population; "refueling" or recharging takes more time, is less available and needs to be planed. It is important to notice, that all the issues are in comparison with ICEVs, which are widely available and dominating since the beginning of 20th century.

3.1 Battery

Among the most common concerns, battery replacement was also very often mentioned.

Battery is very closely related to the final cost and driving range of the electric vehicles. Even though some safety concerns may apply in this matter as well, there seems to be lack of consensus of a higher danger, than in the case of ICEs.

Issue with batteries has its roots in the manufacture process and potential for energy storage. EVs in their current form use batteries which main material is lithium, (along

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[29] OC&C: Hitting the brakes (2022)

[30] Emily R.: Electric Vehicle (EV) Statistics: Are Electric Cars the Future?, (2023)

with Cobalt and other materials such as manganese and high-grade nickel) which makes the manufacture of modern batteries still rather exhausting for resources and labor. This, naturally, influence the final cost perceived by consumers. Although active research is being conducted in effort to find a more abundant material substitution, currently, Li-ion (Lithium-ion) type of cells proved to be the most resilient and long lasting. Specifically speaking there is an effort to develop new batteries using two abundant, cheaper materials — sodium and sulfur.[31]

Long-lasting concern, that is still largely unsolved although improved in past decades, with every energy storage device is the natural loss of energy storage potential (ESP or "capacity") during its usage. Li-ion batteries implemented in EVs are no exception to such effect which is clearly and empirically observable by every consumer during their driving, charging, and discharging stages. Limited lifespan is stated after excessive testing by manufacturers, usually in number of cycles (amount of full discharge and charge) that they may go through before decreasing to a certain percentage level of their initial capacity. Loss of ESP is directly connected to the loss of effective driving range; therefore, a replacement is needed when range decreases to unsatisfactory level (which is usually considered to be 80% of initial). The performance (meaning top speed, acceleration) of vehicle may also be affected slightly with descending ESP. In comparison to ICEs, where loss of range during the lifespan of vehicle does not occur (or is insignificant), this could be perceived as a huge disadvantage.

The simplicity of EVs, which two key components that keeps them driving are electric motor and battery, makes the overall maintenance effective and in a way also cheap. EV's batteries (and motors), in most cases, require very little maintenance before their lifespan is reached, while vehicles with ICE requires a rather regular service checkups and replacement of key parts (which costs are not neglectable) after a given number of driven kilometers is reached. Additionally, the drivetrain in an ICE vehicle contains more than 2,000 moving parts typically, whereas the drivetrain in an EV contains around 20 parts.[32] Although their range is not affected, some statistics prove, that the cost to keep operating ICE vehicles, could reach the cost of a battery replacement for EV after several years of usage.[33] It is important to state, that this statement would need a further examination of operating costs of ICEs and EVs, and currently only serves as an indication of possible misconception.

Most EV batteries have an 8–10-year warranty or a 160,000 km drive limit.[34,35] Research labs already report up to 2,000 EFC (equivalent full cycles). Historical data from Tesla shows capacity degradation of about 5% after 80,000 km. With 2,000 cycles at 250 km each, an EV battery would be potentially good for 500,000 km (with gradual

[31] Nick C., Paul L.: EV battery makers race to develop cheaper cell materials, skirting China, 2022

[32] Forbes - Tom R.: Seven Reasons Why The Internal Combustion Engine Is A Dead Man Walking, (2018)

[33] Wolfgang R.: ADAC Pannenstatistik 2023: Wie zuverlässig sind Elektroautos? (2023)

[34] Tesla: New Vehicle Limited Warranty

[35] Volkswagen: Electric car high voltage battery warranty

range decrease that would be still acceptable).[36] This could suggest, that the concern of replacing the batterie after a few years might not be justified.

Other issues that can be seen from a consumer perspective are also a temperature sensitiveness (with lower temperatures, the effectiveness of lithium-ion batteries reduces, resulting in loss of range).[37] and from environmental point of view, there could be a concern about the possibility of recycling of used batteries.[38], which is still limited. Batteries also add a lot of weight to the vehicles, meaning that in general EVs are heavier and ICEs. Although this improve the stability and safety, since the center of gravity is very low to the ground, possible negative impact could be observed in faster infrastructure wear and tear.[39]

3.2   Range and charging

To this day, insufficient range seems to be the most crucial obstacle preventing from natural adaptation of electric vehicles. This subject is still very important in demand for EVs, as consumers are afraid of "flexibility" of the vehicle, meaning that it will not be reliable for a longer distance. Therefore, we will compare the average range of ICE vehicles and EV while analyzing, how much range is actually needed for average user.

Range of electric vehicles is very variable, going from as little as 125 km[40] up to 835 km per charge.[41] It is measured in Europe by a harmonized test procedure WLTP (Worldwide Harmonised Light Vehicle Test Procedure) which measures the real range of an electric car travelling at an average speed of 46.5 km/h in approximately 23 degrees Celsius temperature, from a 100% to 0% state of charge.[42] This obviously brings challenges, as the test procedure at 23 degrees and without auxiliary consumers such as the air conditioning system leads to idealized measured values. Although the certified WLTP range is not always achievable in real life, it does help to compare between different car makers and models. The "worldwide" part in WLTP might not be very accurate, as other regions apply different measuring practices, such as EPA in United States, or CLTC in China, which in a way, makes the EV range definition somehow non-harmonized and confusing when comparing the vehicles manufactured globally. Short review of real-life statistics proved, that the EPA is the most realistic one, followed by WLTP and then CLTC, which states the most optimistic values. Analyzing the EV database.[43], we can state, that in most cases, the real-life achievable range is about 20% lower, then the one provided by manufacturer (in WLTP), while an

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[36] Battery University: BU-1003a: Battery Aging in an Electric Vehicle (EV), (2019)

[37] Yazan A., Clara S., José R. S.: Effects of ambient temperature and trip characteristics on the energy consumption of an electric vehicle, (2022)

[38] Mengyuan Ch., et. al.: Recycling End-of-Life Electric Vehicle Lithium-Ion Batteries (2019)

[39] Mark P.: Electric Vehicles and The Impact On Infrastructure, (2022)

[40] Electric Vehicle Database: Mini Cooper SE

[41] Lucid: An absolute triumph of efficiency, Lucid Air achieves 520 miles of range, (2021)

[42] Electrive: How WLTP range is really calculated, (2022)

[43] Electric Vehicle Database (https://ev-database.org/)

additional result pointed to higher differences between real life and WLTP at higher range.

The 5 best-selling electric vehicles in 2022[44] were Tesla Model Y (455 km WLTP)[45], BYD Song Plus (380 km WLTP)[46], Tesla Model 3 (491 km WLTP)[47], Wuling Hong Guang MINI EV (approx. 210 km WLTP)[48], BYD Qin Plus (approx. 365 km WLTP)[49]. Let's than assume, based on statistic provided, that currently, 400 km range is acceptable by consumers, when deciding between the increased price and range, as range is also directly correlated with battery, which we already stated is the crucial part of final price. Therefore, simple principle applies here; the longer the range, the higher the price, which is applicable in all situations, considering all other attributes of the vehicle stay unchanged.

With ICE vehicles, the range hasn't been for a long time a discussed matter, as the wide availability of refuel stations makes it rather non-important part of decision-making during purchase of such vehicle. Nevertheless, a median for a range on a full tank of passenger gasoline vehicles was at the 648 km for 2021 models, while maximal range peaked at 1,231 km. With EV, median stood at 377 km (EPA) while maximum mileage available was 652 km (EPA), meaning that the maximum range available barely reached the median of gasoline vehicles.[50]

A study held in 2010, which analyzed 500 vehicles patterns throughout the year revealed, that the limited-range EVs can in fact meet the needs of a significant proportion of drivers. It found that 9% of the vehicles observed, never exceeded 160 km in one day, and 21% never exceeded 241 km in one day. Importantly, this study was held in United States, which "car culture" is much more benevolent and accepting of a regular long-distance travel; we assume, that people are more in acceptance with working further from residence and are willing to travel longer distances by car (between states or for holiday) then in Europe. Therefore, this could imply, that in Europe, range of electric vehicles should be even less concerning.

Additionally, the study proved, that for drivers who would be willing to make adaptations on a few days a year, the suitable population is larger. If they are willing to make adaptations on 2 days a year, the same 160 km range EV would meet the needs

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[44] Žiga L.: Global Electric Car Sales and Electric Vehicle Statistics (Q1 2023), (2023)

[45] Tesla.com

[46] Pedro L.: BYD Song Plus EV is the affordable alternative to the Tesla Model Y (2021)

[47] Tesla.com

[48] Qian J.: Wuling Mini EV Has Sold 1 million Units. Price Starts At 4,400 USD, (2023)

[49] Jed J. I.: BYD Qin PLUS EV 2023 Champion Edition with a range of 610km starts at 129,000 yuan ($18,893), (2023)

[50] Mark K.: US: Median Range Of 2021 Gasoline Vehicles Is 72% Higher Than BEVs, (2022)

of 17% of drivers, and if they are willing to do adaptation six times a year, limited-range vehicles would work for 32% of drivers.[51]

Although the range o 400 km might seem way too low in comparison with ICE, the future infrastructure expansion of charging stations and technological advance that would minimize the time required to recharge vehicle, would make this attribute omissible. Therefore, the "insufficient range" could be rather easily preventable in the future, by increasing the investments to charging stations infrastructure and efficiency. For house owners, this issue is not as significant, as for people living in areas, where house living is not available or less popular due to higher costs, and people have less or no options to recharge their vehicle at their residence.

More recent survey pointed out that, on average for US consumers, a charge time of 30 minutes and a range of 514 km from a single charge represent the 'tipping points' to achieve mainstream EV adoption.[52] Available statistics from European union (EU), following average distance travelled by person per day in 13 countries also pointed out, that just 12,4 km is driven daily by person on average, while drivers in Germany had the largest distance traveled (19 km/day) and drivers in Greece traveled the least (5.6 km/day).[53] Considering these distances, it is clear, that currently provided range of electric vehicles would most likely be sufficient for large part of EU population.

3.3 Price

Based on empirical data, price of electric vehicles does define the difference between buying or not buying the car for most consumers. In development of initial costs, we can observe a price reduction, due to the possibility of a wide selection of lower category models and decreasing costs of batteries.[54,55] At the same time, based on a survey data it appears that the price point still hasn't reached a tipping point, where the EVs negatively perceived range would be overlooked for an affordability and savings during the operation.

Observing the US car market, analyzing all sales of passenger vehicles in 2023 and separating it into two categories – EVs and ICEVs, on average, new electric vehicles initial purchase cost was 20% higher, than with ICE vehicles.[56]

Somehow surprising fact that occurred in one of the survey was, that most people would be willing to accept a slightly higher price of the electric vehicle of the same quality and category as ICE vehicle, meaning that they would be willing to pay more

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[51] Nathaniel S. P. – et. al.: Electric vehicles: How much range is required for a day's driving?, (2011)

[52] PRNewswire - WAYNE, N.J.: New Castrol Study Reveals 'Tipping Points' To Drive Mainstream Electric Vehicle Adoption in The US (2020)

[53] Eurostat: Passenger mobility statistics, (2021)

[54] International Energy Agency: Trends in electric light-duty vehicles, (2023)

[55] U.S. Department of Energy's Vehicle Technologies Office: Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates, (2023)

[56] Cox Automotive: New-Vehicle Transaction Prices Trend Downward as Incentives Rise, (2023)

for EVs over ICEs.[57] This may be due to several assumptions of consumers (which based on information provided in this paper are mostly correct); first, EVs are cheaper to drive, since the source of energy is not petrol or diesel, but electric energy which is expected to be significantly cheaper (energy crises are an exception), due to easier production. The availability could also be considered an advantage if we include a slow charging residential power along with the dedicated fast charging stations to recharge possibilities. Also, with advancing technology of photovoltaics, many households are capable of self-production of electric energy, which can be then transferred to the electric vehicle for "free" (initial cost of solar panels energy production system applies here); secondly, the expected maintenance costs are much lower with EVs than with ICEs, due to the simpler construction; lastly, the assumption that EVs are an environmental friendly alternative to the ICEVs could be observed in the responses and considered a general opinion. Given that, outwardly and during a basic usage, the average consumer does not observe any negative impact on the environment while driving the electric vehicle, the assumption is very natural. Unfortunately, the negative environmental impact of EVs is present, and is not insignificant.

Statistics provided by IEA, which compare the whole life cycle of EVs and ICEs, suggests that the emissions (that include all the emissions related to manufacture and operating of the vehicle) of EVs are at the level of 20 $tCO_{2(e)}$ on average per life cycle. In comparison to the ICEs, which add nearly 42 tons of $CO_{2(e)}$ to the atmosphere during their life cycle, EVs are more than 50% less carbon intensive towards environment (fig. 2).[58] Although this is a positive trend towards the global carbon neutrality, there still needs to be significant adjustments to manufacturing, recycling, and energy production processes, until the electric vehicles could be considered truly carbon neutral and environmentally harmless.

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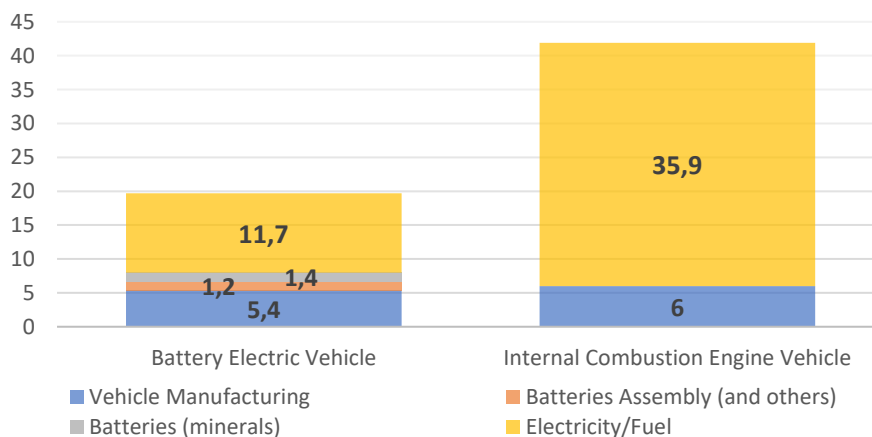
[57] Electric Vehicle Council: Consumer Attitudes Survey 2021, (2021)
[58] International Energy Agency: Comparative life-cycle greenhouse gas emissions of a mid-size BEV and ICE vehicle (2022)

Fig. 2. Comparative life-cycle greenhouse gas emissions of a mid-size BEV and ICE vehicle
(in tCO_2e per vehicle lifetime)

The results are also clear on financial subsidies. In each case, subsidies provided by local governments prove to significantly increase an interest towards electric vehicles. Although this attempt to support the faster transformation of transport sector is feasible in small-scale, which we are currently still experiencing, with increasing demand and manufacturers on market, natural demand with no subsidies would be required for a mass-scale transition.

4 Discussion and Conclusion

The increasing interest and demand for electric vehicles is undoubtedly a trend of 21st century. Although significant issues preventing natural transition are still present, we stated that their relevance is slowly decreasing.

In regard to range, which was one of the most expressed concerns with EVs, a great improvement could be observed, which is expected to continue. Deriving from presented status, we can define several scenarios which would need to fulfill in order to remove the "range" as a concerning attribute of electric vehicles as perceived by consumers; first the technology of batteries would need to advance in such a way, that storage of energy would be more efficient per mass, less demanding for materials and labor and easily recyclable; effectivity of electric motor and other energy demanding parts in EVs would need to increase in order to consume less energy and use it more efficiently, thirdly, the charging stations network would need to be significantly improved and easily accessible in all regions and for all EVs (standardization of charging connectors would also improve the accessibility and reduce the building cost of charging stations), additionally charging stations would need to prove to be sustainable and reliable; lastly, the amount of time to recharge the vehicle, either at residence or charging station, would need to decrease to a comparable level of a time required to refill the tank of ICE vehicle. Making EV battery a removable module is also a possibility, which is being tested by some manufacturers in China and which would allow a establishment of battery replacement stations. Such stations would have a higher potential of time saving during the swap (i.e., recharge) of the battery. Positive fact remains, that statistical data shows, that these scenarios are likely to happen in following decades concurrently. One of the less implemented options among the manufacturers, trying to increase the range of electric vehicle, is also photovoltaics (PVs). Although the efficiency of current solar panels is not at the level, where such a small potential area of placement on passenger vehicle, would make enough of a difference to the range to justify the increase in cost, some manufacturers are indeed trying to implement them in their electric vehicles.[59,60] As mentioned, the issue is that the average passenger car does not provide enough of a physical space, for solar panels to be placed on, resulting in a very limited potential of electricity production from sun.

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[59] Sono Motors official website (https://sonomotors.com/)
[60] Lightyear One official website (https://lightyear.one/)

Although the size of vehicles and locations of usage differs, an example provided by one of the studies analyzing the efficiency of solar panels installed on specific electric vehicle showed, that the amount of energy, which given EV can receive per day to recharge the battery on a July day (which measured the maximum), allow to travel additional 7.98 km (EPA). On the contrary, the lowest measured amount during winter, in January, added only 1.55 km (EPA).[61] Electric vehicles consume a large amount of energy in a short time, which is also one of the reasons, why photovoltaics in its current form is unable to produce enough energy to make vehicle completely independent from grid charging. It is also very common to store vehicles outside of sun to avoid overheating of cabin or damage to the external or internal parts[62], which significantly reduces the potential of PV.

The efficiency of electric motor used in most electric vehicles is already at very high energy efficiency (90%)[63], meaning that the improvement in energy consumption is unlikely. Therefore, the issue of PVs usage in electric vehicles could be addressed in three ways; first, as larger vehicles provide more area for a placement, the potential of solar panels installment increases for trucks with trailers, buses, camper vans as well as other electric vehicles such as ships, where larger area could be used for solar energy production. This means, that PVs even in its current form, could be viable addition for such vehicles. Secondly, energy efficiency of solar panels would need to increase more significantly and thirdly, which is directly connected with efficiency, the costs would need to decrease to the level where the instalment of solar panels would not increase a final price of EV significantly. Technological advance that would result in an increased efficiency of PV could eventually lead to a fully sustainable electric vehicle that would be able to travel *indefinitely* without an external charging (i.e., charging from grid/external energy production device). This prediction can already be observed in a specific case of solar ships.[64] However, in current stage, it is hard to predict, whether the efficiency of solar panels in future could increase to the level, which would make them a regular addition to average sized passenger electric vehicles.

The issue of price might seem to be concerning and relevant at the time, but also follows a positive trend of decline. One of the supporting facts, that makes EV cheaper is, that they are always compared to the prices of ICE vehicles (rationally, as there is no other relevant substitution), which have been increasing in last decade. Some predictions assume, that EV prices could match that of ICE, in the same category and expected level of features, by the end of 2023.

Nevertheless, it is without a doubt that electric vehicles are still notably more expensive than cars with internal combustion engine. Key part, that is the most responsible for current EV prices, are batteries which makes up to approximately 30% of the final costs with most EVs. With regard to that, the expected replacement after 8-10 years puts EV batteries in even more negative position. Additionally, in case of

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[61] Diahovchenko I.- Petrichenko L. – Borzenkov I. – Kolcun M.: Application of photovoltaic panels in electric vehicles to enhance the range (2022)

[62] Sunawar A. - Garniwa I. - Hudaya C.: The characteristics of heat inside a parked car as energy source for thermoelectric generators (2019)

[63] Renault Group: The energy efficiency of an electric car motor (2021)

[64] Silent Yachts official website (https://silent-yachts.com)

collision and even the slightest damage to the battery, the electric vehicle would be considered not suitable for driving and will require the change of the whole battery pack.[65] Issue of battery pack damage is currently getting more attention, and could most likely be avoided in future, by splitting the battery pack into several easily repairable modules, which would then require the replacement of only the parts (modules), that were damaged during the collision. The replacement would then be connected to the remaining undamaged battery modules, which would significantly reduce the overall costs of repair.

On the other hand, the fact that batteries account for a large share of the initial price of EVs indicate, that other parts implemented in such cars are not as cost demanding as parts in ICE vehicles. Therefore, if technology allows an improvement in manufacture of battery systems and extraction of lithium (or other materials, such as sodium), making them significantly cheaper, while manufacturing processes of ICEs stays unchanged, the prices of EVs could be much lower compared to ICE vehicles in the future.

Although the electromobility has a still long way before replacing the currently dominating internal combustion engine vehicles, the statistics prove that they are in fact their largest competitor and possible successor. While issues from various areas, such as range, price, charging, energy availability and environmental footprint are still present, the demand is noticing significant increase in past decade and would most likely continue in this trend in following years.

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Impact of Covid-19 on Restaurant and Travel Businesses Wellbeing

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Abstract. This paper examines the impact of the COVID-19 pandemic on the wellbeing of restaurant and travel businesses in Slovakia. The study utilizes data from the Slovak financial status database FINSTAT to analyze the financial performance of these companies, including revenues, costs, investment, debt, and company size. The research finds that the pandemic has significantly affected the wellbeing of these businesses, with key factors such as decreased revenues, inability to retain employees, and overall sector stability playing a role. The study also reveals a decline in revenues, increased indebtedness, low investment, and decreased performance among these businesses. Government support during the pandemic was deemed insufficient by the companies, further impacting their wellbeing. The paper recommends that the government collaborate with affected companies to develop effective empowerment and welfare-enhancement schemes. This collaboration would help improve the success of government policies and provide the necessary stability for companies in the affected sectors. The restaurant and travel businesses are vital to the economy and the overall recovery from the pandemic, accounting for a significant portion of the GDP and job positions in the European Union. The study further explores the concept of company wellbeing and its significance for business success. It emphasizes the importance of balancing financial growth with the overall wellbeing of the business, as neglecting the latter can lead to stress, burnout, and ultimately, business failure. The research aims to investigate the relationship between negative wellbeing among entrepreneurs and company performance. It suggests that wellbeing at one point in time predicts company performance at a later point, and vice versa. The study utilizes a modified model to analyze the relationship between company wellbeing and various financial variables. Overall, this research sheds light on the impact of the COVID-19 pandemic on the wellbeing of restaurant and travel businesses in Slovakia and provides insights into the relationship between wellbeing and company performance. The findings underscore the need for comprehensive support and strategies to ensure the stability and success of these businesses during and beyond the pandemic.

Keywords: Wellbeing, Company Performance, Covid-19 Pandemic.

1   Introduction

This paper is concerned of impact of the COVID-19 pandemic on restaurant and travel business companies' wellbeing in Slovakia. Data was sourced from Slovak financial status database FINSTAT. Revenues, costs, investment, debt, and size of company have significant impact on companies' wellbeing. Government support for companies throughout pandemic outbreak was generally considered by these companies not efficient and sufficient, and also significantly affected wellbeing of these companies. The primary channels through the pandemic affected companies in this segment are decrease in revenues, inability to adequately pay and keep employees job positions, and overall stability of sector. Financial data from FINSTAT database discovered a significant decline in revenues, increased indebtedness, low investment and decrease in performance. Due to lockdown and travel restrictions revenues were either halted or reduced. This research recommends that the government at all levels create synergies with affected companies in the subsequent empowerment or welfare-enhancement schemes. This will improve the success rate of government policies, given the confidence companies in affected sectors need to obtain stability.

Few have been hit harder by the effects of the Covid-19 pandemic than restaurant and travel businesses. There is no other sector overturned as severely as tourism and hospitality industry because of Covid-19 [41]and the effects were direct and devastating. The Statistical, Economic, and Social Research and Training Center for Islamic Countries [45] reported that out of 217 destinations in the world, 65% are closed for tourists while 25% imposed travel restrictions on the travelers of some specific countries. This segment business owners are facing an unparalleled amount of pressure. It was inevitable that this sustained period of uncertainty would impact the wellbeing of those affected. Purpose of this study is to research a worrying scale this problem. Situation is with no exaggeration to suggest that we're in the midst of a wellbeing crisis, for these companies feeling this acutely. Restaurant and travel businesses are crucial to economy and communities and are central to collective recovery from the Covid-19 pandemic. Restaurant and tourism represent 9,5% GDP of European Union. Creates 11,2% job positions. Almost 3 million companies operate in this sector, while 90% of them are small and medium-sized enterprises [46]. This paper explores the role of wellbeing in restaurant and travel business companies in Slovakia with specific number of employees from 21 up to 49 and possibility of negative wellbeing leading to business failure.

The concept of wellbeing is usually related to individuals. But what about company wellbeing? What does company wellbeing mean to us as a person in business? Company wellbeing is a measure of how well business is balanced. It can be tempting to throw ourselves and people into activity that's designed solely to grow the profits of

a business. But if financial growth is all we focus on, rather than the whole wellbeing of the business, the business and its people will soon be out of balance leading to stress, exhaustion and burnout, people off sick, failure to deliver consistently to customers and a drastic drop in sales. In long run all these issues may lead to company failure.

2   Literature review

The aim of this research is to investigate the relationship between entrepreneurs' negative wellbeing and company performance. The research group for this study are entrepreneurs. Some of research has been executed on this group but there is no definition agreed upon. This research keeps in line with the definition of the European Commission of small and medium sized enterprises as companies employing less than 250 people. In the demarcation of entrepreneurs' research follows the definition by Van Praag and Versloot (2007) namely "individuals who have started up a business or who own a business, i.e., who are self-employed or the owner-manager of an incorporated business". Regarding entrepreneurs, only a small number of studies have explored wellbeing performance relationships (see for a review Gorgievski and Stephan 2016). These studies mainly have used cross-sectional designs and therefore no certain conclusions can be drawn as concerns the bi-directionality of the relationships or length of the time lags. Two longitudinal studies among Dutch farmers have shown that poor mental and physical wellbeing predicted financial hardship and poor financial business performance over 1, 2 and even 10 years of time[12]. Evidence for a possible reversed relationship leading from financial problems to impaired wellbeing was only found within measurement moments, indicating this effect would be short term. Prior research has shown work-related strain predicted business performance more strongly than work engagement did [8]. This research uses measures of entrepreneurial performance as recommended previously by several scholars [35]. The most common way to measure entrepreneurial performance to date are financial parameters, like revenues, profit, and number of employees [33]. The past decade however, there has been a growing interest in more subjective measures of entrepreneurial performance, like achieved autonomy [20], personal satisfaction and growth [33], customer satisfaction [27], family security [20] and flexibility [33]. The reason for the increased popularity of subjective measures in addition to financial business parameters, is the finding that subjective measures are often more predictive of entrepreneurs' decision making and behavior than objective indicators[27].

2.1   Relationship Between Entrepreneurial Performance and Wellbeing
This research will test postulation that unhappy company leads to unproductive company, according to which different dimensions of negative wellbeing predict

entrepreneurial performance. Empirical findings have generally supported the 'happy-productive worker hypotheses, although the strength of the relationships between happiness and performance vary considerably across studies, for example depending on the conceptualization and operationalization of "happiness", for example as purely affective measures versus general or job specific satisfaction, which also has a cognitive component [42]. A meta-analysis of Iaffaldano and Muchinsky (1985) shows that relationships between job satisfaction and job performance are fairly low. Others found considerably higher correlations in their meta-analyses Judge et al. (2001). Work performance may be more strongly predicted by general life satisfaction than by job satisfaction. Considering work engagement, studies have shown positive relationships between work engagement and performance among employees [1,16,39]. Among entrepreneurs, Dej (2011) found a positive relationship between job satisfaction and subjective entrepreneurial success and two recent studies showed work engagement positively related to subjective entrepreneurial success [8] and business growth and subjective business performance [11].

Another aspect influencing whether the 'happy-productive worker thesis' gained support in prior studies is the time frame of the study. Studies focusing on happiness as a state generally found stronger evidence than studies operationalizing it as a trait [42]. This study investigates if wellbeing impacts on entrepreneurial performance over 2 years of time. It is not expected an incidental dip in satisfaction or work engagement could have such a long-term effect, but prior research has shown the different dimensions of wellbeing have a highly stable set-point over time [21]. This stability is caused by internal adjustment processes, also referred to as a 'hedonic tread-mill' [6]. Life satisfaction has been found to have a high degree of stability over 2 years [17], and even 4 years of time [24], irrespective of important life events that may have happened in between. Also work engagement is seen as a relatively stable characteristic of a person [30]. Empirical evidence exists that this stable component, presumably affecting entrepreneurs' efforts and decision making continuously, and not incidental impaired wellbeing, influence financial business performance over a longer period of time [14]. It is therefore expected a positive relationship between wellbeing and company performance.

Hypothesis 1   Wellbeing at T1 predicts company performance at T2.

The second expectation worth to test, is a reversed causal relationship leading from good entrepreneurial performance to positive wellbeing or poor performance leads to negative wellbeing. Several empirical studies among employees have indeed shown good performance makes people happy [6,22]. The explanation given by Veenhoven (1991) is that income helps people to meet their needs and therefore relates to wellbeing. Other studies show that positive organizational performance leads to positive employee attitudes and satisfaction [32]. Siehl and Martin (1990) found that

organizations which perform well, have more resources to invest in their employees, which leads to positive wellbeing. Valued outcomes are typically those outcomes relating to the fulfilment of human needs, such as need for competence, accomplishment and personal growth [19]. Subjective entrepreneurial performance links to those entrepreneurial outcomes entrepreneurs themselves have identified as relevant success criteria, in other words, desirable end states entrepreneurs themselves aim to achieve with their business [36]. It can be expected that achieving at or above these criteria leads to satisfaction, whereas performing below these criteria leads to dissatisfaction. For the reversed relationship is expected relative stability of entrepreneurial performance and wellbeing to play a role. Whereas is expected the stable component of wellbeing to impact on entrepreneurial performance, is expected changes in performance to impact entrepreneurs' wellbeing. Economic conditions have due to Covid-19 pandemic changed considerably in Slovakia. Business performance of restaurant and travel companies have shown sudden and dramatic changes during the 2-year time lag of this study for most companies. Because of the happiness set-point [6,22], it is assumed, good entrepreneurial performance does relate to the experience of positive wellbeing. In addition to testing the reversed relationship from company failure to negative wellbeing over 2 years of time, this data also allows for testing if objective business performance precedes better wellbeing. Companies had retrospectively reported on their financial situation in the book year prior to data collection. Therefore, second hypothesis is formulated as follows as follows:

Hypothesis 2   Company performance predicts wellbeing over time.

3   Methodology

3.1   Model and method

Obakemi et.al (2022) based their research about household wellbeing on Minority group theory, as propounded by Rowntree [14]. It also serves as the theoretical foundation for this study. According to Rowntree, poverty, or poor wellbeing, is caused by the insufficient earnings. According to the theory, some households remain poor because the earnings of the primary wage-earner are insufficient to support the family. I consider, Rowntree's argument analogous to the current post COVID-19 situation of restaurant and travel business companies. Insufficient revenues will cause poor wellbeing.

Mathematically, wellbeing is a function of earnings or in company case revenues. That is,

$$Wellbeing = f\ (revenues) \qquad\qquad (1)$$

Model

The modified model for this research is as:

$$W_i = \beta_0 + \beta_1 DV_i + \beta_2 CompV_i + \beta_3 CuV_i + \beta_4 OtherV_i + \varepsilon_i \quad (2)$$

Where W is a measure of company wellbeing; DV is a set of financial variables that capture company performance. $CompV$ is a set of information on the debt and investment of a company. CuV is a set of information about company utilities; $OtherV$ is a collection of other variables.

Table 1 provides a detailed definition of all the variables for each vector as specified by the model. Furthermore, "i" stands for an individual company, while ε stands for the random error term.

Sample size was selected from Slovak, public financial database FINSTAT. Filter to select data was set to select private Slovak companies from gastro and travel sector, with 21 to 49 employees with financial statements for year 2020 and 2021 operating up to date of research. Sample size has 280 count.

Wellbeing comprises both subjective and objective forms. The former comprises happiness and acceptance. This makes subjective wellbeing rather difficult to measure and its application controversial [2]. The objective wellbeing index conventionally includes real economic indicators. Popova (2016) found it more logical for a higher GNI to boost a higher level of wellbeing. Recently, Yang (2018) proved that the "Preference Index Approach (PIA) is a better metric for measuring wellbeing. Therefore, this study presents items that allow individual companies to rate their wellbeing (either increased, constant, or decreased) by comparing their wellbeing before and after the pandemic.

Individual companies with access to savings, loans and government support are expected to experience less deteriorated wellbeing during the pandemic, compared to companies without access to above mentioned. If the wellbeing of company remained constant or improved during the pandemic as compared to the pre Covid-19 era, it is scored one (1), and it is scored zero (0) if otherwise. The items of assessment are based

on the data from Slovak financial database FINSTAT which includes revenues, profit, assets, equity, markup and total debt change.

The dependent variable is dichotomous, whereas the predictor variables are a mix of continuous and categorical. More importantly, logistic regression makes no assumptions about the explanatory variable distributions. According to Obakemi (2022) a binary logistic regression is the best fit for this study. To avoid cases of multicollinearity, as suggested by Greene (2002), and to arrive at a parsimonious model, the model is gauged using hierarchical forward-backwards selection procedures of the binary logistic stepwise regression technique. Because the study covers many variables, all of the explanatory variables are initially assumed to be equally important, and the simultaneous selection procedure was used. Thus, variables are screened at 1% and 5% significance levels.

Table 8. Definition and Measurement of Variables

Variables	Definition
Wellbeing	Company wellbeing is measured by the quality of life. It is measured in binary form. = 1 if company wellbeing increased/constant after COVID-19, and zero if otherwise
Revenues(Y_{-1})	Revenues in euro (€) during COVID-19
Revenues(Y)	Revenues in euro (€) after COVID-19
$\Delta Y = (Y_{-1} - Y)^2$	Change in revenues
Profit (P_{-1})	Profit in euro (€) during COVID-19
Profit (P)	Profit in euro (€) after COVID-19
$\Delta P = (P_{-1} - P)$	Change in profits
$\Delta P / \Delta Y$	Marginal propensity to profit
Support	=1 if received support from the government after COVID-19 pandemic and zero if otherwise
Δ Asset	=1 if increase in assets after COVID-19 pandemic and zero if otherwise
Δ Equity	=1 if increase in equity after COVID-19 pandemic and zero if otherwise
Δ Markup	=1 if increase in markup after COVID-19 pandemic and zero if otherwise

Δ Total debt	=1 if decrease in total debt after COVID-19 pandemic and zero if otherwise

4   Results

4.1   Preliminary results

Table 2 shows that there were 36% of companies with number of employees from 21 to 24 ad 64% with number of employees from 25 to 49. The average revenue was 845 731,77€, with minimum revenue of 0,00€ and maximum revenue 4 612 908,00€. After Covid-19 pandemic only 46% of companies achieved profit, top one with maximum of 806 296,00€ and last one with loss of -653 909,00€. Average loss per company was -29 112,65€. Average total debt is 110,45%. A high debt ratio indicates that companies are highly leveraged, and may have borrowed more money than can easily pay back. Investors and accountants use debt ratios to assess the risk that a company is likely to default on its obligations.

Average markup was -9,69% and 46% of companies increased their markup and 64% shows decrease in markup. Wellbeing of companies is likely to have deteriorated during the Covid-19 pandemic. Revenues were insufficient, debt ratio increased and overall situation worsen during and after pandemic.

Table 9. Characteristics of companies' financial data.

Variables		Per cent	Average	Std. Dev.	Min	Max
Size	20-24	36%				
	25-49	64%				
Profit		46%	-29 112,65		-653 909,00	806 295,00
Debt			110,45%			
Revenues			845 731,77		0,00	4 612 908,00
Markup	130 up	46%				96,09%
	147 down	64%	-9,69%		-248,30%	

Table 3 presents the distribution of revenues during and after the COVID-19 lockdown. According to FINSTAT there is increase in number of companies whose revenues dropped during pandemic. Decrease in earnings leads to lower wellbeing of companies.

Table 10. Number of restaurant and travel companies at revenue range achieved 2021 and 2020.

Bin 2021	Frequency	Cumulative %	Bin 2020	Frequency	Cumulative %
0	2	0,72%	0	11	3,94%
768818	155	56,27%	768818	144	55,56%
1537636	96	90,68%	1537636	102	92,11%
2306454	12	94,98%	2306454	15	97,49%
3075272	8	97,85%	3075272	5	99,28%
3844090	4	99,28%	3844090	2	100,00%
4612908	2	100,00%	4612908	0	100,00%
More	0	100,00%	More	0	100,00%

Table 4. Histogram data for restaurant and travel companies at revenue range achieved in 2021 and 2020.

Revenues 2020		Revenues 2021	
Mean	779380,6057	Mean	845731,7419
Standard Error	33862,88338	Standard Error	40466,67839
Median	718841	Median	681600
Mode	0	Mode	0
Standard Deviation	565621,6659	Standard Deviation	675926,7895
Sample Variance	3,19928E+11	Sample Variance	4,56877E+11
Kurtosis	4,048373937	Kurtosis	9,085405075
Skewness	1,531394172	Skewness	2,559292682
Range	3616999	Range	4612908
Minimum	0	Minimum	0
Maximum	3616999	Maximum	4612908
Sum	217447189	Sum	235959156
Count	280	Count	280

Table 5. Number of Slovakian companies at revenue range achieved 2021 and 2020.

Firms with revenue range	2019	2020	2021
up to 100 000€	143 820 (67,4 %)	161 014 (69,9 %)	174 450 (69,7 %)
100 000-500 000€	42 313 (19,8 %)	42 513 (18,5 %)	46 367 (18,5 %)

500 000 to 2 mil. €	17 925 (8,4 %)	17 613 (7,6 %)	19 340 (7,7 %)
2 up 10 mil. €	6 968 (3,3 %)	6 806 (3,0 %)	7 525 (3,0 %)
above 10 mil. €	2 389 (1,1 %)	2 294 (1,0 %)	2 515 (1,0 %)
Total	213 415	230 240	250 197

Tables 3 and 5 represent the distribution of company revenues. The standard deviation indicates significant revenue disparity among the cross-section of selected companies. Revenues and company expenditure statistics during Covid-19 differ significantly from those of the pre Covid-19 period. The average, minimum, and maximum revenues dropped. The setback on revenues is a reflection of those whose earnings were affected during the enforcement of pandemic. The results also revealed that the per cent of companies in the revenues bracket dropped while those that earned less increased. The values of the standard deviation for revenue and consumption spending depict the existence of welfare disparity among the companies. The difference between the standard deviations of revenue during and before the Covid-19 lockdown shows that the drop in revenue is more significant to the relative higher earnings than the lower earnings. This is further justified by the fact that the standard deviation during the lockdown is less than before the lockdown. Surprisingly, the standard deviation of company spending during the lockdown rose, an indication of company welfare loss.This study captures a large number of explanatory variables, which informed the use of stepwise regression to avoid spurious regression. The selection was made at both the 1% and 5% significant levels to ensure the reliability of the results. For both significant levels (0.01 and 0.05), the results of both forward and backward selection procedures are nearly identical across all regressions. To avoid duplication, only results estimated at a 5% significance level are discussed. Also, the findings support the absolute revenue hypothesis by Keynes (1936), the lifecycle income hypothesis by Modigliani (1956), and the minority group theory by Rowtree (1941); thus, revenue appears to be the best predictor of wellbeing. To avoid multicollinearity, consumption is excluded from the selection process. All of the predictors are significant and correspond to the a priori expectations. Expectedly, larger companies have better wellbeing during the pandemic than smaller companies. Companies with higher revenues are more likely to experience less deteriorated wellbeing during the COVID-19. The wellbeing of companies whose revenue increased significantly during the pandemic lockdown is more likely to improve. The pandemic halted the activities of the restaurant and travel companies whose revenues were determined by the number of customers who visited them. Unlike some others, who got revenue, these companies were forced to rely on past savings and other sources. The descriptive statistics results will show several cases of revenue irregularity, such as lower revenue and no work, no pay. The findings show that companies with regular revenues during the Covid -19 lockdown are more likely to experience better wellbeing than those whose revenues

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were cut. Support variables escaped the elimination process. During the pandemic lockdown, companies that received government support were more likely to enjoy better wellbeing than those who did not receive the support, respectively. Surprisingly, government support is insignificant. Despite the substantial budget for support, only 39,89 % of restaurant and travel companies received government provided support. Perhaps the government lacked an efficient and long-term mechanism to implement proper schemes. In the model, the study controlled for all four vectors of explanatory variables. Assets, equity, markup and total debt positively and statistically significant, whereas revenues and profits are negatively and statistically significant. Furthermore, the marginal propensity to consume (MPC) of companies did not survive the model's selection criteria. It is, however, found to be statistically significant in the combined model. It demonstrates that the income elasticity of company consumption had a positive effect on company wellbeing during the COVID-19.

5   Conclusion

This study examined the impact of Covid-19 on restaurant and travel business companies during and after pandemic. This research used a data from Slovak financial database FINSTAT to generate a company dataset from a cross section of companies with 21 to 49 employees. The preliminary results found a significant decline in revenues and investment during the Covid-19 pandemic. The sampled companies yearly average revenue was reduced by 53%, while their investment was reduced by 65%. These two variables are important wellbeing indicators. Therefore, it is evident that companies' wellbeing is reduced during the pandemic. To calibrate the quantum of change in wellbeing, this study adopted comparison of financial data to compare wellbeing in two periods, during pandemic (2020) and after (2021) the Covid-19. Thus, the dependent variables are presented in dichotomy form. To avoid spurious regression that is common in cases of a large number of explanatory variables, forward-backwards-stepwise binary regression was used. The preliminary empirical findings show that government support had a positive impact on company wellbeing. The empirical findings show that revenue and profit variables are all significant and consistent across all regressions. The odd ratio shows assets, equity, markup and total debt that are the most influential predictors of household wellbeing. Of much importance to this study is that the government support even though available was not possible for all companies due to different legal reasons. Where available it had positive impact on company wellbeing. It is a call for the government to collaborate with companies since it seems to guarantee the better implementation of empowerment schemes. Research into predictors of entrepreneurial performance remains crucial. Evidence that negative wellbeing affects business performance, will be of interest to entrepreneurs themselves, but also to business consultants, and policy makers. The findings can be food for thought about possible interventions to increase entrepreneurs' wellbeing and thus

possibly their entrepreneurial performance. Improving entrepreneurial performance is not only favorable for individual entrepreneurs, but also for the economy at large, as restaurant and travel companies play a major role in the general economy.

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Understanding the Determinants of Emigration Decisions among the Afghan Population

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Abstract. This study examines the factors influencing emigration decisions in Afghanistan from 2016 to 2021. Specifically, it analyzes the influence of economic, social, and demographic factors on emigration decisions, using a binary logistic regression model and a cross-sectional time series dataset. It finds that owning small land portions, less livestock, and having lower income positively influence emigration likelihood, while owning large land holdings, more livestock, and higher income have a negative correlation. Social factors like political instability, poor public services, insecurity, violence, and family connections abroad play a significant and positive role. Demographic factors such as being young, educated, single, male, living in urban areas, and belonging to smaller households are positively influence the decision to emigrate, while uneducated individuals show a negative influence. The research has implications for public policy, academia, and international donor organizations, emphasizing the need to address push factors in the source country. Future studies can expand the analysis to include additional factors and multiple countries.

Keywords: Afghanistan, Emigration Decision, Economic Factors, Social Factors, Demographic Factors, Logistic.

JEL classification: *O* 15*, F 22, and J 15*

1   Introduction

Emigration from Afghanistan has increasingly been a regional and global issue for transit, destination countries, and for international organizations actively involved in humanitarian assistance efforts. According to the United Nations report, international migrants reached 281 million in 2022, which is 66 million higher than in 2010 [39]. Moreover, as per a comprehensive survey undertaken by Gallup, it has been substantiated that an estimated 700 million individuals, representing roughly 15% of the worldwide populace, exhibit a predisposition towards international migration, expressing a desire to relocate to alternative countries [17]. According to a report by the International Organization for Migration (IOM), in the year 2020, Afghan nationals constituted the second largest group of refugees globally, surpassed only by individuals from Syria [13]. Afghanistan, a nation classified as a developing country, has been grappling with persistent economic and political instability ever since the Soviet Union's invasion in 1979. This protracted state of affairs has precipitated prolonged periods of civil strife, societal instability, and substantial outflows of individuals seeking refuge beyond the country's borders. Nonetheless, antecedent to these upheavals, Afghans were also engaged in emigration predominantly driven by economic imperatives [29].

As illustrated in Figure 1, the initial wave can be identified by the presence of sociopolitical factors, particularly the onset of a war, which was initiated by the invasion of the USSR in 1979 [3]. Subsequently, the second wave emerged as a consequence of the civil war that erupted among the various factions of Mujahideens subsequent to the withdrawal of Soviet troops in 1989, leading to widespread violence within the country. The third wave of mass emigration ensued when the Taliban assumed control over more than 95% of Afghanistan's territory in 1995 and implemented stringent societal regulations and restrictions. The fourth, fifth, and sixth waves of emigration were spurred by the escalation of armed conflict, political instability, and ultimately the collapse of the government in 2007, 2014, and 2021 respectively.
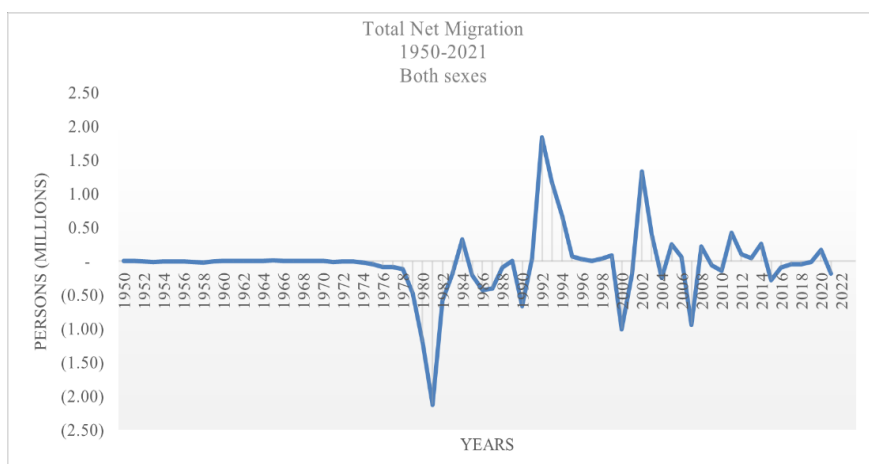
Figure 1. Net Migration Trend [38]

Notably, the announcement of the North Atlantic Treaty Organization (NATO) troop withdrawal by 2014, coupled with the presidential election in the same year, precipitated a state of political instability and consequently resulted in an elevated number of emigrants.

Moreover, various factors including the intensification of insurgency, ongoing peace negotiations with the Taliban, the contentious and fraudulent 2019 presidential election, and the US-Taliban Doha agreement, have emerged as the principal driving forces behind the prevailing upward trend since 2017. Following the withdrawal announcement by the US president in April of 2021 and the subsequent failure of Taliban peace negotiations with the Afghan government, the Taliban escalated their military operations, ultimately culminating in the collapse of the Afghan government in August 2021. This significant turn of events led to an unprecedented surge of 53% in the number of individuals expressing their intent to leave the country [34]. Following the occurrence of the collapse, an approximate total of 150,000 Afghan individuals have been successfully evacuated solely by the United States, the United Kingdom, Germany, Canada, and Australia [25,7,35]. Between October 2021 and January 2022, an estimated one million Afghans migrated to Iran, as reported by The New York Time [19]. Simultaneously, approximately 300,000 Afghans departed for Pakistan, according to a Pakistani official's report [20]. According to Augustova & Karimi (2021), a significant number of 12,000 Afghan individuals departed the country on a daily average subsequent to the collapse [5]. However, it is noteworthy that the neighboring countries have predominantly intensified their deportation efforts. For instance, within the period of December 1st to December 15th, 2022, Iran forcefully repatriated a substantial count of 18,665 Afghan nationals [22].

The decision to undertake emigration is influenced by a multitude of factors, encompassing a complex interplay of socioeconomic, political, and personal elements. In the field of migration studies, researchers commonly employ the conceptual frameworks of "push" and "pull" factors to elucidate the underlying reasons that impel individuals to depart from their country of origin [9].

The extant empirical evidence pertaining to Afghanistan exhibits a predominant presence of diverse factors exerting an influence on the choice to emigrate. Several studies have revealed that, taking into account the socio-political milieu of Afghanistan, the crisis of emigration is intricately intertwined with the recent surge in political turbulence, social instability, and insecurity [26,27,18]. Nevertheless, a plethora of scientific research has established climate change, land degradation, drought, and declining agricultural income as major contributors to social problems, resulting in both internal and external migrations [33,24,23,16]. Additionally, a group of literature focused on the demographic factors such as age, family size, province, education, and gender [28]. However, a comprehensive study of economic factors influencing emigration decision with application of quantitative methods and large sample size define the gap.

This study contributes significantly to the existing literature in several ways. First, the existing empirical evidence thus far has yielded inconclusive results with regard to comprehensively understanding the precise magnitude of economic, social, and demographic factors on emigration. No study has encompassed all three factors concurrently to thoroughly examine their collective influence on emigration. Hence, the existing gap can be defined by the absence of quantitative methods and large sample sizes. Therefore, this research endeavor seeks to address this gap by taking into account economic, social, and demographic factors in a comprehensive manner. Second, it is the first analysis to examine the impact of land on emigration decisions using a large sample size of 73,856 Afghans across 34 provinces of Afghanistan from 2016 to 2021. Third, this study provides distinct empirical evidence regarding the impact of land size, livestock holdings, and income levels on the decision to migrate, thereby highlighting the pivotal role of economic factors. Given that approximately 70% of the Afghan population resides in rural areas and relies on agriculture as their primary means of livelihood, the profound importance of land within Afghanistan's agrarian economy renders it a prime setting for examining economic determinants [42].

Finally, it incorporated comprehensively the social and demographic factors and also highlights the relevance of the research outcomes for policymakers, academics, and the international migration entities. The research is structured into sections covering methodology, results, and conclusion.

Research Question: What are the factors influencing the likelihood of a person in Afghanistan to emigrate?

2   Methodology

2.1   Model Specification

Based on the literature review, the author of this research is utilizing the logistic model to determine the impact of land on emigration decisions. However, the extensive array of factors that influence emigration decisions renders it challenging for migration-related studies to arrive at a dynamic, unified, interdisciplinary econometric model of migration [9].

The logistic regression model is frequently employed in social science research to assess the probability of an event's occurrence. It posits that the connection between the independent variables and the dependent variable follows a linear pattern within the log-odds framework. The logit function serves the purpose of converting this linear relationship into a probability.

$$P(Y = 1) = e^{(\beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k)} \Big/ (1 + e^{(\beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k)})$$

where P(Y=1) is the probability of the dependent variable Y equaling 1 (the event occurring), X1, X2, ..., Xk are the independent variables, β0, β1, β2, ..., βk are the coefficients to be estimated, and e is the base of the natural logarithm.

The coefficients represent the effect of the independent variables on the probability of the event occurring (Hosmer et al., 2013). Additionally, the study applied test for model specification (linktest), Hosmer-Lemeshow goodness-of-fit test, and multicollinearity test, called variance inflation factor (VIF) to ensure the application of proper regression model. STATA 17 is used for the analysis.

Suggested Model

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$
$$i=1,\ldots,n$$

Where Y is the dependent variable which is emigration decision; X_i are the main variables of the focus study, and ε_i represent the random disturbance or errors of the variables.

2.2 Variables Description

The table below presents the survey questions along with their respective measurements.

Table 1. Description of Variables

Variables	Questions	Type	Sign	Literature
Emigration Intension	If given opportunity, would you leave Afghanistan and live somewhere else?	Binary (yes=1)		[10]
Land	How many of the following does your household have?... hectar of Land.	Categorical	-/+	[40]
Livestock	How many of the following does your household have?... Livestock (not poultry)	Categorical	-	[32]
Employment	Do you yourself do any activity that generates money?	Binary (yes=1)	-	[14]
Income	Can you estimate your average monthly household income on one of the following categories(AFN)?	Categorical	-	[10]
Female income	Do female members of the family contribute to this household income?	Binary (yes=1)	+	[36]
Public services (effectiveness)	How successful do you think the government has been in improving the living condition of people living in your area —a lot, a little, or not at all?	Categorical	-	[1]
Political Instability	Generally speaking, do you think things in Afghanistan today are going in the right direction, or do you think they are going in the wrong direction?	Binary (Wrong direction=1)	+	[11]
Happiness	In general, in your life, would you say you are very happy, somewhat happy, not very happy or not at all happy?	Categorical	+	[10]
Violence	Have you or has anyone in your family been a victim of violence or of some criminal act in your home or community in the past year?	Binary (yes=1)	+	[37]
Insecurity	In your view, does any group currently pose a threat to the security of this local area?	Binary(yes=1)	+	[12]

Access use	Do you or do you not use any of the following for obtaining information? ... The internet	Binary (yes=1)	-	[41]
Diaspora	Do you have a family member or close relative that lives abroad?	Binary (yes=1)	+	[8]
Age	How old were you on your last birthday? / How old are you?	Categorical	-	[43]
Gender	Male	Binary (male=1)	+	[2]
Household size	How many people live here at this address?	Categorical	-	[1]
Marital Status	What is your marital status?	Binary (single=1)	-	[30]
Education	What is the highest level (grade) of school you have completed, not including schooling in Islamic madrasa?	Categorical	-	[1]
Urban/rural	CSO Geographic Code	Binary (urban=1)	+	[1]

Source: Compiled by author

2.3 Data

This research utilizes data from the Survey of Afghan People conducted by the Asia Foundation, an international nonprofit organization. The dataset represents all provinces, ethnic groups, and genders in Afghanistan and covers economic, political, and social issues. The survey has been conducted annually from 2006 to 2021, resulting in 148,196 randomly selected observations using a multistage, systematic sampling approach [4]. This paper will utilize cross-sectional time series data from the period of 2016 to 2021, where the data for the year 2020 is not collected due to the COVID-19 pandemic. We have chosen this specific timeframe to ensure the availability of pertinent data concerning our variable of interest, resulting in a total of 73,856 observations across all provinces.

2.4 Descriptive Statistics

Table 2. Households Demographic Characteristics

Category	Respondents	%	Category	Respondents	%
Gender			**Rural/Urban**		
Male	37380	50.61	Urban	16737	22.66
Female	36476	49.39	Rural	57119	77.34
Education			**Region**		
No formal education	36860	49.91	Central/Kabul	14849	20.11
Primary school (1-6)	11656	15.78	East	8640	11.70
Secondary School (7-9)	5417	7.33	Southeast	5435	7.36
High School (10-12)	13490	18.27	Southwest	9973	13.50
University degree (12 +)	6188	8.38	West	7867	10.65
			Northeast	11478	15.54
			Central/Hazarjat	3901	5.28
			Northwest	11713	15.86
Ethnicity			**Age**		
Pashtun	28587	38.71	Young (18-25)	20375	27.59
Tajik	25739	34.85	Adults (26-59)	49292	66.74
Hazara	8251	11.17	Old (60 plus)	4189	5.67
Uzbek	5422	7.34			
Others	5857	7.93			
Marital Status			**Household size**		
Married	59843	81.03	Small (1-5)	8257	11.18

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Single	12329	16.69	Medium (6-10)	39003	52.81
Widow/divorced	1684	2.28	Large (10+)	26596	36.01
Total	**73856**	**100**	**Total**	**73856**	**100**

Source: Calculated by Author in STATA

Table 3. Percentage of Individual who Leaves the Country by Category

Category	Leave	Category	Leave	Category	Leave
Gender		**Land**		**Political Instability**	
Male	38.75	Small (0-1)	38.10	right direction	33.19
Female	35.41	Medium (2-10)	32.88	wrong direction	39.58
		Large (10+)	29.23		
Rural/Urban		**Livestock**		**Insecurity**	
Urban	42.25	Small (0-10)	37.37	Yes	39.97
Rural	35.59	Medium (10-50)	35.34	no	37.61
		Large (51+)	29.18		
Age		**Employment**		**Happiness**	
Young (18-25)	40.77			Very happy	33.71
Adults (26-59)	36.28	Yes	38.43	Somewhat happy	37.94
Old (60 plus)	28.96	No	35.92	Not very happy	40.34
				Not at all happy	41.00
Marital Status		**Female income**		**Victim of Violence**	
Married	35.88				
Single	43.67	Yes	40.35	Yes	39.53
Widow/divorced	32.36	No	36.30	no	36.56
Household size		**Income**		**Access to internet**	
Small (1-5)	40.38	Low (0-5000)	34.94	Yes	48.79
Medium (6-10)	38.71	Medium (5001-25000)	34.52	no	35.18
Large (10+)	33.72	Large (25001+)	31.60		
Education		**Public Services Effectiveness**		**Diaspora (link abroad)**	
No formal education	32.74				
Primary school (1-6)	36.27	A lot	32.02	Yes	47.20
Secondary School (7-9)	41.43	A little	37.87	no	30.70
High School (10-12)	44.60	Not at all	41.69		
University degree (12 +)	44.44				

Source: Calculated by Author in STATA

3 Result

The regression analysis aimed to examine the influence of various factors on the emigration decision in Afghanistan during the period of 2016-2021. The dependent variable is binary, representing whether individuals intended to emigrate or not. To obtain a reliable and consistent regression result, the current study first applied various model specifications and diagnostic tests, the results of which are presented in the following order:

3.1 Diagnostic Tests Result

To validate the assumptions of the logit regression model, such as the absence of perfect multicollinearity among the independent variables, we conducted the VIF test. The results indicate a mean VIF of 1.28 and a maximum of 2.42, which falls within an acceptable range below the lower boundary of 5. Moreover, the linktest, performed to assess model specification accuracy, suggests that the model is correctly specified

(hatsq = 0.403). Furthermore, the Hosmer and Lemeshow's goodness-of-fit test (Prob > chi2 = 0.262) confirms the fitness of the logistic model.

To account for potential heteroskedasticity and serial correlation, we utilized logistic regression while considering robust standard errors. The results obtained through various diagnostic and model specification tests consistently support the use of the logit model with robust standard errors. Nevertheless, for the purpose of demonstrating consistency and trend analysis, we included separate logit regression models for each year.

3.2 Discussion of the Regression Result

After controlling for other factors, the results indicate that a small portion of land, livestock ownership, and income have a significant positive influence on the probability of making an emigration decision, while owning large land, livestock, and having a high income have a negative influence. This suggests that individuals with less land, livestock, and income are economically more vulnerable and consider emigration as an alternative livelihood option. The expansion of irrigation networks to arid agricultural land and investments in the distribution of arable land will decrease the likelihood of Afghan people emigrating. This means that having a substantial amount of land, livestock, and income provides opportunities for employment or self-employment, reducing the probability of emigration. However, there is a positive and significant correlation between employment in 2016 and 2019. Additionally, households with female income significantly influence the probability of emigrating, suggesting that skilled women are more willing to leave [15].

Several social factors significantly influence the decision to emigrate in Afghanistan. These factors encompass dissatisfaction with political instability, inadequate public services, pervasive insecurity, widespread violence, and high levels of public unhappiness. Moreover, the presence of family or connections abroad, as well as the utilization of the internet for obtaining news and information, positively contribute to the likelihood of emigration. Social networks and information dissemination play a pivotal role in the migration process, suggesting that a well-executed social media campaign has the potential to discourage emigration.

Among the demographic factors examined, the analysis revealed that several characteristics are positively correlated with the decision to emigrate. These characteristics include youth, education, single, marital status, male gender, urban residence, and being in small households. Conversely, individuals lacking education exhibit a significantly negative correlation, indicating a diminished inclination to emigrate.

It is important to note that the results are contingent upon the specified time period and the variables incorporated in the analysis. Further research is necessary to obtain a more comprehensive understanding of the factors influencing emigration decisions in Afghanistan.

Table 3. Regression Result

EMIGRATION DECISION VARIABLES	(1) Pool-logit	(2) 2016	(3) 2017	(4) 2018	(5) 2019	(6) 2021
Small Land (0-1 hectar)	0.185***	0.175***	0.243***	0.262***	0.206***	0.0706
	(0.0269)	(0.0573)	(0.0593)	(0.0422)	(0.0477)	(0.0477)
Large Land (10+ hectar)	-0.313***	-0.0844	0.323*	-0.149	-0.056***	-0.196
	(0.0915)	(0.239)	(0.187)	(0.1620)	(0.161)	(0.161)
Low Income (1-5000afs)	0.0766***	-0.0819	- 0.166***	0.0436	0.0913***	0.0591
	(0.0283)	(0.0546)	(0.0623)	(0.0504)	(0.0474)	(0.0474)
High Income (25001afs+)	-0.157	-0.191	-0.464**	-0.199	-0.0954	-0.195
	(0.114)	(0.327)	(0.209)	(0.131)	(0.189)	(0.189)
livestock (10-50)	0.0595*	-0.128*	0.120*	0.0404**	0.0139	0.109
	(0.0356)	(0.0702)	(0.0699)	(0.0441)	(0.0689)	(0.0689)
Livestock (50+)	-0.276***	-0.0561	-0.0118	-0.100***	-0.1522	-0.522***
	(0.104)	(0.237)	(0.205)	(0.187)	(0.260)	(0.160)
Employment	-0.0359	0.175***	0.0673	-0.0354	0.154***	0.0144
	(0.0288)	(0.0612)	(0.0641)	(0.0546)	(0.0476)	(0.0476)
Female Income	0.156***	0.0276	0.0716	0.135***	0.219***	0.119***
	(0.0246)	(0.0517)	(0.0552)	(0.0446)	(0.0414)	(0.0414)
Public services (not satisfied)	0.162***	nil	0.105**	0.176***	0.223***	0.123***
	(0.0203)		(0.0448)	(0.0343)	(0.0335)	(0.0335)
Political Instability	0.296***	0.118***	0.254***	0.366***	0.236***	0.236***
	(0.0201)	(0.0430)	(0.0448)	(0.0341)	(0.0361)	(0.0361)
Insecurity	0.0981***	nil	nil	0.0017	0.0735**	0.135***
	(0.0198)			(0.0332)	(0.0318)	(0.0318)
Violence	0.0110	0.370***	0.217***	-0.1203*	-0.0185	-0.0185
	(0.0245)	(0.0490)	(0.0523)	(0.0491)	(0.0410)	(0.0410)
Happiness (not at all)	0.256***	0.130	-0.115	0.119	0.348***	0.248***
	(0.0445)	(0.0879)	(0.101)	(0.0886)	(0.0463)	(0.0663)
Internet use (for news)	0.346***	0.316***	-0.0140	0.407***	0.2425***	0.325***
	(0.0266)	(0.0692)	(0.0742)	(0.0511)	(0.0592)	(0.0392)
Diaspora (relatives abroad)	0.577***	0.987***	0.538***	0.511***	0.597***	0.697***
	(0.0191)	(0.0406)	(0.0432)	(0.0329)	(0.0319)	(0.0319)
Age group (18-25)	0.0452*	0.0296	0.117**	0.0123	0.0648**	0.0648
	(0.0263)	(0.0550)	(0.0571)	(0.0314)	(0.0456)	(0.0456)
Marital Status (single)	0.132***	0.189***	0.105	0.048**	0.1416	0.141***
	(0.0319)	(0.0638)	(0.0708)	(0.0380)	(0.0533)	(0.0533)
Household size (1-5)	0.0871***	0.0986	0.114*	0.195	0.1765**	0.0765
	(0.0293)	(0.0675)	(0.0692)	(0.0550)	(0.0466)	(0.0466)
Urban	0.150***	-0.0716	0.0445	0.006	0.143**	0.243***
	(0.0232)	(0.0488)	(0.0553)	(0.0570)	(0.0351)	(0.0351)
Gender (male)	0.0558**	-0.0202	0.143***	0.0354	0.255***	-0.0551
	(0.0285)	(0.0606)	(0.0633)	(0.0542)	(0.0469)	(0.0469)
Educ (no formal education)	-0.154***	-0.195***	-0.0357	-0.097***	-0.151***	-0.191***
	(0.0227)	(0.0483)	(0.0515)	(0.0473)	(0.0381)	(0.0381)
Educ (high school)	0.110***	0.165***	0.0880	0.155***	0.1218	0.121***
	(0.0274)	(0.0624)	(0.0644)	(0.0519)	(0.0430)	(0.0430)
Constant	-1.292***	-1.562***	-1.336***	-1.421***	-1.097***	-1.097***
	(0.0378)	(0.0825)	(0.0832)	(0.0651)	(0.0666)	(0.0666)
Observations	50,990	12,602	9,988	14,936	17,752	18,275

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4   Conclusion

This study examined the economic, social, and demographic factors influencing emigration decisions in Afghanistan from 2016 to 2021. Existing empirical evidence on the influence of economic, social, and demographic factors on emigration has yielded inconclusive results. No study has comprehensively examined the collective impact of these factors simultaneously. This research aims to fill this gap by utilizing quantitative methods and large sample sizes to comprehensively analyze these factors on emigration. Additionally, based on the cross-sectional time series data and insights from existing literature, a binary logistic regression model with robust standard error was chosen for the analysis. Diagnostic tests, including multicollinearity (VIF) and model specification and fitness, ensured the regression result and model's reliability.

The logistic model, adjusted with robust standard error, has revealed significant findings. Taking various factors into account, the study indicates that land ownership in smaller portions, livestock ownership, and lower income positively influence the likelihood of emigration in Afghanistan. Conversely, owning large land areas, having substantial livestock holdings, and higher income levels negatively impact the decision to emigrate. Social factors, including political instability, inadequate public services, public dissatisfaction, insecurity, violence, internet usage, and family connections, exhibit a positive and significant correlation with emigration decisions. Furthermore, demographic factors such as youth, education, single status, male gender, urban residence, and belonging to smaller households are positively correlated with the decision to emigrate. Conversely, a negative correlation is observed among individuals with low levels of education.

The research findings hold implications that are expected to be relevant for public policy, academics, and international donor organizations that strive to address challenges associated with migration from developing countries like Afghanistan. To enhance the robustness of future studies, it is advisable to include additional factors and conduct research using a panel of countries.

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Analysis of the Capital Structure of the Company in the Period Before and During the COVID-19 Pandemic

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Abstract. This paper summarizes the optimal capital structure, comparing the period before and during the COVID-19 pandemic. Using the analysis of financial statements, we deal with the adequacy of the capital structure, drawing on the available literature that describes both classical and current models. We concluded that the company's low credit indebtedness was very beneficial for companies during the pandemic period since companies with a high credit burden were much more likely to become insolvent. The company we monitor draws foreign sources of coverage mainly from the sources of the consolidated whole, which is a huge competitive advantage, but we realize that not every company has such possibilities. In addition, itis necessary to monitor liquidity indicators, because our analysis showed that although the company, we monitor is financially sound and in excellent shape, it may have problems with repaying its liabilities, as its liquidity ratios have been below the optimal threshold for a long time.

Keywords: Capital Structure, Pandemic Period, Financial Statements, Financial Indicators.

JEL classification: *G30, G32, M41*

1   Introduction and literature review

The COVID-19 pandemic shocked financial markets around the world and, as a result, markets became extremely volatile, with many company bankruptcies recorded in a brief period. Most businesses sought financial assistance to remain operational. This work focuses on analyzing the capital structure of a company compared to before and during the COVID-19 pandemic. Influencing operational risk through debt levels says that decisions about corporate capital structure help firms immunize against the pandemic, and the results of this work will be interpreted through an analysis of the financial statements of the selected company.
The theory of the irrelevance of the capital structure of Modigliani and Miller (1958) is considered the starting point of the modern theory of capital structure. Based on

assumptions about investor behavior and the capital market, MM's model illustrates that a firm's value is not influenced by a company's capital structure. Securities are traded on a perfect capital market, all relevant information is available to managers and shareholders so that they can make their decision (no asymmetry of information), that is, transaction costs and costs of taxation do not exist. Borrowing is possible for companies and individual investors at the same interest rate that allows domestic leverage. Companies operating in similar risk classes have similar operating leverage, interest payable on debt does not save any burden and at the same time companies monitor 100% dividend payments. According to these assumptions, the MM model proved that there is no optimal debt-to-equity ratio, and the capital structure is irrelevant to shareholder profit. The MM model argued (1958) that the value of a leveraged firm is the same as that of a firm without leverage. Therefore, suggest that managers do not deal with the capital structure and are free to choose the composition of debt to equity. Notable contributions to the MM approach include Hirshleifer (1966) and Stiglitz (1969). They argue that increasing leverage increases the risk of the firm and, as a result, the cost of equity increases. The theory of the irrelevance of the capital structure was very correct in theory, but it was based on an unrealistic set of assumptions. For this reason, this theory has led to a lot of research on capital structure. Although the MM model was theoretically valid, a tax-free world was not real. To make the model more accurate, Modigliani and Miller (1963) incorporated the effect of tax on the cost of capital with the value of the firm. In the presence of corporate taxes, the value of the firm increases with leverage due to the tax shield. Interest on debt capital is an acceptable deduction from the company's income and thus reduces the net tax burden of the company. As a result, there would be an additional benefit of using debt capital by reducing the firm's cost of capital. The disadvantages in the MM model prompted a series of investigations devoted to proving the irrelevance of both theoretical and empirical character. Likewise, other theories that contribute to the theorem of capital structure can be developed based on the MM model, and it is exceedingly difficult to confirm any of them. Although there are weaknesses in the MM model, it cannot be completely ignored or eliminated.

Since the publication of the work of authors Modigliani and Miller (1958) "Theories of the irrelevance of capital structure", the theory of the structure of corporate capital has been a study of interest of financial economists. Over the years, three major theories of capital structure have emerged that deviate from the assumption of perfect capital markets, in which the "irrelevance model" operates. The first is trade-off theory, which assumes that firms trade the benefits and costs of debt and equity financing and find an "optimal" capital structure after accounting for shortcomings such as taxes and transaction costs. The second is the "pecking order" theory (Myers, Majluf, 1984), which argues that firms follow a hierarchy of funding to minimize the problem of information asymmetry between managers and shareholder. Baker and Wurgler (2002) proposed a new theory of capital structure, namely theory of market timing of capital structure. This theory states that the current capital structure is a cumulative result of past attempts to time the stock market. The timing of the market means that companies issue new shares when they perceive that they are overvalued and that companies buy back their own shares when they consider them undervalued. The market timing of issuing stock issues has already been well established empirically by other authors, but

Baker and Wurgler show that the impact of market timing on capital structure is constant.

Various authors use the term compromise theory to describe related theories. In all these theories, the decision maker evaluates the different costs and benefits of alternative leverage plans. It is often assumed that the solution is obtained by balancing marginal costs and marginal benefits. When corporate tax was added to the original irrelevance, it created an advantage for debt by serving to protect tax revenue. Since the objective function of the firm is linear and there are no compensation costs for debt, this means 100% debt financing.

Compromise theory

The compromise theory of capital structure (Kraus, Litzenberger, 1973) suggests that firm value is maximized at an optimal capital structure where marginal benefits and marginal costs of debt are equal. The excessive use of debt above optimal levels therefore leads to a decline in the value of the enterprise and an increase in fixed risk, which is called the 'excessive indebtedness effect'. In addition, a positive deviation from the optimal capital structure increases the likelihood of financial difficulties, causing companies to file for bankruptcy. On the other hand, the value of firms continues to rise, with debt levels below the optimal level of capital structure to capture interest rate tax benefits, while remaining at a low level of bankruptcy risk. In other words, underleveraged firms have greater debt capacity to make new investments through debt loans (Machica, Mura, 2010). As a result, insufficient leverage provides firms with greater liquidity and security, especially in the event of a sudden cash flow shortage. However, low debt levels also cause problems among shareholders and managers. Entrenched managers have more free cash to spend in their own interest rather than shareholders' best interest (Jensen, 1986), but managerial entrenchment is mitigated in economic recession (Kesten, 2010) and managers care more about their job security. Therefore, low debt levels may not be an issue in case of any agency conflict between shareholders and managers during a crisis period.

Demand for external funds increased in the presence of cash flow shortages due to COVID-19, as all business activities had to close to stop the spread of the virus. As a result, firms were negatively affected by the pandemic shock and sought more funds to cope with liquidity shortages. Halling et al. (2020) found that the bond market has become more active since the outbreak of COVID-19, and Li et al. (2020) and Acharya and Steffen (2020) further document that the pandemic has increased the drawdown of bank loans and lines of credit. The ability of companies to borrow from capital markets or banks depends on their current debt capacity. For example, when firms adopt a conservative debt policy that maintains financial flexibility, they can finance new investments with larger volumes of debt issuance (Marchica, Mura, 2010). Keeping leverage low therefore provides greater debt capacity and financial flexibility, which brings benefits to businesses during market downturns. Fahlenbrach et al. (2020) found that firms with high financial flexibility lose less market value due to COVID-19 than firms with low financial flexibility. In other words, firms with more debt are at higher risk than firms with less debt because leverage is significantly positively correlated with stock yield volatility (Black, 1976; Christie, 1982; Schwert, 1989).

COVID-19 is forcing companies to think about a new business management strategy to survive the crisis and increase adaptability to the future. The risk of bankruptcy is closely related to the level of debt of the company, and therefore the way in which the company's executives determine the capital structure can directly affect the future of the company. The trade-off theory of capital structure suggests that over-leveraged companies are more likely to find themselves in financial difficulties than older underleveraged companies. Therefore, making the right decision on the capital structure helps to reduce the risk of bankruptcy when companies find themselves in financial difficulties.

2   Methodology and results

To create an analysis of sources of financing, we need to know the financial statements of the company for a period of at least 5 consecutive years. To base our analysis, we selected data from the financial statements for the period 2017-2021.

Analysis of the company's indebtedness
Measuring a company's total indebtedness is particularly important. With it, we can find out to what extent the company is financed by foreign sources. The share of equity and foreign capital affects the financial stability of the company. A high equity ratio increases the stability of the enterprise, however, by using foreign capital, it is possible to increase the return on equity using leverage. However, society must be careful not to fall into debt distress. The most used indicators are (Sivák et al., 2019):

- the degree of total indebtedness – expresses the structure of financial resources and the value of this indicator should be in the range of 0.3 to 0.7. This suggests that the leverage ratio in the company should not exceed 70%.
- degree of self-financing – this is the debt ratio of equity. This indicator tells us how many units of foreign capital account for 1 unit of equity. This is in addition to the level of total indebtedness. The sum of these two indicators must be 100 %.
- Leverage – tells you what proportion of assets equity is. The value of this resource should be balanced with the value of the share of foreign capital in assets.

In the following review, we will analyze selected debt indicators of our selected company.

The total indebtedness indicator indicates the extent to which foreign capital is used to finance the needs of the enterprise. Total indebtedness can affect the overall profitability of a business. We calculate it using the formula:

$$\frac{foreign\ capital}{assets} \cdot 100$$

(1)

Table 1. – Development of total debt ratios and degree of financial autonomy

Items/indicators	Period				
	2017	2018	2019	2020	2021

Accounts payable	1 740 338 000	1 677 178 000	1 297 165 000	1 678 318 000	1 299 864 000
Total assets	3 119 417 000	3 077 672 000	2 953 686 000	3 097 258 000	2 722 294 000
Total indebtedness	55,79%	54,50%	43,92%	54,19%	47,75%
Equity	1 379 079 000	1 400 494 000	1 656 521 000	1 418 940 000	1 422 430 000
Total assets	3 119 417 000	3 077 672 000	2 953 686 000	3 097 258 000	2 722 294 000
Degree of financial autonomy	44,21%	45,50%	56,08%	45,81%	52,25%

Total indebtedness at Volkswagen is optimal. The company has been at the lower limit of optimal indebtedness for a long time. In 2019 and 2021, we can see that the company is below 50%, which indicates that the company is in good financial shape but with a low potential for leverage.

The degree of self-financing is the opposite of the total debt ratio. Summing up these indicators, we get a value of one hundred and express the degree of financial independence of the company. We express it using the formula:

$$\frac{own\ capital}{assets} \cdot 100 \qquad (2)$$

Table 1 shows that during the period under review the company prefers self-financing to a significant extent, as the degree of self-financing is around 50 %. It can be stated that the ratio of self-financing and external resources of the company is balanced in the reporting period, slightly oscillating during the monitored years.

Developments in credit indebtedness

This indicator reflects to what extent the company covers assets through loans. We express it using the formula:

$$\frac{bank\ loans}{assets} \cdot 100 \qquad (3)$$

We note that the company does not use this source of financing at all and uses the funds to which it is entitled as part of the consolidated whole.

Table 2. – Development of the long-term debt ratio

Items/indicators	Period				
	2017	2018	2019	2020	2021
Long-term liabilities	352 009 000	350 552 000	270 628 000	73 208 000	75 851 000
Bank loans	0	0	0	0	0
Total assets	3 119 417 000	3 077 672 000	2 953 686 000	3 097 258 000	2 722 294 000
Long-term indebtedness	11,28%	11,39%	9,16%	2,36%	2,79%

This indicator tells us to what extent the company is bound to repay the obligation for a long time. We express it using the formula:

$$\frac{long-term\ foreign\ resources}{assets} \cdot 100 \qquad (4)$$

It tells us about the extent to which long-term foreign capital can be used to finance the needs of the enterprise. We can see that the development thanks to investments is initially slightly upward, but at the beginning of the pandemic the company reduced credit indebtedness to a minimum level.

Table 3. – Development of the leverage ratio

Items/indicators	Period				
	2017	2018	2019	2020	2021
Total assets	3 119 417 000	3 077 672 000	2 953 686 000	3 097 258 000	2 722 294 000
Equity	1 379 079 000	1 400 494 000	1 656 521 000	1 418 940 000	1 422 430 000
Leverage	2,26	2,20	1,78	2,18	1,91

This indicator indicates what proportion of assets is equity. We calculate it using the formula:

$$\frac{assets}{own\ capital}$$

(5)

From the analysis, we can find that society fluctuates around the second mark. The company was above 2 in the first years of the period under review, i.e., most assets were leveraged with around 55 % because of incoming investments. Subsequently, 2021 again brought a larger share of equity. With good financial condition of the company, it can be assumed that this positive development will continue in the future. This will be due to the improved production potential in the form of its optimization and the setup of such production, which will be focused primarily on the production of SUVs with an emphasis on electric propulsion, which are a proven attribute that forms the greatest potential of this automaker.

Financial health indicators

Financial health indicators tell us about the overall performance of the enterprise. The return on equity (ROE) expresses the percentage of profit that the company earned from one euro of equity.

For the period under review, we can observe a good financial return of our selected company. The year 2019 was significant for the company, when the indicator grew to the level of about 27%, in recent years the indicator has been around 13% on average, which we consider to be particularly satisfactory results that testify to the good financial health of the company.

Return on assets (ROA) is a percentage of the profit a company earned from €1 in assets.

This indicator, like ROE, testifies to the excellent financing of the company, where on average it accounts for 6% of profit per one euro of assets. Once again, we highlight 2019, where the company managed to climb up to around 15%.

EBIT and EBITDA show us earnings before interest and taxes. In addition, EBITDA considers impairment and amortization. From the data below, we can see that compared to before and during the pandemic, companies' profits have not fallen to such a level that the company is in any way existentially threatened.

Table 4. – Development of indicators of financial health of the enterprise

Financial health indicators					
Items/indicators	Period				
	2017	2018	2019	2020	2021
Equity	1 379 079 000	1 400 494 000	1 656 521 000	1 418 940 000	1 422 430 000
Clear profit	173 299 000	191 902 000	447 572 000	206 684 000	191 704 000
ROE	12,57%	13,70%	27,02%	14,57%	13,48%
Total assets	3 119 417 000	3 077 672 000	2 953 686 000	3 097 258 000	2 722 294 000
ROA	5,56%	6,24%	15,15%	6,67%	7,04%
Interest expense	4 809 000	4 077 000	1 377 000	3 912 000	3 793 000
Tax on income from ordinary activities	66 812 000	108 974 000	-127 900 000	71 158 000	72 140 000
EBIT	244 920 000	304 953 000	321 049 000	281 754 000	267 637 000
The result of economic activity	244 920 000	304 952 000	321 049 000	281 758 000	267 637 000
Copies	219 515 000	311 958 000	259 849 000	231 789 000	216 666 000
Revenue from the sale of DM and materials	0	0	0	2 240 000	2 140 000
EBITDA	464 435 000	616 910 000	580 898 000	511 307 000€	482 163 000
Degree of operating leverage	100,31%	117,19%	105,38%	120,62%	94,55%

The degree of operating leverage tells us how much the amount of profit change is affected by the change in the amount of sales. From the data, we can see that except for 2021, where due to the pandemic the company was forced to have limited production for most of the year, the company had excellent indicators, which testifies to its strong market position.

Company liquidity analysis

Liquidity is the ability to turn assets into ready-made funds as quickly as possible and at the least cost. It reflects the company's ability to pay its due obligations. There are 3 levels of liquidity (Sivák et al., 2018):

- **Level 1 – immediate liquidity** – indicates the company's current ability to pay its liabilities. Its optimal value is 0.2-0.6. We calculate it using the formula:

$$\frac{financial\ assets}{short-term\ foreign\ resources}$$

(6)

- **Level 2 – current liquidity** – expresses a company's ability to pay its liabilities on time, without taking inventories into account. Its optimal value is 1.0-1.5. A value of 1 means that the company is still able to pay its liabilities without being forced to sell its inventory. Below this value, the company is forced to sell its stock. We calculate it using the formula:

$$\frac{short-term\ assets+short-term\ receivebles}{short-term\ foreign\ resources}$$

(7)

- **Level 3 – total liquidity** – indicates the company's ability to repay its liabilities over the long term. Its optimal size is 1.6 – 2.5. The value should not fall below 1, as this would indicate that the company is completely illiquid. If the value of the indicator were too high, this would indicate an unproductive use of the funds invested. We calculate it using the formula:

$$\frac{current\ assets}{short-term\ foreign\ resources}$$

(8)

Table 5. – Analysis of the company´s liquidity indicators

Items for liquidity calculation					
Entries	Period				
	2017	2018	2019	2020	2021
Financial accounts	240 004 000	116 609 000	278 701 000	460 116 000	143 918 000
Short-term receivables	727 584 000	936 106 000	736 405 000	920 437 000	828 983 000
Stocks	248 313 000	254 214 000	301 832 000	268 968 000	414 051 000
Current liabilities	1 351 243 000	1 280 394 000	967 815 000	1 541 852 000	1 161 941 000
Bank loans	0	0	0	0	0
Liquidity ratios					
Indicators	Period				
	2017	2018	2019	2020	2021

Level I liquidity	0,17762	0,09107	0,28797	0,29842	0,12386
Level II liquidity	0,71607	0,82218	1,04886	0,89539	0,83731
Level III. liquidity	0,89984	1,02072	1,36073	1,06983	1,19365
Net working capital	-135 342 000	26 535 000	349 123 000	107 669 000	225 011 000

The above data shows that the company has a long-standing liquidity problem. This is since the company has recently invested its own funds, especially in fixed assets. Recently, this development has had a negative tendency. It will be in the interest of the company to review its financing policy so that in the future, despite sufficient funds, there is no problem with the company's insolvency to pay its obligations on time. These figures also imply a declining value of net working capital. In the future, however, an improving tendency of the company's liquidity can be assumed if investments are withdrawn. Interestingly, the pandemic period did not affect the composition of assets in the company to a considerable extent, based on which we conclude that the pandemic did not force a change in the strategic decision-making of our chosen company.

3   Conclusion

Concluding our analysis, we can conclude that the development of the financing structure in each company is remarkably diverse. In particular, the company uses financing through its own resources, which is also made possible by the advantages of the status of a joint-stock company. Within the framework of its own funds, in addition to profit, the company also uses the issuance of employee shares, which is allowed by its mother abroad. However, this source does not constitute such an important source of financing in this company, but in the future, it can be assumed that in case of potential problems, the company will start to issue them to a greater extent, since it has a long-term aversion to foreign sources of financing, which we have managed to demonstrate also based on financial indicators of this company. The pandemic period has not affected the company's business activities financially, so we can say that even the production shutdown during the worst period did not cause the company greater financial difficulties.

Our analysis focused primarily on the development of the share of own and external funds in a certain period of the selected company. We found that the financial situation is developing in a good direction, as the company's sales and assets in the year-on-year period are at a favorable level. However, it was surprising to us that this company does not make sufficient use of the potential of foreign resources and prefers to finance it through its own resources, from which it makes the most profit even at the cost of making its investments significantly more expensive in this way.

Furthermore, based on our analysis, we found that the company has a long-standing liquidity problem, and we suggest that it reconsider its attitude towards this fact so that it does not have to face a problem of repaying its liabilities in the future.

Overall, our analysis managed to show that the variability of the company's sources of financing is incredibly significant. which has been confirmed during the COVID-19 pandemic. This is also proven by our chosen company, where on the basis of indicators we could see that if it were more efficient in the use of sources of financing, it would not give preference to its own sources of financing to a large extent and would also involve more foreign sources, then there would be no problem with overpricing of capital and overall the company would at least partially manage to solve the liquidity problem, but such a financing scenario could subsequently be harmful to the company, which would not have made it perform so well during the pandemic period.

Overall, it can be stated that the company has many possibilities through which it can finance its business activities and it is up to the company's management how to use these possibilities in order to contribute to the greatest possible financing efficiency and eliminate as much as possible the costs associated with the acquisition of capital and possible financial difficulties associated with it.

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Sorting of Municipal Waste by Citizens in Slovakia

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Abstract. The paper focuses on the sorting of municipal waste by citizens of the Slovak Republic. Waste represents one of the biggest environmental challenges today, which affects not only Slovakia, but the whole world. Household waste, or municipal waste, is considered a particularly problematic source of waste. Its amount increases from year to year. In 2020 alone, its amount in the European Union (EU) amounted to 505 kg per person, according to data available on Eurostat, while only 48 % of it was recycled. The Slovak Republic, as an EU member state, must align its waste management policy with EU goals. At the same time, waste management, which should be environmentally friendly and use secondary materials contained in waste, is one of the critical elements of EU environmental policy. Major part of municipal waste in some EU countries still ends up in landfills and Slovakia is no exception despite the fact waste sorting is mandatory there. Just smaller part of municipal waste is recycled. The paper examines influence of selected factors on sorting of municipal waste by citizens of the Slovak Republic. It determines whether gender, age, income, household size and sufficient information about where the sorted waste ends up have some influence on sorting of municipal waste by citizens of the Slovak Republic.

Keywords: Waste Sorting, Municipal Waste, Household Waste, Waste Sorting in Slovakia.

JEL classification: *Q 53, D 10, R 11*

1 Introduction

EU waste policy aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. The legal framework for waste processing and disposal in the EU is directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste (directive on waste). Slovakia also implemented this directive into its legal order in Act no. 79/2015 Coll. on waste (waste act). So, in Slovakia and other member states, the waste management hierarchy applies, which represents the basic idea of the Waste Act and is based on the Waste Directive. According to the waste management hierarchy, waste management's main priority is the prevention of waste. This is followed by preparation for reuse, recycling, and another recovery (e.g., energy recovery), and waste disposal is only in the last phase.

So, despite the fact that much effort is devoted to collecting and recovering materials from waste, from an environmental point of view, waste prevention takes precedence over any waste treatment (landfill, energy recovery, and recycling). This is because it prevents the production and processing of products and substances that become waste [§ 6 (1) of the Waste Act].

Despite the fact that waste prevention should be a priority, it is rarely an integral part of local waste management [4, 40]. So, even if the goal of waste management in the EU is to prevent the generation of waste at the local level, they still struggle mainly with waste disposal. The solution to reducing household waste going to landfills is precisely the promotion of its separation at the source into recyclable or compostable components. Despite the fact that EU policy supports waste sorting in its member states, according to data from the European Commission [16], over 60 % of municipal waste in some EU countries still ends up in landfills.

Despite being the solution to waste management in many countries of the world, landfills represent the worst possible way to manage waste. The side effects of landfills include dust, odor, noise, the presence of pests, the risk of accidents, the creation of emissions released into the air and climate (mainly methane) and the release of waste into the soil, underground, or surface waters and marine environment. This can lead to their contamination, negative health effects and detrimental effects on biodiversity and economic activity. Another way of dealing with waste is, for example, incineration, which is also associated with air and climate pollution [42]. From this point of view, waste sorting is the key to collection and transport, disposal and resource utilization. Thus, it has become an important starting point for the implementation of the waste management strategy and for solving the complex situation with the amount of waste [18]. Recycling is one of the most effective methods used to reduce waste [28].

Waste management in Slovakia also focuses on reducing waste landfilling and recycling it. Even though landfilling should be the last possible alternative for waste management, according to the Slovak Waste Management Program for the years 2021 to 2025, it is the most common way of managing municipal waste in Slovakia. According to data available from the Statistical Office of the Slovak Republic, up to 40.7 % of municipal waste was disposed of by landfill in 2021. In 2021, 2.7 million tons of waste were created in Slovakia. The municipal waste recycling rate this year reached approx. 49 %, and only approx. 9 % was energetically recovered for electricity or heat through equipment for the energy use of waste. Based on the above, a large part of the waste in Slovakia is still landfilled, even though it is the worst possible way of handling waste.

According to the EU, the goal is for less than 10 % of waste to be landfilled by 2035. This is also why the Waste Management Program of the Slovak Republic for the years 2021 to 2025 is trying to reduce the total landfilling of waste, focusing mainly on municipal waste. The sorting of municipal waste is primarily intended to help with this. In the sorting of municipal waste, the attitudes of residents towards this issue play an important role because it is their positive attitude that can help to increase the recycling rate of this type of waste [38].

2   Literature Review

Waste sorting is mandatory in Slovakia. According § 81 (9) of the Waste Act, there is the obligation to participate in the municipal waste collection system in the municipality. By the Waste Act, paper, glass, plastics, metals, multi-layer combined materials based on cardboard, and, from 2021, also bio-waste will be sorted in Slovakia. The question is to what extent citizens fulfill this obligation, given the already mentioned amount of municipal waste that ends up in landfills (40,7 % in 2021).

The purpose of sorted waste collection is to ensure the recovery of the sorted components of municipal waste. Therefore, the level of purity of the sorted component is very important. In Slovakia, the level of municipal waste sorting is also reflected in the calculation of the fee for depositing waste at a landfill [20]. Simple access to the right information greatly supports the sorting of household waste. Residents' awareness of how to use these devices can further reduce misclassification [32]. To support sorting, information should be provided repeatedly in a way that engages people. Involvement can be achieved through personal contact, a two-way communication channel, or the inclusion of citizens in dialogues about the waste sorting system [33]. It is essential to address the existing mismatch between the technical system and the users' perspective by more actively involving citizens in discussing the problems the current system presents while helping them express what they need to make the system work better [31].

In individual studies, we can come across different factors that influence residents' attitudes toward sorting. Practical experience around the world has shown that the willingness to engage in recycling can be influenced by a number of factors [30]. One of these factors is, for example, the fact that sorting requires time and energy from people, which some are not willing to invest in [9, 25]. Separating waste for recycling also usually requires some space in the home [24, 36]. The size of the dwelling is often limited, and, moreover, it can bring a different benefit to the user than if it is used for waste sorting/storage. Houses are therefore associated with higher recycling rates than multi-family dwellings such as apartments [23, 1]. Household size, in terms of its members, is sometimes used as a proxy for time constraints: larger households offer more free time to devote to recycling [3, 39, 29].

According to some authors, household cooperation in waste sorting is influenced and driven by morality [1, 12]. The introduction of separate waste collection schemes in the absence of any financial incentive can be considered a manifestation of this fact [1]. With really strong moral preferences, individuals may even be willing to pay for recycling [12].

Many studies that evaluate recycling behavior describe the benefits that individuals get from cooperation in the form of sorting in the form of observing their own pro-environmental values [5, 23, 6]. In relation to pro-environmental preferences, the authors describe household members driven by a desire to feel good, a desire to avoid feeling guilty about not giving enough [8].

Another fact that affects the attitude of residents toward sorting can be the observance of social norms [36, 7, 35].

Some authors also investigate the policy preferences of household participation in a public good scheme [15, 11]. For example, right-wing ideology tends to be associated with a lower willingness to pay for environmental goods, environmental taxes, and environmental causes [15]. For example, research in the US has shown that Democrats and liberals have higher rates of recycling [10]. Or a survey in Sweden found that willingness to sort is higher among Green Party supporters [22].

The difference in waste management systems has a significant impact on waste sorting behavior [18]. Systems that are culturally sensitive and adapt to their users' needs are more effective over time in promoting and supporting household recycling behavior long term [26]. It is the currently available infrastructure for waste sorting and collection that creates an environment within which individual citizens then willingly perform the given behavior, i.e., sorting. So, the way this environment is configured affects this behavior. Convenient infrastructure is key to increasing the collection of sorted waste, regardless of whether it is a rural or urban area [33].

According to research, even a smaller distance to collection containers increases the amount of sorted impact. [31, 32]. It has even been shown that households with nearby collection containers separate twice as much as those with remote collection points [13]. Citizens who have trash cans near their homes are willing to recycle more types than when they have to walk longer to drop off the waste due to the inconvenience caused by carrying the large volume that waste usually has [21].

Sociodemographic factors are known to influence waste production and therefore influence waste sorting. However, there is little consensus in the literature on how these factors influence triage, so sociodemographic considerations may only be useful in specific contexts [33].

For example, higher education is believed to promote a willingness to sort waste [3, 34, 36]. Residents with higher education are more willing to accept waste sorting, while residents without higher education more often perceive the difficulty of waste sorting [27]. Regarding income, in many studies, the income variable is positive but not statistically significant [22, 23]. In the mentioned studies, the authors argue that the positive and negative effects of income work against each other. However, some studies indicate that higher acceptance positively affects recycling [39, 36]. Certain types of waste are recycled more by the higher-income group precisely because certain products (such as newspapers) are more likely to be purchased by households with a higher income [19].

In terms of age, according to studies, older people are generally the ones who recycle more [36]. Thus, older residents are more willing to sort waste, while young adults are more susceptible to the influence of family and friends, which may be related to the larger social circle of this age group [27].

In terms of gender, studies show that women's attitudes toward waste sorting are more supportive. [27, 34]. And this includes the recycling of electronic waste in collection centers [34].

According to some studies, the perceived effectiveness of the policy significantly influences the attitudes of households and their intentions to sort waste [27, 34]. Likewise, for people who sort, the question of trust is important, which concerns that the waste is effectively recycled [28].

3   Methodology

In our research we mainly focused on finding the influence of selected factors on waste separation by the inhabitants of Slovakia. So, our research question is: "Does the selected factors influence waste sorting of Slovak people?"

We decided to research the influence of 5 selected factors: gender, age, income, household size and to have sufficient information on how sorted waste is handled. We drew data for our research from a questionnaire.
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For each of the investigated variables, we established two hypotheses at the beginning of our research, null and alternative. Together, we established the null and alternative hypotheses for 5 different variables:

H01: Gender and waste sorting are mutually independent variables.
HA1: Gender and waste sorting are mutually dependent variables.
H02: Age and waste sorting are mutually independent variables.
HA2: Age and waste sorting are mutually dependent variables.
H03: Income and waste sorting are mutually independent variables.
HA3: Income and waste sorting are mutually dependent variables.
H04: Household size and waste sorting are mutually independent variables.
HA4: Household size and waste sorting are mutually dependent variables.
H05: Sufficient information about where the sorted waste ends up and waste sorting are mutually independent variables.
HA5: Sufficient information about where the sorted waste ends up and waste sorting are interdependent variables.

4   Results

Table 1. Waste sorting by gender

	Sort waste	*Don't sort waste*	*Row Total*
Man	114 (38,4 %)	19 (6,4 %)	133 (44,8 %)
Woman	148 (49,8 %)	16 (5,4 %)	164 (55,2 %)
Column total	262 (88,2 %)	35 (11,8 %)	297 (100 %)

Result:
$Chi^2 = 1.449458$ $p = 0.228615$

As we can see in table 1, up to 6,4 % of interviewed men do not sort waste. In the case of women, it is 5,4 %. In this case we received a value of $p > 0,05$. This means that we do not have enough evidence to reject our null hypothesis, so we accept it. Thus, our survey did not confirm the dependence of waste sorting on gender.

Table 2. Waste sorting by age

	Sort waste	Don't sort waste	Row Total
Less than 18	1	0	1
18 – 20 years old	33 (11,1 %)	6 (2 %)	39 (13,1 %)
21 – 25-year-old	74 (24,9 %)	16 (5,4 %)	90 (30,3 %)
26 – 30 year old	28 (9,4 %)	5 (1,7 %)	33 (11,1 %)
31 – 35 year old	49 (16,5 %)	5 (1,7 %)	54 (18,2 %)
36 – 45 year old	59 (19,9 %)	2 (0,6 %)	61 (20,5 %)
46 – 55 year old	13 (4,4 %)	1 (0,3 %)	14 (4,7 %)
66 and more	5 (1,7 %)	0	5 (1,7 %)
Column total	262 (88,2 %)	35 (11,8 %)	297 (100 %)

Result:

Chi^2 = 9.623951   p = 0.210904

As we can see in Table 2, up to 2 % of respondents aged 18-20 do not sort waste, as do 5,4 % of respondents aged 21-25, 1,7 % aged 26-30, 0,6 % aged 36 up to 45 years, 0,3 % aged 46 to 55. In this case we received a value of $p > 0,05$. This means that we do not have enough evidence to reject our null hypothesis, so we accept it. Thus, our survey did not confirm the dependence of waste sorting on age.

Table 3. Waste sorting by income

	Sort waste	Don't sort waste	Row Total
Unemployed	54 (18,2 %)	3 (1 %)	57 (19,2 %)
Less than 646 euros (minimum wage)	40 (13,4 %)	10 (3,4 %)	50 (16,8 %)
646 euros (minimum wage)	7 (2,4 %)	2 (0,6 %)	9 (3 %)
647 - 1 000 euro	23 (7,7 %)	4 (1,3 %)	27 (9 %)
1 000 - 1 200 euro	31 (10,4 %)	3 (1 %)	34 (11,4 %)
1 201 - 1 500 euro	29 (9,8 %)	2 (0,6 %)	31 (10,4 %)
1 501 - 1 800 euro	15 (5 %)	6 (2 %)	21 (7 %)
1 801 - 2 000 euro	12 (4,1 %)	2 (0,6 %)	14 (4,7 %)
2 001 - 2 500 euro	26 (8,7 %)	0	26 (8,7 %)
More than 2 500 euro	25 (8,4 %)	3 (1 %)	28 (9,4 %)
Column total	262 (88,2 %)	35 (11,8 %)	297 (100 %)

Result:
   Chi^2 = 17.17545   p = 0.0460383

As we can see in Table 3, up to 1 % of respondents who are unemployed, do not sort waste, as do 3,4 % of respondents who earn less than the minimum wage, 0,6 % of respondents earning the minimum wage, 1,3 % of respondents whose income is between 647 – 1 000 euros, 1 % of respondents whose income is between 1 000 – 1 200 euros, 0,6 % of respondents whose income is between 1 201 – 1 500 euros, 2 % of respondents whose income is between 1 501 – 1 800 euros, 0,6 % of respondents whose income is between 1 801 – 2 000 euros and 1 % of respondents whose income is more than 2 500 euros. In this case, we received a value of $p < 0.05$. This means we reject our null hypothesis and accept the alternative. Thus, our survey confirmed the dependence of separation on the amount of income.

Table 4. Waste sorting by household size

	Sort waste	*Don't sort waste*	*Row Total*
Live alone	39 (13,1 %)	12 (4 %)	51 (17,1 %)
2 members	54 (18,2 %)	7 (2,3 %)	61 (20,5 %)
3 members	53 (17,8 %)	5 (1,7 %)	58 (19,5 %)
4 members	77 (25,9 %)	8 (2,7 %)	85 (28,6 %)
5 members	23 (7,7 %)	3 (1 %)	26 (8,7 %)
6 members	15 (5 %)	0	15 (5 %)
7 and more members	1 (0,3 %)	0	1 (0,3 %)
Column total	262 (88,2 %)	35 (11,8 %)	297 (100 %)

Result:
   Chi^2 = 9.930568 p = 0.1276066

As we can see in Table 4, 4 % of respondents, who live alone, do not sort waste, 2,3 % of respondents whose household has 2 members do not sort waste as 1,7 % of respondents whose household has 3 members, 2,7 % of respondents whose household has 4 members, 1 % of respondents whose household has 5 members, and none of the respondents whose household has 6, 7 or more members. In this case, we received a value of $p > 0.05$. This means that we do not have enough evidence to reject our null hypothesis, so we accept it. Thus, our survey did not confirm the dependence of separation on household size.

Table 5. Waste sorting by sufficient information about where the sorted waste ends up

	Sort waste	*Don't sort waste*	*Row Total*
Yes, have enough information	43 (14,5 %)	4 (1,3 %)	47 (15,8 %)
No, I haven't. I want more	201 (67,7 %)	21 (7,1 %)	222 (74,8 %)
I don't care	8 (2,7 %)	2 (0,7 %)	10 (3,4 %)
I think all sorted waste ends up in a landfill	10 (3,4 %)	8 (2,7 %)	18 (6,1 %)
Column total	262 (88,2 %)	35 (11,8 %)	297 (100 %)

Result:

$Chi^2 = 20.75738$ $p = 0.0001182234$

As we can see in Table 5, 1,3 % of respondents who do not sort waste have enough information about how sorted waste is handled. 7 % of respondents who do not sort waste do not have enough information but would like to. 0,7 % of respondents who do not sort waste are not interested in it. And 2,7 % of respondents who do not sort waste think that sorted waste ends up in a landfill. In this case we received a value of $p < 0,05$. This means we reject our null hypothesis and accept the alternative. Thus, our survey confirmed the dependence of separation on sufficient information about how the sorted waste is further handled.

5   Conclusion

Sorting municipal waste is an important means of reducing the amount of waste that ends up in landfills, which is the worst possible way of managing waste. In Slovakia, more than 40 % of municipal waste is still landfilled, despite the fact that by 2035 this amount is set to be less than 10 % in line with EU targets. It is for this reason that political efforts in the field of waste management are focused on supporting the sorting of the municipal waste directly by their creators. Despite the fact that citizens in Slovakia are obliged to sort municipal waste according to the Waste Act, this is not always the case, as our questionnaire shows, in which 11,8 % said that they do not sort waste.

There are a number of studies devoted to this topic, with their authors citing various factors that influence waste sorting. We focused on some of them in our research. First, we investigated the relationship between gender and its effect on sorting; according to the study [27, 34] women have a more positive attitude toward waste sorting. However, the influence of gender on waste sorting was not confirmed in our research. Next, we investigated the relationship between age and its influence on waste sorting. In terms of age, according to studies, older people are generally the ones who recycle more [36, 27]. However, even in this case, the relationship between this variable and waste sorting was not proven. Some studies indicate the influence of income on waste sorting or that higher income positively affects recycling [39, 36, 19]. In our research, we were able to demonstrate that the amount of income affects waste sorting.

On the contrary, the dependence between household size and sorting was not proven, despite the fact that according to some studies [3, 39, 29] it is precisely in multiple households that they tend to have more time and energy for sorting. Since there are more members among whom this activity can be divided. Time and energy are also considered important factors influencing waste sorting. On the contrary, we managed to demonstrate the impact of sufficient information about where the sorted waste ends up. This is in line with the study of Minelgaitė and Liobikienė [28], according to which the issue of trust that the waste is effectively recycled is important for people who sort. We consider this finding to be important information for policymakers, who could focus more attention on promoting awareness in this direction. As our research has also shown, there are still people (6,1 % of our respondents) who think that sorted waste ends up in a landfill anyway, which, of course, can be a significant reason for their lack of interest in participating in separation.

Of course, our research focused only on a few selected factors that can have an impact on the sorting of waste by residents. So there is still a lot of place to focus on others in more detail in the future.

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Eastern Flank of NATO – Analysis of the Eastern Flank on NATO Countries' Military Expenditure

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Abstract. The Eastern Flank of NATO countries – Latvia, Lithuania, Estonia, Poland, Slovakia, Hungary, Bulgaria, and Romania – are all situated in the neighbourhood of Ukraine and Russia. That is the reason why their security importance for the whole Alliance is increasing in the context of the war in Ukraine. However, there is the question of how the Russian invasion to Ukraine can impact the military expenditure of the mentioned countries. Nonetheless, to answer such a question, there needs to be empirical proof that the Eastern Flank of NATO countries´ military spending correlates together. The aim of this article is to examine the relationship between the military spending of Eastern Flank of NATO countries and assess how the Russian invasions of Chechnya, Georgia, and Crimea have affected their military expenditures.

Keywords: Eastern Flank, Military Expenditure, Russia.

JEL classification: *F50, H50*

1   Literature review

NATO's Eastern Front is becoming increasingly important in the context of the war in Ukraine. However, the Eastern Flank of NATO countries, which forms the buffer zone between the Alliance and Russia, made up of Bulgaria, Estonia, Hungary, Lithuania, Latvia, Romania, Poland and Slovakia, has been the focus of NATO's attention for several years. In order to enhance the Alliance's security, the NATO forward presence concept[66] was introduced in Estonia, Lithuania, Latvia, and Poland in 2017, and subsequently in Bulgaria, Hungary, Romania and Slovakia after the invasion of Ukraine. The author focuses on the Eastern Flank of NATO countries mainly through their institutionalized cooperation in the Bucharest 9 (B9) minilateral format. Even though the member of the format is also the Czech Republic, it is not further examined since the Czech Republic is not defined as the Eastern Flank of NATO country. Agnieszka Orzelska-Staczek from the Polish Academy of Sciences defines the mission of this group is to strengthen transatlantic security by reinforcing NATO's eastern front. She argues that the B9 states are committed to investing more in their defence, building mutual cohesion, and increasing the credibility of common defence, hence, becoming security givers and not security takers (Orzelska-Staczek, 2020). Whereas this commitment agrees with the official statements of the B9 group (NATO, 2023), there is a lack of research in the assessment of the real cohesion, cooperation, and military expenditure between the countries. However, this aspect is significantly important, since the countries are creating the border of the Alliance and in the case of conflict, they will be the first protectors of NATO. Alexander Lanoszka from the University of Waterloo is also sceptical about the commitment of NATO's most powerful members to protect the territory of the other members of the Alliance (Lanoszka, 2023). There is no tangible evidence that Article 5 should not be activated in the case of invasion. Multinational battlegroups can be proof of the unity and integrity of NATO members.

Furthermore, the question of cohesion is linked also to the military spending patterns of the observed countries. According to the data from the Stockholm International Peace Research Institute, the Invasion of Russia to Ukraine increased the military expenditure of Europe by 13%. Thus the the invasion influenced the military expenditure of Europe in a way it hasn't in the last 30 years (SIPRI, 2023). Nan Tian argues that the recent trend in military expenditure is the consequence of Russian actions which serve as an incentive for countries to enhance their defence capabilities and deterrence. In the example of Finland and Lithuania, Tian proves that the geographical proximity to Russia positively influenced their military spending, between the years 2013-2022 (Tian, 2023). Whereas Tian concentrates mainly on Finland and Lithuania, Cavendish goes further and argues that the Russian invasion has a positive effect on many more European countries´ military spending plans, since they already announced that they will meet or exceed the NATO targets years between they planned to do so (Cavendish, 2023). Astrov from the Vienna Institute for International Economic Studies confirms the positive effect of the Russian aggression on EU countries' military spending and adds, that EU countries will become much more

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[66] NATO forward presence concept includes the Eastern Flank of NATO countries.

important members of NATO than ever before (Astrov, 2023). Whereas authors in their research address the relationship between Russian invasions and military spending, they focus mainly on the recent invasion to Ukraine, omitting other Russian invasions that could have had an impact on military spending. Furthermore, the current state of the art overlooks the impact of the invasions on the Eastern Flank of NATO as a whole, rather it examines selected countries from the group separately, which makes it unfeasible to find synchronous defence spending patterns between Eastern Flank of NATO countries. In conclusion, academic research is omitting the question of the Eastern flank of NATO countries' reactions to the Russian invasions abroad through the unified effort to increase military expenditure.

2   Methodology

Hence, this article aims to determine whether the Eastern Flank of NATO countries have invested in defence synchronously by examining the correlation in their military expenditures over the past 28 years. Additionally, it aims to analyze how the military expenditure of the Eastern Flank of NATO countries has been affected by Russian invasions in other countries.

To fulfil the goals, we suggested three hypotheses. Firstly, we assume that the military spending of the Eastern Flank of NATO countries is synchronous and coordinated, thus they assess the regional security situation identically. Secondly, if the correlation between the countries' military spending is significant, we examined the collective military spending of the Eastern Flank of NATO countries and analyzed the impact of chosen Russian invasions on the country's military spending. Thirdly, there is a correlation between the time and military spending of the countries, hence if the military expenditure increases over time. The article is divided into 3 parts.

The first one is examining the Eastern Flank of NATO countries' military expenditure over the last 28 years. This period was chosen in order to analyze the military spending of the countries from the Russian invasion of Chechnya, Georgia and the annexation of Crimea. Whereas the current invasion of Ukraine is included, there is no intention to analyze its impact on the country's military spending due to the abstention of recent data. Rather it is the goal to foresee the behaviour of the NATO Eastern Flank countries, thus if their military spending will be static or will increase. To define the correlation the IBM SPSS software was used. Due to the length capacity of the article, the author illustrates only the results of quantitative research rather than the whole dataset.

The second part is dedicated to the analysis of the impact of Russian invasions on the military spending of the Eastern Flank of NATO countries. We chose 4 Russian invasions from 1995 to 2022, which could have influenced the countries' military expenditure. Chosen invasions are the invasion to Chechnya, the invasion to Georgia, the annexation of Crimea, invasion of Ukraine. To answer the research question, we calculated the average military expenditure of the countries over the observing period and examined the impact of the Russian invasions on the country's military investment behaviour. Parallel to the quantitative analysis we also performed the qualitative

analysis to compare the data with the topic's coverage of academic and research organizations.

The third part aims to conclude the article by summarising the main findings and providing predictions for the military expenditure behaviour of the Eastern Flank of NATO countries. In the article we used the dataset from the SIPRI military expenditure data (SIPRI, 2023), relevant internet sources and academic and research articles published in SCOPUS and Web of Science.

3   Correlation of the Eastern Flank of NATO countries' military expenditure

As can be observed in Table 1, there is a strong correlation between the defence military expenditure of the Eastern Flank of NATO countries during the observed period. Correlation is very significant at the 0.01 level in the majority of the country's combinations, whereas there are a few cases when the correlation is significant at the 0,05 level. Thus, almost all the correlation of all countries´ military expenditure is significant, at least on the 0,05 level. The correlation table proves, that the country's military investment behaviour during the years is not random, rather it can be influenced by the perception of the threat from abroad or by the coordination with each other. The collected data show also other interesting phenomena. The highest correlation can be observed among the Baltic states' countries. Latvian, Estonian and Lithuanian military investments during the observing period show a significant level of cooperation, from 0.883 between Estonia and Latvia to 0.918 between Latvia and Lithuania. Such a high correlation cannot be seen in the military expenditure of chosen V4 countries, where the correlation was fluctuating between 0.378 and 0.673.

Table 11. Correlation of military expenditure of the Eastern Flank of NATO countries over the observing period 1995-2022. Source: SIPRI, 2023.

		Bulgaria	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Observing period
Bulgaria	Pearson Correlation	1	,416*	,621**	,607**	,576**	,408*	,568**	,533**	0,342
	Sig. (2-tailed)		0,028	0,000	0,001	0,001	0,031	0,002	0,003	0,075
	N	28	28	28	28	28	28	28	28	28
Estonia	Pearson Correlation	,416*	1	,606**	,883**	,886**	,946**	,805**	0,223	,984**
	Sig. (2-tailed)	0,028		0,001	0,000	0,000	0,000	0,000	0,254	0,000
	N	28	28	28	28	28	28	28	28	28
Hungary	Pearson Correlation	,621**	,606**	1	,768**	,809**	,673**	,795**	,644**	,522**
	Sig. (2-tailed)	0,000	0,001		0,000	0,000	0,000	0,000	0,000	0,004
	N	28	28	28	28	28	28	28	28	28
Latvia	Pearson Correlation	,607**	,883**	,768**	1	,918**	,848**	,842**	,446*	,820**
	Sig. (2-tailed)	0,001	0,000	0,000		0,000	0,000	0,000	0,017	0,000
	N	28	28	28	28	28	28	28	28	28
Lithuania	Pearson Correlation	,576**	,886**	,809**	,918**	1	,940**	,945**	,485**	,844**
	Sig. (2-tailed)	0,001	0,000	0,000	0,000		0,000	0,000	0,009	0,000
	N	28	28	28	28	28	28	28	28	28
Poland	Pearson Correlation	,408*	,946**	,673**	,848**	,940**	1	,889**	,378*	,939**
	Sig. (2-tailed)	0,031	0,000	0,000	0,000	0,000		0,000	0,047	0,000
	N	28	28	28	28	28	28	28	28	28
Romania	Pearson Correlation	,568**	,805**	,795**	,842**	,945**	,889**	1	,641**	,755**
	Sig. (2-tailed)	0,002	0,000	0,000	0,000	0,000	0,000		0,000	0,000
	N	28	28	28	28	28	28	28	28	28
Slovakia	Pearson Correlation	,533**	0,223	,644**	,446*	,485**	,378*	,641**	1	0,132
	Sig. (2-tailed)	0,003	0,254	0,000	0,017	0,009	0,047	0,000		0,503
	N	28	28	28	28	28	28	28	28	28
Observing period	Pearson Correlation	0,342	,984**	,522**	,820**	,844**	,939**	,755**	0,132	1
	Sig. (2-tailed)	0,075	0,000	0,004	0,000	0,000	0,000	0,000	0,503	
	N	28	28	28	28	28	28	28	28	28

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

This phenomenon can be explained by the Polish efforts to build one of the strongest and most important armies in Europe (Politico, 2022). Thus, it can be stated, that the correlation doesn't have to be linked with the affiliation of the countries in the B9 minilateral group. On the contrary, it can be affiliated with historical experiences and the perception of threat, as in the case of Baltic countries.

According to data, Baltic countries share historical aspects and perception of threat with Poland, since their correlation fluctuates between 0.848 and 0.946. These countries have a similar attitude towards Russia and, on the contrary, Russia makes a claim on their territories (Reuters, 2023; Stars and Stripes, 2023). Thus, according to data, the Baltic states and Poland share the perception of threat and have similar military investment behaviour, about which we will elaborate in the next part of the publication.

The correlation model also shows that the lowest correlation is between Slovakia and Estonia, where the correlation is not even significant. The reason for this phenomenon can be the stagnating military spending of the Slovak Republic. The share of military expenditure in the GDP of the Slovak Republic was fluctuating between 1.25% to 1.70% during the whole observing period, whereas the Estonian share of military expenditure in the GDP was continuously rising (SIPRI, 2023).

This finding leads us to the second phenomenon of the correlation model, which is the correlation between military expenditure and the progress of time. The hypothesis set for this article was, that the Eastern Flank of NATO countries' investments are increasing over the observing period. Nonetheless, this hypothesis was only partially

confirmed. Whereas the majority of countries show a significant correlation, there are some exceptions that did not increase their military expenditure over the observed period. The lowest correlation can be indicated in the case of the Slovak Republic, where the correlation is not significant. This phenomenon can also be confirmed by previous warnings by NATO, which recommended increasing the quantity and quality of Slovak armed forces. Nevertheless, this trend can be related to domestic policy motivations rather than to the geopolitical aspects since the new government led by Prime Minister Eduard Heger increased the military expenditure with the aim to be more resilient towards the threats from Russia (Teraz 2018; Teraz 2022). The second lowest correlation between military spending and the observed time period can be indicated in the case of Bulgaria. However, the rest of the countries show a significant correlation, whereas the highest is observed in the case of Estonia and Poland.

According to the findings it can be stated, that the country's military expenditure over the observing period is not random, but rather influenced by the same stimulus.

4   Analysis of NATO Eastern Flank countries' military expenditure

As could be observed in the previous section, the military spending of the Eastern Flank of NATO countries significantly correlates with each other. This fact opens the next question, hence what influences the amount of the Eastern Flank of NATO countries' military spending.

When examining the data, an interesting phenomenon occurs. The first Russian invasion in the observed period occurred in 1999, sometimes referred to as Putin's first War (History on the Net, 2022). The Russian invasion of Chechnya could have been the reason for increased military spending, however, there are more possible explanations for this phenomenon. The year 1999 showed, that Russia does not hesitate to use its armed forces in the interventions abroad. However, the Eastern flank of NATO countries could have been even more concerned about the Russian massive military buildup that started in 2003. According to Susanne Oxenstierna from the Swedish Defense Research Agency, Russia increased its defence budget, and military strength, and set the foundations for further reform of the Armed Forces and for pursuing their geopolitical goals (Oxenstierna, 2016). This could have been the motivation for Eastern Flank of NATO to increase their security through higher investments in the military as can be seen in Figure 1. Motivation to do so could have been also influenced by the economic boom in all Eastern Flank of NATO countries, which they experienced between 2000-2007 (Worldbank, 2023).
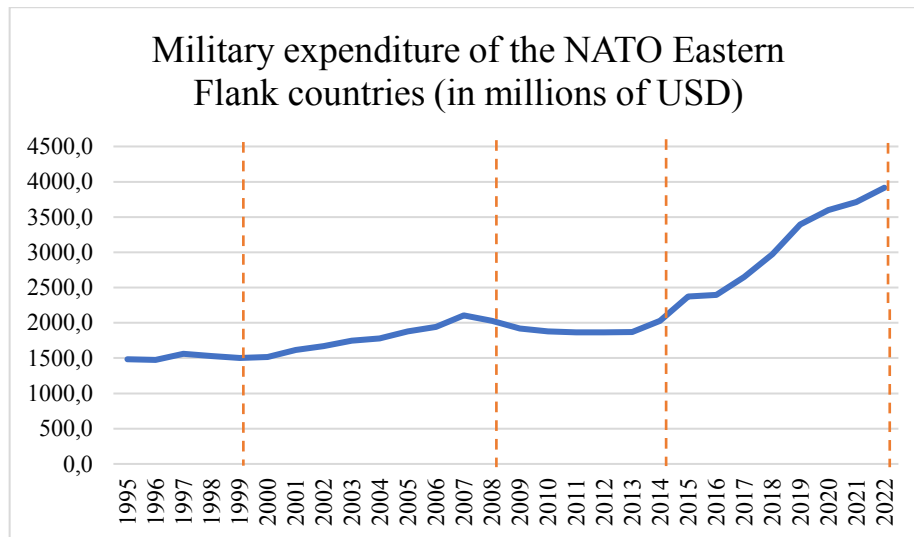
Fig. 1. Military expenditure of the Eastern Flank of NATO countries. Source: SIPRI MILEX

Whereas the war in Chechnya and the military buildup of Russia seem to have an impact on the Eastern Flank of NATO countries, the invasion of Georgia in 2008 did not affect military spending (Figure 1). On the contrary, we can observe a moderate decrease between 2008 and 2014. The Putin's invasion was the proof, that Russia has the superpower ambitions and wants to control its sphere of influence (Oxenstierna, 2016). It is astonishing, that the Eastern Flank of NATO countries did not react to this invasion, since all of them are the target of Russia, which perceives them as the sphere of influence (NTI, 2021). NATO and the Western world are often criticized, that their reaction was weak and led to the Russian next invasions (Atlantic Council, 2021). The data in Figure one confirms these claims and shows, that the reaction of the Eastern Flank of NATO countries was not appropriate, even underestimating the Russian threat.

However, data show that the annexation of Crimea in 2014 was a significant impulse for the Eastern Flank of NATO countries to invest more in the military. Figure one shows, that the Russian invasion to Ukraine in 2014 boosted the country's military expenditure, which has been continuously increasing since then. Although Stephen G. F. Hall from the University of Bath criticizes the Western reaction as weak and allowing the next Russian invasions (University of Bath, 2023). Esme Kirk-Wade, a researcher from the House of Commons Library, does not agree and argues, that the annexation of Crimea led to the confirming commitment to invest more into the military, which also the figure 1 confirms. Furthermore, the Eastern Flank of NATO countries was strengthened also by Allied forces by incorporating the NATO forward presence concept. Thus, it can be stated, that the Russian annexation of Crimea had an important impact on the Eastern Flank of NATO countries military expenditure. The motivation to increase military spending can have a root also in the concerns about the hybrid threats, which Russia activated after the annexation of Crimea (Lanoszka, 2023).

5   Conclusion

The last Russian invasion occurred on the 24th of February 2022, when Russia attacked Ukraine intending to overthrow Kyiv in a few days. This goal was not achieved, and the war is at the time of writing this article still ongoing. The reason why we did not analyze the data about the impact of the war in Ukraine in the previous section is, that it is too soon to assess its impact on the military expenditure of the Eastern Flank of NATO countries. However, in the article, we proved that there was a significant correlation between the military expenditure of the Eastern Flank of NATO countries over the last 28 years. Thanks to this finding we can assess that the countries perceive the threats from abroad, mainly from Russia, similarly. Furthermore, the quantitative analysis proved that almost all the Eastern Flank of NATO countries increased their military expenditure over time. On the basis of these findings, we could consequently examine which stimulus has an impact on the country's military expenditure. After the examination of the data, we can declare that the annexation of Crimea had the strongest impact on the military expenditure of the NATO Eastern Flank countries. After this event, military spending started continuously increasing and shortly after also the NATO multinational battlegroups were established, the first four in 2017 in Poland and Baltic states and the second four in Slovakia, Hungary, Romania, and Bulgaria after the Russian invasion to Ukraine in 2022. On the contrary, the Russian invasion to Georgia did not affect the countries´ military expenditure. There is a strong reason to believe, that NATO and the Western world underestimated the invasion in Georgia and reacted only in symbolic ways, which opened the doors for Russia to try similar operations again. Due to various factors such as the Russian military buildup or economic boom, it is difficult to assess the impact of the Russian invasion to Chechnya impact on the countries´ military spending. However, it can be declared that the Russian actions were the main motivation to strengthen their defences.

According to the mentioned findings, we can predict that the current invasion of Russia in Ukraine will have a positive effect on the country's military spending, as well as on the Eastern Flank of NATO countries' mutual cooperation.

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Balancing Risk and Reward: Unveiling the Credit Conundrum in P2P Lending - A Tale of Default and Profit Scoring

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Abstract. A credit risk assessment is a vital component of the lending process, particularly in the rapidly growing realm of peer-to-peer (P2P) lending. This empirical study delves into the credit risk assessment methods of default and profit scoring, employing machine learning techniques on a publicly available dataset sourced from P2P lending platform – Lending Club. Our investigation yields insightful findings, emphasizing the paramount importance of accurate credit risk evaluation and their implications for loan portfolio returns. The outcomes of our analysis reveal that profit scoring outperforms default scoring in terms of higher annualized returns on loan portfolio. Notably, this superior performance of profit scoring is primarily attributed to its ability to intelligently accept more loans. This is due to the fact that traditional default modelling approaches do not take into account the possibility that certain defaulted loans would generate positive annualized returns as debtors may default at the end of the loan life cycle. By considering not only the risk of default but also the potential profitability of a loan, profit scoring enables lenders to make informed decisions and optimize their portfolio returns effectively. Our findings further reinforce the need for lenders to adopt advanced credit risk modelling techniques, such as profit scoring, to navigate the dynamic P2P lending landscape successfully.

Keywords: P2P Lending, Default, Profit Scoring, Machine Learning.

JEL classification: *G21, C55*

1   Introduction

The evaluation of credit risk plays a pivotal role in lending decisions, as financial institutions strive to strike a delicate balance providing a credit to as many customers as possible with the loan default rates [14]. Traditionally, default scoring models have been employed to assess the likelihood of loan repayment, focusing primarily on the

borrower's creditworthiness and historical repayment patterns. However, as the lending landscape evolves, alternative approaches, such as profit scoring [21], have gained prominence in capturing the multidimensional aspects of credit risk.

Default scoring methods primarily aim to predict the probability of default. Such models are trained on a sample of loans with binary target variable – Default or Full repayment of all liabilities [3]. While default scoring is effective in identifying high-risk borrowers and minimizing default rates, it often neglects an essential aspect of lending: the potential profitability of the loans.

In contrast, profit scoring takes a more comprehensive approach to credit risk assessment by considering the potential returns associated with lending to a particular borrower [21]. The profit scoring models aim to maximize the profitability of the loan portfolio while managing credit risk implicitly. This approach leads to prediction of future annualized return on a loan according to the parameters of loan application.

In this article, we delve into the key differences between default scoring and profit scoring in the context of loan assessment. We aim to shed light on the advantages and limitations of each approach and explore how they impact lending decisions and loan portfolio performance. Drawing on an empirical study utilizing peer-to-peer (P2P) lending data, we examine the effectiveness of both default scoring and profit scoring in terms of loan portfolio profitability.

By comparing the outcomes of default scoring and profit scoring models, we aim to provide valuable insights for lenders and financial institutions seeking to enhance their credit risk assessment strategies. Understanding the trade-offs between default scoring and profit scoring is crucial for informed decision-making in lending, as it allows lenders to strike a balance between mitigating default risk and maximizing the profitability of their loan portfolios.

2 Literature Review

In a variety of application fields, including language models or image recognition, machine learning (ML) and artificial intelligence (AI) have attained human-level performance. Yet, Munkhdalai et al. [18] perceive expert-based credit risk models as those which rule the financial industry. Financial Stability Board (FSB) [7] finds it challenging to conduct a broad assessment of the effectiveness of ML models since the predictive power of these models has often only been examined in experimental settings of academic research. Fintech companies, such as P2P lending platforms, in particular tend to apply machine learning into their processes [2].

An attempt to incorporate machine learning advancements into the field of credit scoring is not brand new. The initial initiatives started in 2003 when Baesens et al. [1] started examining the performance of several categorization approaches. According to the literature review, intelligent systems appear to have the necessary components to perform better than conventional methods.

Conventional credit scoring models rely mostly on linear statistical models [9]. However, Khandani et al. [12], similarly as Gambacorta et al. [9], declares the need to address the problem of credit quality assessment with more advanced, non-linear techniques. He relies on the results of an empirical test, in which he showed that such

more complex models can outperform traditional linear approaches by 6 to 23% in terms of minimising realised losses, thus also bringing a financial dimension. The literature review shows a bit conflicting evidence about performance of linear models relative to the more advanced ones. The conclusions of Munkhdalai et al. [18] or Finlay [8] put logistic regression level-headed comparing to non-linear predictive models, whereas Chang et al. [4] study reveals that ensemble learning algorithms, such as XGBoost, dominate logistic regression by a large margin. A comprehensive study of Lessmann et al. [15] compares individual classifiers with ensemble classifiers. He concludes that logistic regression does not lag behind other individual classifies and is comparable also with neural network classifier, which is supposed to capture for non-linear relationship, yet it falls short in comparison to ensemble models. Ensemble algorithm combines multiple individual models, such as decision trees or neural networks, to make more accurate and robust predictions by aggregating their outputs.

Serrano-Cinca et al. [21] highlights the importance of incorporating profit-based assessment methods to optimize lending decisions and enhance the overall economic performance of P2P lending platforms. The study demonstrates that by considering profit as the primary criterion for loan approval, P2P lending platforms can achieve higher annualized returns on their loan portfolios. A more recent re-examination of profit scoring as a viable alternative to traditional credit scoring methods in P2P lending is brought by Lyócsa et al. [16]. According to the empirical research of the study, profit scoring performs better than default scoring when it comes to producing greater annualized returns on loan portfolios. This outcome is mostly attributable to taking more loans rather than depending heavily on strict default risk assessment.

In an analysis of credit card underwriting, Krivorotov [13] concludes that profit scoring approach reshuffles a bank's credit card portfolio substantially and may possibly make the credit card portfolios riskier.

3 Research Methods

This chapter discusses machine learning (ML) techniques used in the modelling section, explains how we arrived at the annualized rate of return of loans using modified internal rate of return (MIRR), and provides a brief introduction to the data sample utilized in the research part.

3.1 Statistical Methods

Statistical learning is a key tool in analysing and modelling various real-world phenomena. In the field of credit risk assessment, statistical models are crucial for predicting the likelihood of default and managing risk [3]. For the aim of credit scoring, we chose three essential statistical learning tools: support vector machine (SVM), Extreme Gradient Boosting (XGBoost), and linear regression (LR) or Logistic Regression (LogReg) and their regularized variants (L1 and L2 penalty).

Linear regression (LR) is a popular statistical modelling technique used to establish a relationship between a dependent variable and one or more independent variables. It aims to fit a linear equation that best represents the data. LR aims to predict actual value

of response variable and is solely used for regression tasks [17]. However, in some cases, the basic linear regression model may suffer from issues like overfitting or high sensitivity to outliers. To address these challenges, various regularization techniques can be employed. Ridge regression (L2 penalty regularization) adds a penalty term to the ordinary least squares (OLS) objective function, which helps shrink the coefficient estimates towards zero and hence reduces model complexity [10]. Lasso regression (L1 penalty regularization), on the other hand, not only introduces a penalty term but also performs feature selection by enforcing some coefficients to be exactly zero [6]. This makes lasso regression useful for feature selection and creating more interpretable models. These regularization techniques provide flexible tools to improve the performance and interpretability of linear regression models in various scenarios.

Logistic regression (LogReg) is a statistical method used for classification tasks (mostly binary), where a goal is to predict the probability of an instance belonging to a specific class [19]. Unlike linear regression, logistic regression uses a logistic or sigmoid function to transform the linear combination of predictors into a probability score. This score represents the likelihood of an instance belonging to the positive class.

Support Vector Machine (SVM) is a powerful and versatile supervised machine learning algorithm used for both classification and regression tasks [20]. It aims to find an optimal hyperplane that maximally separates different classes or predicts continuous values with the highest margin of confidence. SVM achieves this by transforming data into a higher-dimensional space using kernel functions, allowing for both linear and nonlinear decision boundaries. It is known for its ability to handle high-dimensional data and effectively deal with outliers.

Extreme Gradient Boosting (XGBoost) is a powerful and widely used machine learning algorithm known for its exceptional predictive performance when tuned properly [5]. It belongs to the gradient boosting family and is based on the concept of ensemble learning. XGBoost combines the predictions of multiple weak decision trees to create a strong predictive model. It utilizes a gradient boosting framework, where each subsequent tree is built to correct the errors made by the previous trees.

In our study we need to employ algorithms capable of performing both classification and regression. The main difference between classification in default scoring and regression in profit scoring lies in the nature of the prediction task and the objective of the analysis. In default scoring, the goal is to classify instances into binary classes (e.g., default or non-default) based on applicants' creditworthiness. On the contrary, in profit scoring, the objective is to estimate the potential profitability of each instance or transaction, typically in terms of expected profit or return on investment. Regression in profit scoring involves predicting a continuous variable and aims to optimize financial outcomes by evaluating the potential monetary gains or losses [16].

3.2   Modified Internal Rate of Return

Lending Club provides data about applicant characteristics, as well as the history of debtor repayments for accepted loans. In order to test superiority of profit scoring, we need to calculate the annualized modified internal rate of returns (MIRR) from the payments history [22]. The derived MIRR will become the target variable of our

regression models as opposite to the competing default models trying to classify loans into correct category – Default and Non-default.

We presume initial transfer of funds following the approval of a loan application to be a single payment. Then, we assume the repayments of debtor towards the platform to be reinvested at the median IRR of loans for the last 12 months. With this approach we are able to obtain an annualized rate or return and hence to compare the loans with different maturities.

3.3 Data

Lending Club is a prominent peer-to-peer (P2P) lending platform based in the United States. It operates as an online marketplace connecting borrowers and investors, offering a streamlined alternative to traditional banking channels. Anonymised data about its accepted and rejected applications, as well as the final status of the loan – Repaid or Default – is accessible and free to download for investors on their webpage.

The dataset [11] covers period of 2007-2018 in which 2.2 mil. loans were granted by the platform. There are more than 150 features in the dataset. In the data transformation process, the original set of records was reduced to 1.2 mil loans with more than 530 columns. The features were transformed in the nature that continuous variables are standardized, and categorical data is dummy encoded. Feature standardization involves transforming the values of each feature in the data to have a zero-mean (by subtracting the mean) and unit variance, ensuring that the features are on the same scale. Variables with a high prevalence of missing values were deleted in the process to ensure better data quality.

Table 12. Descriptive statistics of Modified Internal Rate of Return of loans in portfolio

	Default rate	Annualized rate of return (in %)				
		Mean	Median	STD	10th percentile	90th percentile
Full data	19.53%					
Non-Default		13.27	12.27	4.86	8.33	19.45
Default		-44.51	-40.85	35.83	-97.97	1.27
Train data	19.45%					
Non-Default		13.30	12.30	4.88	8.35	19.43
Default		-44.86	-41.12	36.05	-98.05	1.50
Test data	20.02%					
Non-Default		13.35	12.36	4.87	8.33	19.55
Default		-44.39	-39.90	35.99	-98.11	1.11

4 Results of the Research

In Fig 1. we highlight the fact discussed in the introduction of the paper. A default rate analysis (1.2 mil. loans) reveals that in 19.53% of cases liabilities are not fully repaid. If we zoom in into subsample of loans with positive annualized returns, we find that even defaulted loans fall into the profitable category. About 11% of loans when borrowers did not fully meet their obligations (i. e. default) are still relatively lucrative (approx. 2% of entire loan portfolio) as depicted in the right-hand side of Fig. 1.
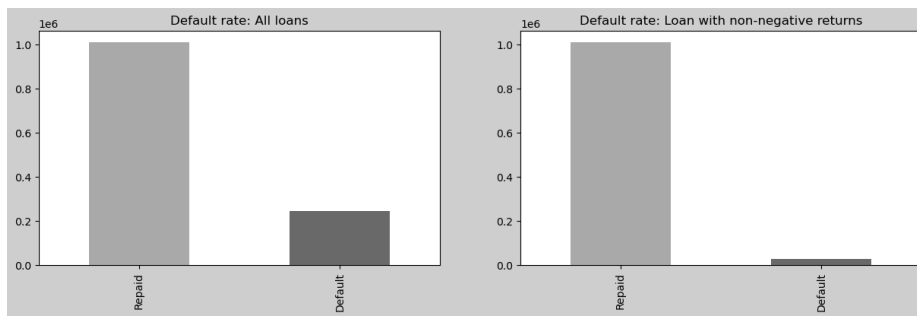
Fig. 10. Default rate in the portfolio of analysed Lending Club loans.

A deep dive into distribution of annualized rate of returns in the loan portfolio is presented in Fig 2. The left bottom panel exhibits drill-down on non-performing loans, which can nudge some investors to target even defaulted one as some bring profits.
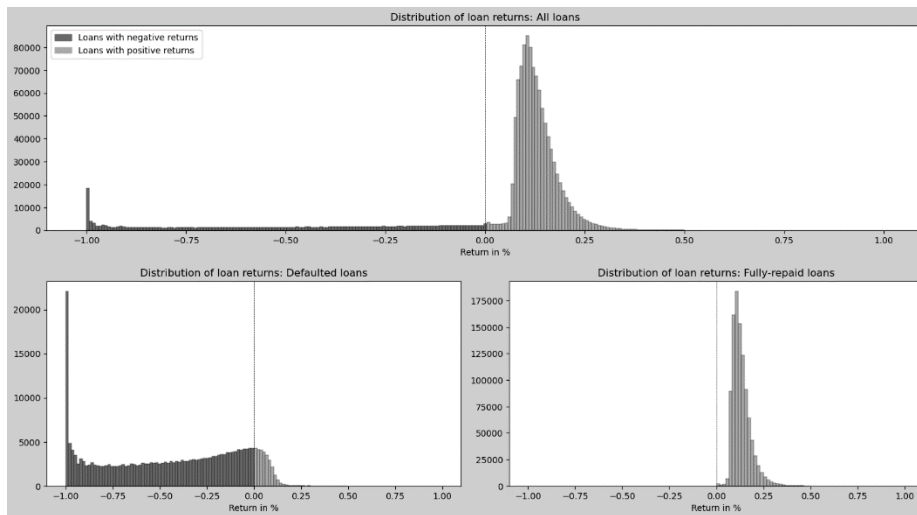
Fig. 11. Profit distribution of P2P lending loan portfolio of Lending Club. Notes: Loans that led to negative internal rate of return are denoted with dark grey. The upper panel depicts distribution of entire portfolio of accepted credit applications, the lower panel provides split view on segment of defaulted (left side) and fully repaid loan (right side).

In the modelling part we employed individual linear algorithm learning (i.e. LR and LogReg), regularized forms of such a linear model (L1 or L2 penalty, respectively), individual non-linear model (namely RBF kernel SVM) and ensemble method which aggregates results of multiple base models (such as XGBoost). Table 2. presents out-of-sample performance of all the models and the results provide compelling evidence about potential financial benefits of proposed paradigm shift from credit to profit scoring. As we are using diverse set of machine learning algorithms, we believe the research delivers adequately robust findings. If we investigate nominal yields of lending platform, an average gross profit of default classification models is $9,8 mil., whereas algorithms projecting profits average at $12,9 mil. The difference between two families of modelling paradigms is more than 30%. Even though the total gross profit does not account for differences in term lengths (loan maturities), it is quite substantial margin. Except of Gaussian RBF kernel algorithm, which is a negative outlier among profit scoring models, all others profit-driven approaches to credit approval are superior to their default-oriented counterparts by more than 10% in terms of arithmetic average returns or median returns.

Table 13. Results of different modelling approaches applied to test dataset (out-of-sample)

	(in %) Invested loans	MIRR (in %) for entire portfolio			(in mil. $) Total profit
		Median	Mean	STD	
Credit scoring					
LogReg	58.43	7.23	3.29	15.75	10.53
LogReg-L2	59.76	7.49	3.18	16.27	10.10
LogReg-L1	61.04	7.61	2.80	17.17	8.63
RBF-SVM	66.85	8.22	2.76	19.22	9.55
XGBoost	60.38	7.55	3.12	16.59	10.28
Profit scoring					
LR	66.93	8.43	3.57	17.57	14.27
LR-L2	66.87	8.40	3.53	17.53	13.69
LR-L1	67.92	8.48	3.41	18.30	12.97
RBF-SVM	67.25	8.47	1.88	22.68	9.61
XGBoost	73.10	9.07	3.39	19.89	13.99

The credit approval process is very complex and requires balancing inherent risks and potential rewards. The credit scoring models noticeably overestimate risk of an applicant. Contrarily, the set of algorithms focused on profit projection grants loans substantially more often.

As profit scoring approach outperforms the default classification in average returns across accepted loans by only small margin, if we account for opportunity cost of rejected loan, the difference in performance on entire portfolio in significant (Table 2).

Taking this into account, we presume that the profit is generated by the increased acceptance rate that the profit scoring technique associates itself with.
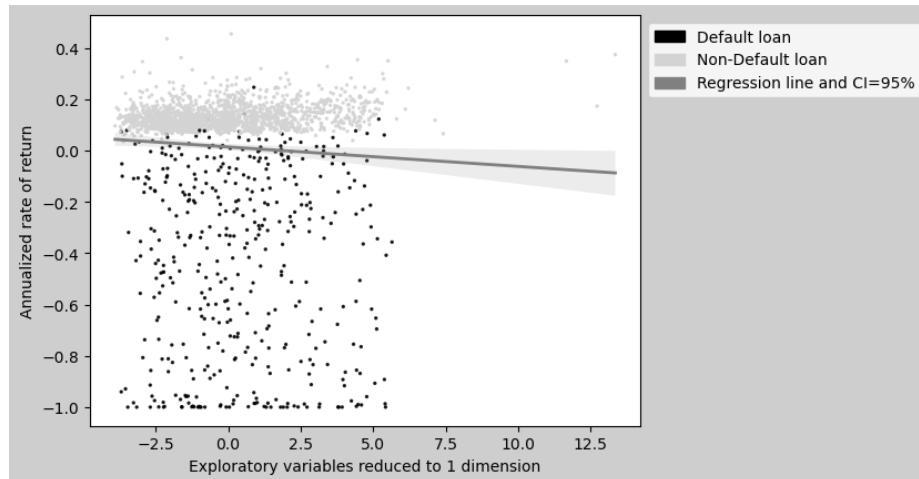

Fig. 12. The relationship between annualized rate of return and independent variables reduced to one dimension. Note: Our dataset includes 522 exploratory variables, and they were linearly reduced via Principal Component Analysis (PCA) to a single variable plotted on X-axis for visualization purposes. This dimensionality reduction explains only 24.8% of variance in original dataset with 522 features. Therefore, the findings should be regarded with some scepticism.

Fig. 3. depicts the most prominent challenge that profit scoring models face. The higher the inherent riskiness of applicant (X-axis), the higher the volatility of returns. The riskier the credit is, the higher the interest rates assigned to the liability and hence higher the potential return. On the other hand, the riskier the customer is, the more likely the default occurs. It is extremely difficult for the algorithm to predict the possible profit on a deal of customer with low creditworthiness. This conclusion is indicated by growing confidence intervals of regression line (at confidence interval of 95%).

5   Conclusion

The comparison of the same statistical models in two families of algorithms – classification and regression – shows supremacy of profit scoring approach to credit approval in P2P lending. The dominance is confirmed not only with relative values of average and median profit in out-of-sample portfolio of loans, but also with nominal gross profit in monetary units. Despite that the profit-driven approach is riskier. The variability of annualized returns grows as we change the task from default detection to profit projection. This premise holds across all modelling techniques.

Our findings about growing variability of profits with decreasing credit quality of applicant creates a room for further development in the area of credit risk modelling. The plausible direction of future research could lead to the blend modelling. The best results might be achieved when more prudent credit scoring approach is applied to the

class of riskier customers, whereas profit scoring can help to identify profitable deals on the borderline between default and non-default. Alternatively, a quantile regression can offer additional predictive power in profit scoring as quantile regression is an extension of linear regression used when the conditions of linear regression are not met.

6   Acknowledgement

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Econometrics and Gender: Do Women Score Better in Econometrics? Evidence from Slovakia.

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Abstract. Knowledge of econometrics and the use of quantitative methods improve the outputs of undergraduate students, especially their final theses. The question that this paper deals with is whether women and men achieve different results from the study subject Introduction to quantitative methods. The research was carried out at the end of 2022 in the months of November and December on a sample of 165 Slovak students through two questionnaires. They completed the course in their native language.
The research results showed that men had a better average score during the first mid-term test. The results were carried out based on the summary statistics and the construction of a simple regression model. A month later, women scored on average better and had a better median value on the Advanced Statistical Tests test. However, these results were not statistically significant. Differences could be also observed in the preparation for the seminars. Women were preparing more during the semester while men spent more time preparing before the test itself.

Keywords: Econometrics, Gender Differences, GRETL, Study Results, Quantitative Methods

JEL classification: *A22, C01*, C21

1   Introduction

Econometrics is widely recognized as an important research methodology in the field of economics, and it is also commonly used in other social science disciplines. Economics faculties and business schools focus more and more on teaching quantitative methods and some even more advanced courses in econometrics usually working with statistical software. The skills related to this field are more and more required both in the public and private sectors.

This research is part of a larger research on indicators that have an impact on study results in econometrics since the determinants of student performance in this field continue to be a topic of ongoing discussion not only among lecturers but also policymakers.

The data was collected on undergraduate degree students. This paper focuses on the issue of gender differences in learning and achievement. The aim of the article is to analyze the main differences between men and women based on the obtained data. Students' preparation for the seminars, their participation, the length of the preparation, as well as their study results were considered. Moreover, in the literature review, an overview of the available literature related to the research is presented. The methodology is adapted to serve future students in acquiring new knowledge from econometrics.

2   Literature review

Differences between men and women are an issue that is widely discussed not only in the public sector but also in the academic area. A wide variety of authors focus their research on econometrics scoring.

Already in the 70s of the 20th century, the American professor at the Pennsylvania State University Cohn (1972) tested the main characteristics and performance of his students from the subject "Introduction to Econometrics". He used a sample of the graduates of his course during the winter semester of 1971. The purpose of this study was the reorganization of the subject. Mainly in terms of class size, frequency of course offering, student mix, and number of sections. The sample he used was relatively small. Only 43 students were included and only 5 of them were women. However, he proceeded in a similar way to the research in this article. He provided the students with a short questionnaire with questions about their student background in subjects such as economics, mathematics, and statistics. In addition, he had official records from the university. Thirdly, he had his own data on student performance. This study includes many limitations, such as the already mentioned small sample of students and, at the same time, a possible problem with multicollinearity. However, the results indicated that the grade in mathematics largely influences success in econometrics, while knowledge in economics does not guarantee suitable prerequisites for econometrics. The study does not suggest that women perform better than men. Women achieved higher, but it was not significant.

A decade later, Paul (1982) at Towson State University conducted similar research to determine results from macroeconomic principles. During the years 1976-1979, he collected data for 836 students, which he obtained via questionnaire form. Students filled in information about their age, race, gender, marital status, and information about their academic studies to date. In addition, a question regarding their outside employment was added to the questionnaire. The results indicate that there is a statistically significant association between outside employment and academic performance.

Romer (1993) focused mainly on the relationship between class attendance and study results. He stated that lectures and tutorials or class meetings are the primary means of instruction for students at the academic level and in reality the attendance is "*far from perfect*" (p. 167). Therefore, he investigated the evidence, of whether the university should do something about absenteeism. The paper suggests that there is very strong statistically significant evidence that there is a relationship between attendance and class performance.

Dancer (2003) used a sample of 696 first-year university students in Sydney, Australia. 53,6% of them were males (373 students) and the rest 323 were females. The author investigated the differences in the teaching and performance of women and men in two basic courses - an economics course and an econometrics course. The author assumed that women would achieve higher and that the level of mathematics undertaken at school will affect econometrics performance, but not economics. The results show that in terms of gender effect, women achieved better results in econometrics, but men scored higher in economics.

In the latest study, Cladera (2021) devoted herself to evaluating the approach to econometrics on a sample of 87 students in 2018. The students completed a statistics course before the econometrics course. The content of the introductory course was devoted to the introduction to the linear regression model and topics related to its specifications such as multicollinearity, specification errors, dummy variables, autocorrelation, and heteroscedasticity.

3   Data and methodology

The purpose of this section is to outline the data collection process for analysis and description of the research sample. The aim of this article is to test the hypothesis of whether there are differences in study results in econometrics and statistics between both sexes. Moreover, the article focuses on the differences between preparation, participation in seminars, the lectures. Thus, it includes variables that could be related to the study result from the course.

The research was carried out as part of the course "Introduction to Quantitative Methods" on 2nd-year undergraduate students at the University of Economics in Bratislava. The course was taught in the Slovak language in statistical software GRETL (Gnu Regression, Econometrics and Time-series Library) during the winter semester. All enrolled students had to take two midterm tests, the first one in November and the second one in December 2022.

After each test, students were asked to fill in a questionnaire. The data obtained from the questionnaire were paired with other data we already possessed and then they were later anonymized. The questionnaire´s return rate was high up to 99.39% and 164 of the total number of 165 students completed it. Data collection was completed in January 2023.

As presented in Table 1, the gender representation in the research was slightly in favor of men, who represented up 53% of the respondents. Men were the most dominant in Study Group 2 (73%), Study Group 1 (63%), Study Group 6 (61%) and Study Group

3 (57%). They had a slightly higher representation in Study Group 7, where there were 11 men and 10 women. Women dominated in the Study Group 4 (63%), Study Group 5 (58%) and Study Group 8 (57%).

The article follows previous study Vojtasová, Solej (2023) and it focuses on the analysis of the results using simple statistical methods. The results of our study are presented graphically using box plots. The results of the mid-term tests by gender and study groups in which the students completed their studies are mainly presented.

Table 1. Distribution of econometric students by gender and study group

	MALE	%	FEMALE	%	TOTAL
Study group 1	12	63%	7	37%	19
Study group 2	16	73%	6	27%	22
Study Group 3	12	57%	9	43%	21
Study Group 4	7	37%	12	63%	19
Study Group 5	10	42%	14	58%	24
Study Group 6	11	61%	7	39%	18
Study Group 7	11	52%	10	48%	21
Study Group 8	9	43%	12	57%	21
TOTAL	88	53%	77	47%	165

To compare the differences between the sexes, we used boxplots, where we had a comparison between the study groups for both tests and then the differences between men and women in both tests. Our research assumes that women have better academic results. We tested these claims with two statistical t-tests. The null hypothesis of the t-test is that there are no differences between men and women.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$$

- $\bar{x}1$ is the mean of the first sample (male)
- $\bar{x}2$ is the mean of the second sample (female)
- $\sigma1$ is the standard deviation of the first population (male)
- $\sigma2$ is the standard deviation of the second population(female)
- $n1$ is the number of the data points in the first sample (male)
- $n2$ is the number of the data points in the second sample (female)

H_1 hypothesis: The is no gender difference in mid-term test I. results.
H_2 hypothesis: The is no gender difference in mid-term test II. results.

4   Results

The beginning of this chapter is devoted to the results from both mid-term tests. Based on the obtained test results, presented in Figure 1 we can conclude that men achieved

from mid-term test 1 a better average result in five out of the eight groups. Mid-term test 1 contained 2 tasks, which were dedicated to the examination of the knowledge of summary statistics, work with boxplots and histograms. Furthermore, they included an exercise for conducting a model in statistical software and testing the significance of the model, the significance of selected variables, heteroskedasticity and autocorrelation of residuals.

In the groups where there were predominantly women, men achieved a better average in two out of three cases. On the contrary, in groups that were represented by more men, women achieved a better result in two out of 5 cases.
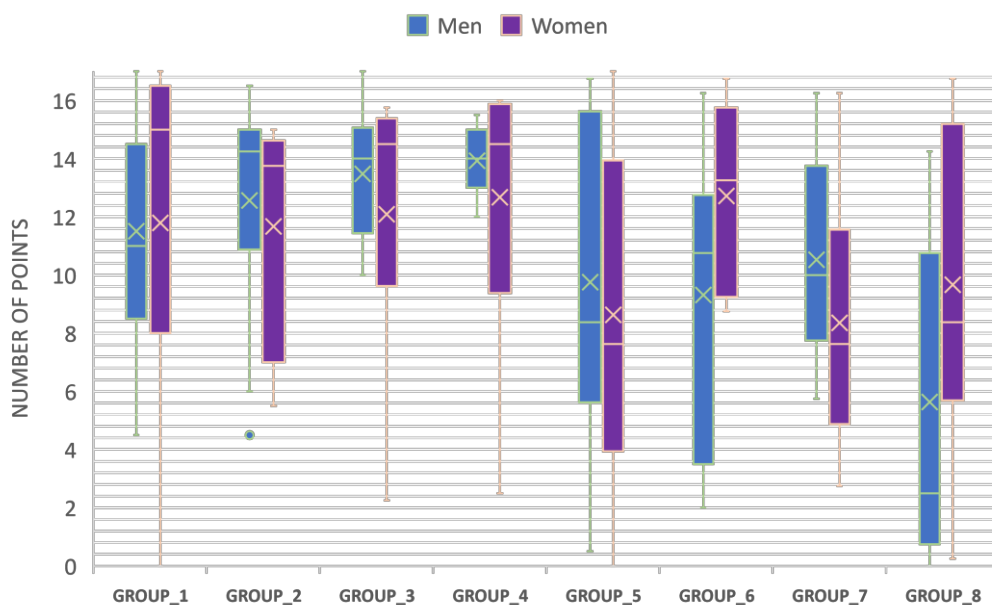
Fig. 1. Results from the mid-term test 1 based on groups and gender.

Study Group number 1 was relatively equal in terms of average, men achieved an average of 11.5 points and women achieved an average of 11.79 points. Women have a higher median value by up to 4 points. In Study Group 2, men had a better average and median than women. Their average result was 12.56 points, while the women's score was 11.67 points. The male median of 14.25 points was 0.5 points higher than the female median. In Study Group 3, men achieved a better mean but a worse median. Out of all analyzed study groups, the men achieved the best average result in Study Group 4 (13.93 points). Women from Study Group 4 obtained on average 12.67 points.

Other groups achieved weaker results, especially among men. The men from Study Group 5 achieved an average of 9.75 points, while the women 8.63 points. Men also had a better median. This group consisted of 24 students, which is the largest number of students per group. In Study Group 6, women achieved better results than men. Women achieved a result of 12.71 points and men 9.32 points. In group 7, the men achieved an average of 10.52 points and the women 8.35 points. The worst result was

achieved by Study Group 8. Men scored on average only 5.63 points and women 9.67 points. In this group, the biggest difference in the result in favor of women was recorded.
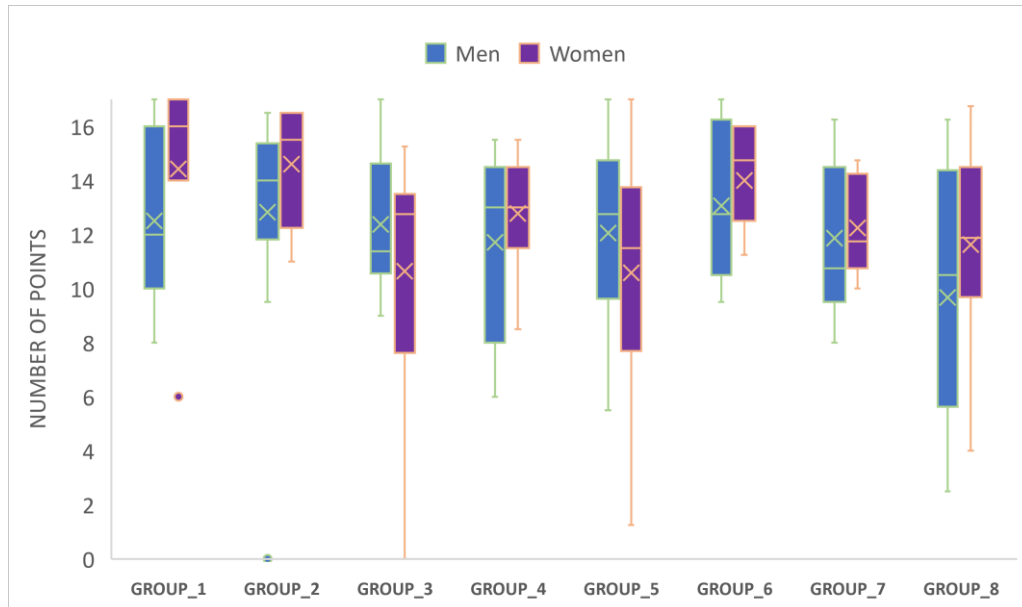

Fig. 2. Results from the mid-term test 2 based on groups and gender.

Figure 2 shows the results from mid-term test 2, which included more extensive statistical tests and was based on tasks related to a simple regression model, multicollinearity, interpretations of artificial variables and econometric model specification. Students could obtain a maximum of 17 points in 3 tasks. The second test took place about a month after the first one.

In this test, women achieved better results than men in 6 out of 8 Groups. In groups predominantly occupied by women, men achieved a better average only once, also once in groups with more men. Moreover, women also achieved better median values than men in 75% of cases, once the median was equal (Study Group 4) and once in Study Group 5 the median was in favor of men.

The average result in Study Group 1 was 15.85 points for women, compared to 12.85 points for men. Women in another Study Group 2 scored on average 14.6 points which is 1,77 more than men (12.83 points). Study Group 3 achieved a female average score of 10.64 points, which was one of the lowest averages together with Study Group 5 (female average of 10.59 points). The men in Study Group 3 had higher average results (12.38 points), together with men from Study Group 5 (12.06 points).

The Study Group 4 reached an average of 12.77 points as for women and an average of 11.71 points for men. Study Group 6 had an average of 14 points for women and almost a point lower for men (13.07 points). In Study Group 7, only a slight difference in gender results was recorded. Women achieved 12.25 points and men 11.86 points. The last Study Group had better results from the second midterm exam than from the

first one. The average result for men was only 9.67 points. The women from this group once again had a significantly better result, almost by two points (11.625 points).
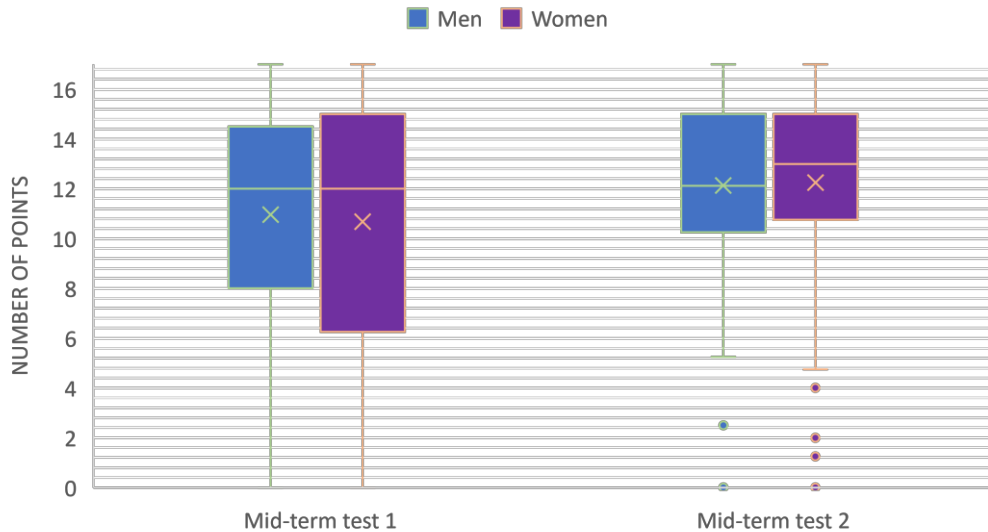

Fig. 3. Results from the mid-term test 1 and mid-term test 2 based on gender.

The following Figure 3 can answer the question of whether men or women have better results in econometrics. The figure displays a boxplot showing the comparison of the results of men and women from both tests across all groups. When the average value was very similar in the first test.

Men had a better average score of 10.95 points. Women scored on average 10,68 points. The median was the same for both genders at 12 points. On the other hand, in mid-term test 2, women were more successful, and their average score was 12.25 points, which was 0.13 points higher than the average score of men. Men achieved an average of 12,12 points.

Other values were always very similar, but always better in favor of women. Half of the women obtained from the test more than 13 points, for men it was approximately one point less (the median was 12,125 points).

Table 2. Statistical tests for hypothesis

H_1 hypothesis:	The is no gender difference in mid-term test I. results
Test statistic: t(156)	= (10,9569 - 10,6818)/0,742573 = 0,37044
Two-tailed p-value	= 0,7116
H_2 hypothesis:	The is no gender difference in mid-term test II. results
Test statistic: t(155)	= (12,1279 - 12,2467)/0,562988 = -0,210945
Two-tailed p-value	= 0,8332

Table 2 shows the results of the t-test and the test statistics, through which the two hypotheses were verified. In the first hypothesis, we have had statistically verified the difference between women and men in the mid-term test I. The second hypothesis tested this difference in mid-term test II. Both tests confirmed that there is no statistically significant impact of gender on the test score from econometrics. The two tailed p-value is higher than 0.05. Therefore, null hypothesis for both hypotheses cannot be rejected.

Table 3. The mean of selected variables

Variable	Mid-term test I.		Mid-term test II.	
	Men	Women	Men	Women
Tutorial activity	2,61	2,18	3,76	3,51
Tutorial attendance	5,49	5,57	4,64	4,58
Lecture attendance	2,52	3,08	1,21	1,51
Preparation before tutorial *(in minutes)*	17,49	22,34	22,41	29,89
Preparation before mid-term *(in minutes)*	287,66	261,47	197,24	177,84

The last Table 3 is used to evaluate the basic supporting statistics that were part of the questionnaire. We can see that men were slightly more active in the seminars and scored slightly more points than women before both tests. Regarding attendance in tutorials, no big gender differences were found. However, women attended lectures on average more often than men throughout the academic year. Moreover, we identified that women were preparing more for seminars during the semester. On average, 22 minutes in the first part of the winter semester, and a little less than 30 minutes in the second part of the semester. Men spent less time on ongoing preparation for seminars before both mid-term tests. At the same time, they studied longer before the mid-term test itself. On average, women spent 20 to 25 minutes less getting ready before mid-term tests.

5   Conclusion

Research on the determinants of grades is a valuable insight for teachers and universities. This article is devoted to proving gender differences in the mid-term test result from econometrics. Our main hypothesis was constructed based on the literature is that women will achieve better academic results. The analysis included data from 165 students who enrolled in the course entitled "Introduction to Quantitative Methods". Through the questionnaires, the students provided answers that are in sufficient quantity and enable detailed examination of the determinants of the study results.

The study exanimated results of two mid-term tests, which included tasks from descriptive statistics, boxplots, histograms, simple regression model, multicollinearity, interpretations of artificial variables and econometric model specification.

Based on the results, students performed on average better in the first mid-term test. Men scored 10.95 points; women scored 10.68 points. In terms of the median, both sexes obtained the same number of 12 points. Women had a better upper quartile, meaning that the top 25% of women had a better result than the top 25% of men. On the contrary, men had a better result in the lower quartile. In terms of groups, men had a better result in 5 out of 8 cases.

In the second mid-term test, the women achieved better results. This test was more extensive. Women had an average of 12.25 points and men 12.12 points. Moreover, women also had a better median result than men and their result was better in 6 out of 8 groups. Additionally, statistical tests showed that these differences were not statistically significant. Finally, based on the summary statistics, some differences in attendance at seminars and participation in lectures were highlighted. Women prepared more intensively during the semester and went to lectures more often, men, on the other hand, prepared longer for the exam itself and earned more points on average for the activity during the lessons.

Acknowledgments

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Impact of European Structural and Investment Funds on the Slovak Economy

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Abstract. The European Structural and Investment Funds (ESIF) represent a valuable tool of the European Union. EU countries use the funds to finance activities focused on different areas. They are primarily aimed at reducing regional disparities between regions. The objective of this paper is to examine the effect of the European Structural and Investment Funds on economic indicators in Slovakia. To achieve this aim, the paper examines the evolution of economic indicators between the years 2007 and 2021. Secondary data on the drawing of the European Structural and Investment Funds in Slovakia in the period under review are identified. The impact is detected in the paper based on regression and correlation analysis. Established on the correlation and regression analysis outcome, we can argue that there is a dependence between the implementation of ESIF and the economic indicators, although the implementation of the ESIF has a small impact on gross domestic product and unemployment.

Keywords: European Structural and Investment Funds, Economic Growth, Regression and Correlation Analysis.

JEL classification: *C02, A10, F63*

1   Introduction

European Commission and Member States of the European Union founded a multiannual economic scheme. The main objective of this framework was to revive the European economy. Another objective was to improve the coordination between national and European policies. The funds were also intended to enable market integration and improve citizens' well-being (Becker, Egger, von Ehrlich, 2018). The European Structural and Investment Funds represent the main investment instrument for promoting economic growth in the Member States and developing their economic convergence (Nishimura, Au-Yong-Oliviera, Sousa, 2021). At the same time, promotes competitiveness and reduces regional disparities. European Commission (2017) claims

the funds are a significant source of investment and account for up to 70% of total investment (European Commission, 2017). The investment is focused on four key sectors that generate growth. That includes research, and innovation, digital technologies, support of low carbon economy, and small businesses (European Commission, 2017).

The importance of the ESIF is also highlighted in the European Commission Report. It shows that Central and Eastern European countries benefit most from the Cohesion policy. The report also tells that European Union funding for cohesion policy has increased from an average of 34 percent in the previous 2007-2013 programming period to 52 percent in the programming period 2014-2020. This implies that the share of European funds in public finances is increasing in member states, which is contrary to the basic principle of cohesion funds: they are intended to complement public finances, not to replace them. Figure 1 displays the trend in public investments. It is expressed as a share of the GDP of the Member States.
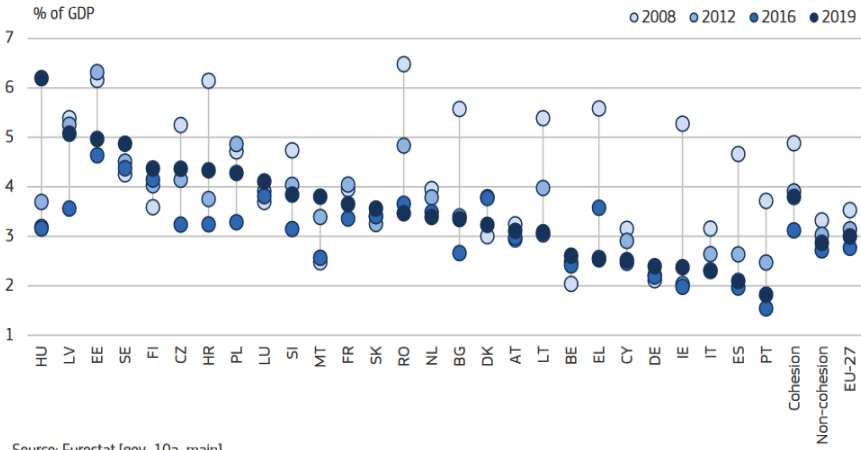
Source: Eurostat [gov_10a_main].

Fig. 1 Trends in public investment as a share of GDP, Source: European Commission p. 288,2023.

The 8th Cohesion Report issued by the European Commission (2022) declared that through cohesion policy regional and social disparities amongst regions have been reduced. The Commission expects cohesion funding to increase the gross domestic product per capita of less developed regions in EU countries by up to 5 percent by 2023 (European Commission, 2022). Cohesion investments to Report "have contributed to a 3.5 percent decrease in GDPs per capita in the least developed regions and 10 percent in most developed regions" (European Commission 2022, p. 288). Convergence between Member States has enhanced over the years, but intra-regional disparities within fast-growing Member States have increased (European Commission, 2022). And

while the value of employment is increasing, disparities between regions stay wider than before the year 2008.

1.1   Literature Review

The literature is full of studies assessing the effect of European Union funds on economic expansion, and development. However, the findings of individual studies vary considerably. On the one hand, some studies have found a positive impact of the European Structural and Investment Funds on the economy. A positive impact was found by Žáček, Hrůza, and Volčík (2018), who examined it on quantitative modeling approaches and dynamic panel data regression techniques (Žáček, Hrůza, and Volčík, 2018). Pellegrini et. al. (2013) and Maynou (2014) also confirmed the positive relationship during the programming period (Pellegrini et. al., 2013, Maynou, 2014). Dicharry (2021) finds that the size of the effects of EU funds depends on the pace of implementation of the funds. Faster disbursement of funds decreases the effectiveness of the Cohesion Policy and therefore reduces the ability of the funds to stimulate economic growth (Dicharry, 2021). Durova (2022), based on an empirical survey, finds that in the short run, funds have a positive effect on the economy in Bulgaria, but overall, she rejects a positive impact (Durova, 2022). According to Bähr (2008), the cohesion policy has a significant effect on economic expansion when the states demonstrate a higher degree of decentralization (Bähr, 2008).

The negative attitude stems from the assumption of the inefficiency of public finances due to corruption and the dislocation of private investment. The following authors Canova and Marcet (1995), and authors Fagerberg and Verspagen (1996) find no significant effect of funds examined through convergence regressions (Canova and Marcet, 1995, Fagerberg and Verspagen 1996). A similar result was reached by Vanhoudta et al. (2000), who looked at the impact of both national and European public investment in the European Union regions (Vanhoudta et al., 2000) Dapkus and Streimikiene (2014) explored the impact of EU funds using Lithuania as a case study. The authors considered the European funds as a main opportunity for the new Member States, which can draw the attention of foreign investors. Although, according to Dapkus and Streimikiene the contribution of EU funds is still not sufficient to have a considerable effect on the country's development (Dapkus and Streimikiene, 2014).

According to Dall´Erba and Fang (2015), there are three theoretical approaches to the interpretation of the impact of European funds on economic growth. The first approach is called the traditional and accepts declining returns to investment and exogenous technological change (Dall´Erba &Fang, 2015) The endogenic growth theory has constant or increasing returns to investment and endogenic technological change (Barro & Sala-i-Martin, 2004). The third approach named the new economic geography says that integration can lead to differences. The regional policy according to Mohl and Hagen (2010) can only lead to economic convergence (Mohl and Hagen, 2010). Mohl and Hagen (2010) suggest that cohesion policy may have a long-term impact whether it supports research and development and investments in human capital (Mohl and Hagen,2010)

2   Methodology

The paper is purposed to find out the effect of the European Structural and Investment Funds on the Slovak economic indicators. Gross domestic product and unemployment were taken as economic indicators. Correlation and regression analysis were used in the paper to investigate the impact.

Correlation analysis is used to analyze the correlation between two variables. The degree of correlation between the above variables has been interpreted in the paper based on Pearson's correlation coefficient. Pearson correlation coefficient can reach the values in the interval $(-1,1)$ (Nekrep et al., 2018). A positive result indicates a positive correlation, and the observed variables are developing in the same direction. A negative result shows a negative correlation. It means that one variable is increasing, and the other variable is decreasing.

The interpretation of the results corresponds to the interpretation of the correlation by Nekrep et al (2018). We consider the results in the range $r > 0 \cap r \leq 50$ as a weak correlation. A medium correlation is a result in the range $r > 0.50 \cap r < 0.80$. We interpret a correlation greater than 0.80 and less than 0.99 as strong. In the case of a correlation of 0, we speak of zero dependence and 1 of perfect dependence. To address the correlation coefficients' significance, the Student's t-test was also applied in the paper. The significance level was set at 0.05.

Data on gross domestic product and unemployment were drawn from secondary sources. The main source was the database of the Statistical Office of the Slovak Republic. Data on the implementation of the European Structural and Investment Funds were taken from the European Commission. The Ministry of Investment, Regional Development, and Informatization does not provide data throughout the whole time under the review.

The main research question of the paper is to analyze whether the implementation of the European Structural and Investment Funds has an impact on gross domestic product and unemployment.

3   Main findings

In this part, we investigate whether there is a dependence between the drawing of the European Structural and Investment Funds in Slovakia and economic indicators, namely gross domestic product per capita and unemployment. A positive feature of the monitoring of the development of the gross domestic product per capita is its annual increase between 2007 and 2021. In this period, the absolute value of this indicator increased by 6 369 €, which stands for a 56 % percentual increase. The development of the unemployment rate is also positive, with a decrease of 119 329 persons between the years 2007 and 2021. The decrease represents a 41 % change.
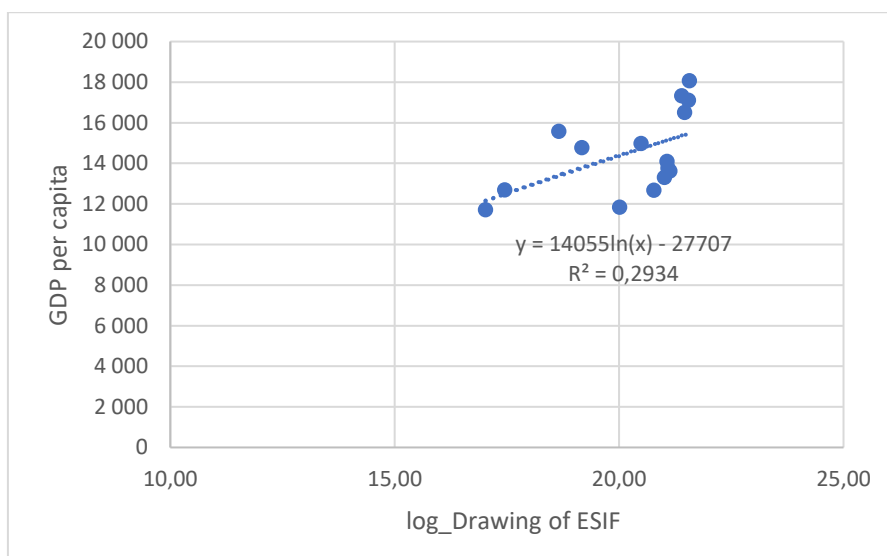
Fig. 2 Scatter chart of GDP per capita and implementation of European funds in the Slovak Republic in the years 2007-2021, Source: Processed on data from the Statistical Office of the Slovak Republic and the European Commission

In Figure 2, the dependence between GDPs per capita and the absorption of ESIF. Looking at the correlation between the spending of the European Structural and Investment Funds and the gross domestic product per capita in the Slovak Republic, we can see that the regression relationship is characterized by a medium correlation (correlation coefficient = 0,5417) and the F-test confirms that the chosen model is correct. The Significance F < 0.05 is valid. The linear-logarithmic equation of the relationship is $y = -27707 + 14055\ln(x)$ and indicates that if the drawing of the EU funds increases by 1 %, the gross domestic product will increase by 140,55 €.

Table 17. Dependence between ESIF implementation and gross domestic product per capita

Regression Statistics	
Multiple R	0,685727
R Square	0,293471
Adjusted R Square	0,239122
Standard Error	1766,443
Observations	15

Source: Proceed on the data from the European Commission and the Statistical Office of the Slovak Republic, 2023.

The value of the coefficient of determination came out to be 0.2934, indicating that the chosen regression line explains about 29% of the variability, the rest being unexplained variability, the effect of random factors, and other unspecified effects. There is a

correlation between the two mentioned indicators, namely gross domestic product per capita and the implementation of the ESIF.

In the next section, we examine whether the drawing of ESIF affects unemployment in Slovakia. Based on the graphical representation and the data from the correlation analysis, this relationship cannot be examined based on linear dependence.

On this basis, the paper investigated the nonlinear relationship through several nonlinear functions. From the nonlinear functions, the hyperbola and logarithmic functions were calculated. In addition, the exponential function (logY) was also calculated. The results of examining the relationship between unemployment and fund utilization through the above methods are presented in the following table.

Table 2. Results of non-linear functions between employment and fund absorption

Non-linear function	Significance F	P -value
Hyperbola	0,8870	5,8E-08
Logarithmic Function	0,8678	0,314
Exponential Function	0,0016	0,0010

Source: Processed on data from the Statistical Office of the Slovak Republic and the European Commission, 2023.

In Table 2 we can see the logarithmic and power function models are not appropriate because of Significance F (0.8678 > 0.05). The P-value for the regression coefficient of logarithmic and power function (0.314) is higher than 0.05, so the regression coefficient is statistically insignificant. The models mentioned above are not appropriate. The exponential function achieves a p-value of 0.0010 and Significance F is x > 0.05. In this case, we can say that the model is right to establish the correlation between the indicators. The graphical illustration of the dependence between unemployment and implementation can be seen in Figure 3.

The figure shows a scatter plot with the equation $y = 12658e^{1E\text{-}10x}$ and $R^2 = 0{,}4603$. The x-axis is labelled "Drawing of ESIF" and the y-axis is labelled "Unemployment".
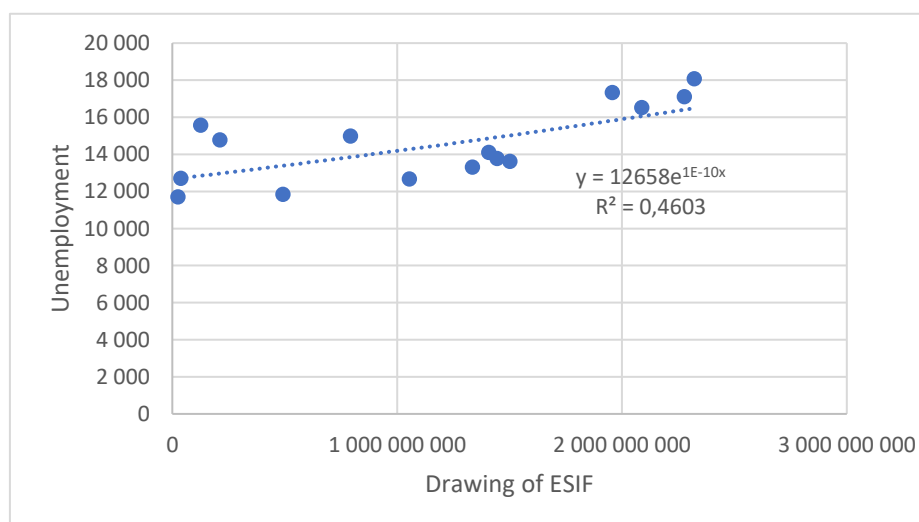
Fig. 3 Scatter chart of dependence between unemployment and implementation of European and Structural Funds in the Slovak Republic, Source: Processed on data from the European Commission and the Statistical Office of the Slovak Republic, 2023.

The result of the regression analysis may be seen in Table 3. The value of the coefficient of determination came out to be 0.544, indicating that the chosen regression line explains about 54% of the variability, the rest being unexplained variability, the effect of random factors, and other unspecified effects.

Table 3. Dependence between ESIF implementation and unemployment.

Regression Statistics	
Multiple R	0,738027
R Square	0,544684
Adjusted R Square	0,50966
Standard Error	60362,86
Observations	15

Source: Processed on data from the Statistical Office of the Slovak Republic and the European Commission, 2023.

Based on the performed correlation and regression analysis, we can argue that there is a dependence between unemployment and the implementation of the ESIF.

4 Conclusion

European funds are the major financial tool. European Structural and Investment Funds are aimed at promoting economic growth and development, increasing the competitiveness of regions, and reducing disparities between them. Their significance is confirmed by the increasing share of EU funds in the public finances of the Member States which rose from 34 percent in the earlier programming period to 54 percent in the 2014-2020 programming period.

The major objective of the paper was to find out whether there is a dependence between the drawing of European Structural and Investment Funds and economic indicators in Slovakia.

The main research question of the paper was to analyze whether the implementation of the European Structural and Investment Funds has an impact on gross domestic product and unemployment.

On the base of the results of correlation and regression analysis, we can conclude that there is a dependence between the implementation of the European Structural and Investment Funds and both economic indicators - gross domestic product and unemployment. Although the dependence between the examined values is there, the real effect of ESIF on the gross domestic product and employment is according to the results of correlation and regression analysis low. The relationship between the ESIF and gross domestic product has been detected through linear function. The dependence between ESIF and employment has been investigated through the exponential function.

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The Current Situation of Tourism in the Countries of the Visegrad Four and Their Connection to Sustainability Expressed by Selected Indexes

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Abstract. Through tourism, countries can make their cultural heritage available
to the whole world. It offers job opportunities and brings money to the regions
but can also damage culture, monuments, and the environment. The object of the
tourism industry is to strive for the sustainable competitiveness of the tourism
industry in addition to making a profit. Economic, social, cultural, and
environmental development must reconcile economic growth with sustainable
development. The structure of the paper consists of an introduction, a
methodology containing the work process, which was presented, the theoretical
starting points of tourism and the results of the work, where our main objective
was to identify the current situation of tourism in the Czech Republic, Hungary,
Poland, and the Slovak Republic and identify the environmental and economic
performance of four countries in connection with the eco-innovation index, the
environmental performance index, and an overall score according to sustainable
development goals.

Keywords: Tourism, Tourism Sustainability, V4 Countries.

JEL classification: *O10, L80, L83*

1 Introduction

Due to its uniqueness, tourism of countries of the Visegrad Four, represented by the
Czech Republic, Hungary, Poland, and the Slovak Republic, attracts many tourists
yearly. Their fascinating nature, uniqueness of different cultures, historical monuments,
and cultural experience in the form of traditional cuisine have become their main
attraction. However, it is essential to note that tourism is destroying natural

biodiversity. The mentioned fact can be seen as a paradox, given that tourism depends on natural beauty. According to the UNWTO (2023), tourism should fully account for its current and future economic, social, and environmental impacts, which are also linked to the needs of visitors, the environment, host communities and industry. Considering the sustainability of environmental quality, economic growth and consumption, tourism sustainability is among the most critical topics.

2   Methodology

In the results of this study, we focused on identifying the current situation of tourism in V4 countries - the Czech Republic, Hungary, Poland, and the Slovak Republic, where we used available data from Eurostat. The main objective of this study is to identify the current situation of tourism and to evaluate the sustainable development of tourism in V4 expressed by the selected indexes. We used analysis, synthesis, comparison, data prediction, and graphic display for an understandable presentation. We predict the possible development of the number of tourists and visitors in the monitored countries from March 2023 to August 2023, when the number of visitors should peak, and we expect the peak of the tourist season. The data were identified for January 2021 - February 2023, where, in addition to the number of arrivals to tourism facilities in selected countries, we also identified and predicted the number of nights spent in those accommodation facilities. We identified the time series, stationarity and trend of selected data obtained from Eurostat in the period January 2021 - February 2023 for visits and the number of nights spent in accommodation facilities of the V4 countries and, using the Exponential smoothing model, we identified the properties, cyclicality, seasonality, and series of data, where we attempted to predict the upcoming semi-annual cycle based on weighted averages of previous observations. To approximate the current situation of the countries in connection with sustainability, in the results of the work, we also pointed out the situation in indicators such as the Environmental Performance Index and the Eco-innovation Index. We also pointed out the current situation of fulfilling the seventeen sustainable goals. At the end of the paper, we brought the evaluation of the examined data.

3   Theoretical background

Tourism has significantly contributed to the economy of many communities worldwide due to its ability to generate income and employment. We are seeking new forms of tourism planning, management, and development. Although tourism is a source of significant economic benefits, its unplanned growth has contributed significantly to environmental degradation and negative social-cultural impacts. These undesirable side effects have raised concerns about conserving and preserving natural resources, human well-being, and long-term economic viability (Álvarez-García et al., 2018). That is why the sustainability of tourism is a crucial area of its future. It is essential to mention that the issue of tourism sustainability is increasingly in demand. Author Han (2021) considers environmental sustainability the main topic of contemporary tourism because

he believes that environmentally sustainable consumer behaviour is essential for protecting the environment. According to Palacios-Florencio and others (2021), tourist destinations mustn't be overcrowded. Nowadays, the author even considers it as a significant factor. According to the authors Janusz and Bajdor (2013), tourism has no negatives. However, let's turn our attention to the vital tourism industry. The authors believe this industry can significantly worsen the environment and negatively affect the local community.

Due to the arrival of hundreds of tourists to the destination, there is a possibility that the tourists will bring something unknown to the destination, for example, it may cause obesity or other problems for the community (Janusz and Bajdor, 2013). Since tourism is closely related to the environment, the authors Díaz and Gutiérrez, (2010) believe environmental protection is essential. Yang et al. (2023) highlight the importance of maintaining a high level of consumer satisfaction, significantly raising awareness of sustainability issues, and expanding strategies that ensure sustainability. To ensure sustainability, we must balance the needs of society's environmental, economic, and social sectors. The importance of tourism sustainability is reflected in environmental protection, economic benefits and socio-cultural protection (Yang et al., 2023). According to the Global Sustainable Tourism Council (2022), sustainable tourism includes sustainable practices that seek to identify the impacts of tourism, with the primary objective of minimizing negative and maximizing positive impacts. It should be noted that responsible travel refers to the behaviour of individual travellers who seek to make choices in line with sustainable tourism practices.

Tourism has a long tradition of sustainability-related initiatives, and different indexes or indicators measuring the environment's situation point to its connection with influencing the current and future state. The sector can be credited with moving quickly from its initial focus on economic benefits to a position of recognizing its broader sustainability implications.

The weight of indicators is a significant issue when measuring the sustainability of tourism. Its importance stems from the fact that the weights can significantly impact the evaluation of the analyzed regions and subsequent policymaking (Mikulic et al., 2015).

Long-term economic and environmental health points to the quality of the environment. V4 countries are constantly developing in this area, although, according to the author, tourism sustainability assessment indicators need to be more applicable. It needs to be sufficiently explored.

Table 18. Selected destination Indicators

Criteria	Indicator	Unit of Measure
Sustainable Tourism Management in Tourism Enterprises	Percentage of tourism enterprises/establishments in the destination using a voluntary certification/labelling for environmental/quality/sustainability and/or Corporate Social Responsability measures	%
Tourism Flow at the Destination	Number of tourist nights per month	Number of nights
	Relative contribution of tourism to the destination's economy (% GDP)	%
	Daily spending per overnight tourist	Local currency
Tourism Enterprise Performance	Average length of stay of tourists (nights)	Number of nights
	Occupancy rate in commercial accommodation establishments per month and average for the year	%
Inclusion/Accessibility	Percentage of rooms in commercial accomodation establishments accessible for people with disabilities	%
	Percentage of commercial accommodation establishments participating in recognised accessibility information schemes	%
	Percentage of public transport that is accessible to people with disabilities and with specific access requirements	%
Protecting and Enhancing Cultural Heritage, Local Identity and cultural Assets	Percentage of residents that are satisfied with the impacts of tourism on destination's identity	%
	Percentage of the destination's events that are focused on traditional/local culture and heritage	%
Solid Waste Management	Waste production per tourist night compared to general population waste production per person (kilos)	kg
	Percentage of tourism enterprises separating different types of waste	%
	Percentage of total waste recycled per tourist compared to total waste recycled per resident per year	%
Sewage Treatment	Percentage of sewage from the destination treated at least at secondary level prior to discharge	%
Water Management	Water consumption per tourist night compared to general population water consumption per resident night	Litres
	Percentage of tourism enterprises taking actions to reduce water consumption	%
	Percentage of tourism enterprises using recycled water	%
Energy Usage	Energy consumption per tourist night compared to general population energy consumption per resident night	%, coefficient
	Percentage of tourism enterprises that take actions to reduce energy consumption	%
	Percentage of annual amount of energy consumed from renewable sources (Mwh) compared to overall energy consumption at destination level per year	%
Landscape and Biodiversity Management	Percentage of local enterprises in the tourism sector actively supporting protection, conservation, and management of local biodiversity and landscapes.	%

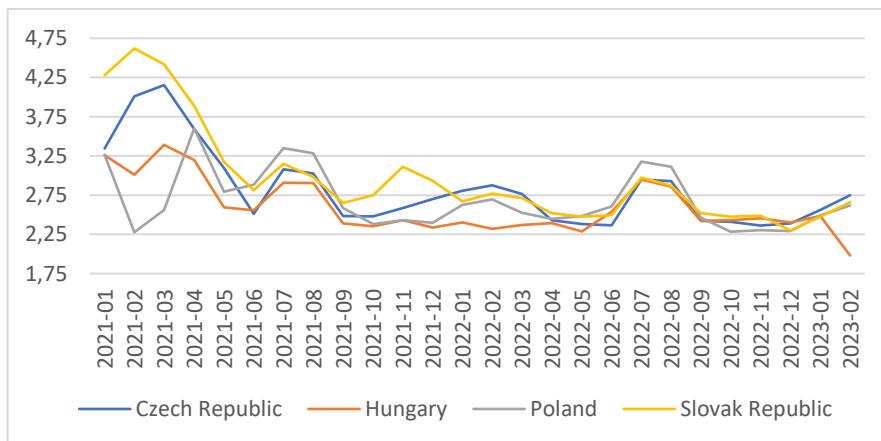Source: own processed based on the European Commission, 2016

4   Results

In this chapter, we identify the current situation of tourism in the countries of the Visegrad Four, the average number of nights spent by tourists, the prediction of the development of visitors and their number of nights spent, the development and forecast of arrivals and the number of nights spent by tourists in accommodation facilities for the period January 2021 - August 2023, Eco-innovation index, Epi Score and an overall score while achieving Sustainable Development Goals in connection with tourism.
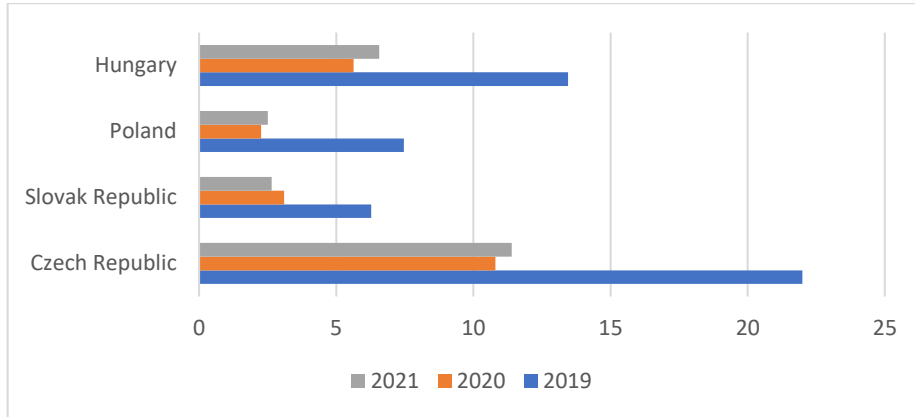
Graph 1. Number of arrivals in tourist accommodations the Visegrad Four, 2019-2021
Source: own processed based on the Statista, 2023

The graph 1. shows the number of arrivals in tourist accommodation in the Czech Republic, the Slovak Republic, Poland, and Hungary from 2019 to 2021. Values are expressed in millions. The last accessible data was available for 2021. The highest number of tourists was reached in 2019. The Czech Republic took the first place with a value of 22 million, Hungary took the second place with a value of 13.45 million, third was Poland with a value of 7.47, and fourth was the Slovak Republic with a value of 6.27. In 2020, the number of arrivals to the countries decreased. One of the main reasons was the pandemic caused by the Covid-19 disease. Pandemic measures have started to ease. The year 2021 brought better results as values started to rise again. The Czech Republic took the first place with a value of approximately 11 million. A significantly lower number of arrivals was recorded in Hungary, with a value of 6.57 million. The Slovak Republic moved to third place and reached a value of 2.64 million. The fourth place was occupied by Poland, which reached 2.51 million.

Graph 2. Average number of nights spent by tourists
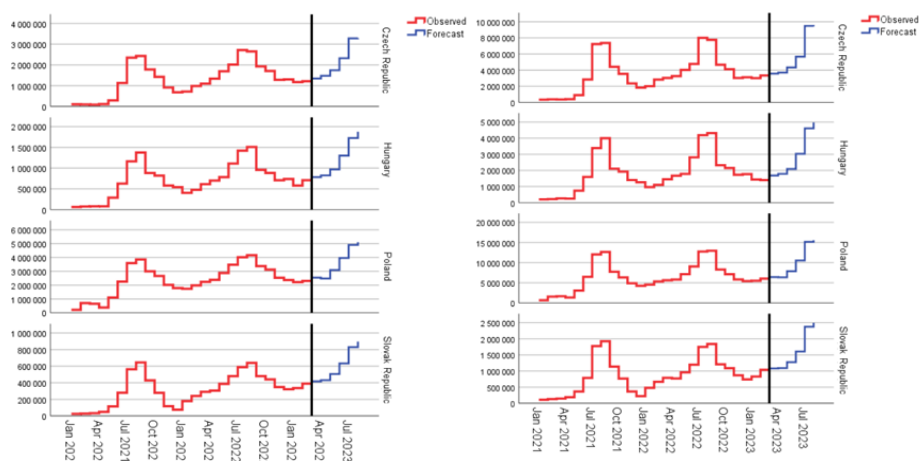Source: own processed based on the Eurostat, 2023

Graph 2. shows the average number of stays by tourists in V4 countries. In the monitored period of the last 26 months, tourists visiting the V4 countries spent an average of 2.5 - 3 nights in their facilities.

Table 2. Prediction of the development of visitors and their number of nights spent

TIME	Expected arrivals at accommodation facilities				Expected number of days spent in facilities			
	Czech Republic	Hungary	Poland	Slovak Republic	Czech Republic	Hungary	Poland	Slovak Republic
2023-03	1 344 544	781 101	2 542 539	416 496	3 566 377	1 687 417	6 420 076	1 080 965
2023-04	1 475 998	823 658	2 479 335	431 225	3 693 836	1 788 005	6 360 657	1 092 082
2023-05	1 743 624	968 762	3 088 871	505 216	4 333 040	2 090 665	7 880 433	1 274 917
2023-06	2 323 185	1 301 830	3 963 856	633 587	5 668 319	3 029 131	10 542 861	1 604 815
2023-07	3 281 669	1 725 294	4 905 838	829 306	9 482 633	4 606 956	15 165 357	2 372 946
2023-08	**3 289 102**	**1 876 518**	**5 108 297**	**896 112**	**9 419 401**	**4 977 092**	**15 573 535**	**2 492 066**

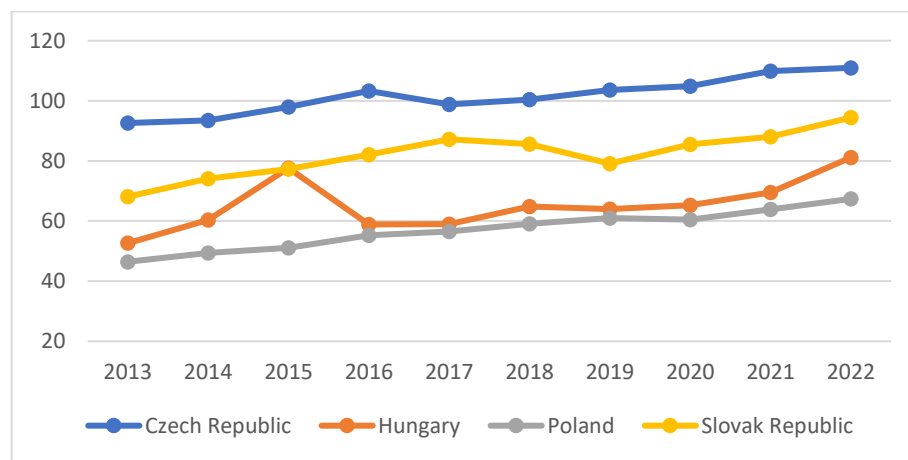Source: own processed based on the Eurostat, 2023

Table 2 shows our six-month statistical predictions for forecasting tourism development in the V4 countries. We can expect the season's peak in August, followed by a tourist decrease. This year, the biggest rush of tourists is expected since the outbreak of the Covid-19 pandemic.

Graph 3. Development and forecast of arrivals and the number of nights spent by tourists in accommodation facilities for the period January 2021 - August 2023
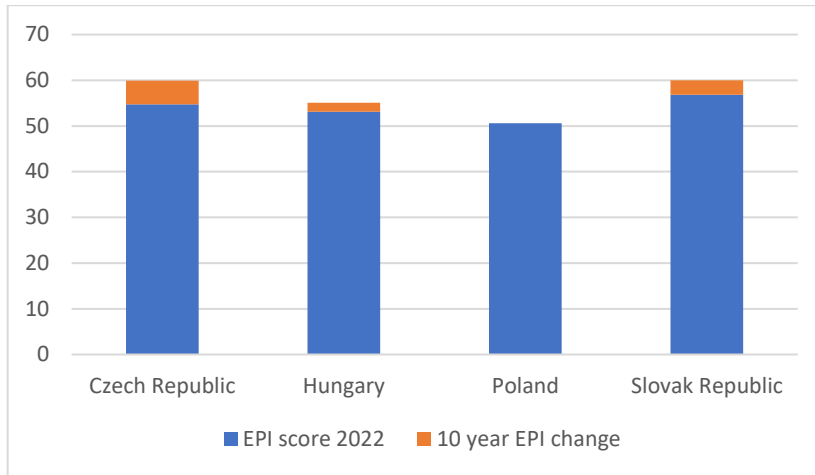Source: own processed based on the Eurostat, 2023

Graph 3. shows the development of visits and the number of nights spent in hotels, short-term accommodation, etc. We illustrated the development in January 2021 - February 2023 and subsequently predicted the development in the next six months. At the end of the forecasted period, the number of tourists should reach the annual peak. From the predicted values, we can conclude that this year, the peak of visits and the number of nights spent in accommodation facilities will be reached in all monitored countries. Among the monitored countries - the Czech Republic, Hungary, Poland and the Slovak Republic, the most popular tourist country is Poland, followed by the Czech Republic, Hungary, and the Slovak Republic.

Graph 4. Eco-innovation index
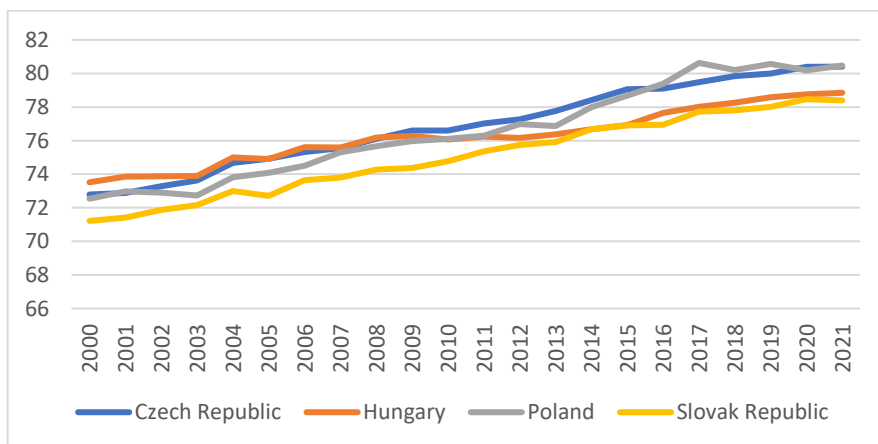Source: own processed based on the European Commission, 2023

The Eco-innovation index shows the performance of the V4 countries in the field of ecological innovation. Its task is to expand a holistic view of social, environmental, and economic performance. The indicator is based on sixteen sub-indicators in five thematic areas, which include socio-economic results, results of efficient use of resources, ecological innovation inputs, outputs, and activities. In this indicator, the Czech Republic took first place, ahead of Slovakia, Hungary and Poland. Ecological innovations impact the sustainability of tourism and its prosperity.

Graph 5. Epi Score
Source: own processed based on the epi.yale.edu, 2023

EPI as Environmental Performance Index shows a view of ecological innovations' economic, environmental, and social performance. The index serves as a tool for evaluating the performance of ecological innovations. The graph also shows the 10-year change, which is positive in Czech, Hungary, and the Slovak Republic. According to this indicator, there was no change in Poland. This index uses 32 performance indicators in 11 categories across the environment and the vitality of ecosystems. The index analyzes in-depth environmental performance by many categories and provides guidelines for moving towards a sustainable future related to tourism. The total score can reach a maximum value of 100. Among the V4 countries, the Slovak Republic was ranked best this year. Ranking: the Slovak Republic 18, the Czech Republic 19, Hungary 33 and Poland 46.

Graph 6. Overall score while achieving Sustainable Development Goals
Source: own processed based on the Sustainable Development Report, 2022

Graph 6. shows the overall score, which measures the incremental progress towards achieving all 17 Sustainable Development Goals. The tourism industry has an impact on the achievement of these SDGs. The score can be interpreted as a percentage of Sustainable Development Goals achievement. A score of 100 indicates that all SDGs have been achieved.

5   Conclusion

A high-quality and clean environment is the biggest attraction for tourists. However, it is necessary for the tourists themselves to feel responsible and take care of nature. Every individual should understand that this is a critical factor that can contribute to a better environment. The Czech Republic reached approximately 22 million arrivals in tourist accommodation, meaning it reached the highest number within the V4. In 2021, the Slovak Republic reached almost 3 million tourist arrivals. Hungary is the second most visited country, and Poland is the least visited country within the V4. Many tourists look for accommodation facilities in Poland and the Czech Republic. In Hungary and the Slovak Republic, the number of visitors who use accommodation for tourism is the lowest among the V4 countries. The size of countries and infrastructure, the number of monuments, the situation of the environment, country innovations and ecological prosperity influence this factor. Our results will serve for further research in this complex area of sustainability.

6   Acknowledgements

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