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DYNAMIC MEASURES OF SOVEREIGN SYSTEMIC RISK²

This paper introduces a dynamic dependence framework to calculate various indicators of systemic sovereign default risk. Our analysis reveals a notable increase in systemic fragility among euro-area sovereigns since the onset of the Subprime Crisis, particularly during the First Greek Bailout in May 2010. Furthermore, our measures successfully capture key events within the euro area, including Mario Draghi's impactful "whatever-it-takes" speech in mid-2012 and the Cypriot Banking Crisis of 2012-2013. The incorporation of dynamic dependence into our measures provides a more comprehensive depiction of systemic risk within the euro area sovereign system, often demonstrating distinct dynamics when compared to their static counterparts. These findings carry significant policy implications and contribute to enhancing our understanding of systemic risk among euro-area sovereigns.

Keywords: Sovereign Default; Systemic Risk; Financial Stability; Financial Distress; Tail Risk; Contagion
JEL: C16; C61; G01; G21

1. Introduction

In the past decade, the issue of sovereign default has gained significant prominence, particularly within the context of the euro area (EA). The potential adverse consequences of a default by an EA government have prompted numerous sovereign and bank bailouts, while also impacting interest rates, capital flows, trade dynamics, and overall economic growth in Europe and beyond. Consequently, there is a pressing need for an extensive examination of sovereign risk levels and their implications for the broader financial system within the EA. This necessity has given rise to fundamental questions that demand thorough investigation: How can the systemic risk of sovereigns be quantified? What are the mechanisms for

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² This paper is an outcome of a project undertaken at the European Central Bank (ECB) using proprietary Intercontinental Exchange Competition and Markets Authority (ICE CMA) data, downloaded via Datastream. While Datastream has its own in-house CDS provider (Thomson Reuters), the quality of the data, as well as the duration of the time series for many sovereigns and banks is not satisfactory. However, Datastream provides CDS data from other sources (in this case – ICE CMA), at the cost of purchasing an additional license. The ECB agreed to provide data for this project for the duration of the research stay but declined any subsequent updates.

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measuring feedback and contagion effects stemming from a sovereign default? Is it likely that defaults of smaller peripheral governments would trigger defaults of larger EA sovereigns? Despite their crucial relevance to the formulation of consistent and timely macro- and micro-prudential policies, these questions remain largely unanswered.

This paper makes a valuable contribution to this discourse by proposing an innovative approach to analyze systemic risk and contagion among sovereigns, drawing upon market expectations regarding default risk. By employing this approach, we enhance several significant measures of sovereign systemic risk within the regulators' toolkit. To this end, our study adopts a comprehensive methodology for assessing joint default risk among sovereigns, aiming to augment existing measures that capture conditional systemic default risk within the euro area sovereign system, developed in Radev (2022c).

It is imperative for regulators and policymakers to examine and monitor euro area sovereign default in conjunction with banking default due to the significant exposures of EA banks to EA government debt observed during the sovereign debt crisis (see, for instance, ECB 2010b; EBA 2011; IMF 2011; Acharya, Thakor 2016). The potential transmission of negative shocks from sovereigns to the banking sector can lead to the collapse of the entire EA financial system. Although sovereign defaults are relatively rare, they carry substantial welfare costs not only for the parties involved in the debt contract but also for third parties. On one hand, defaulting sovereigns experience reputational losses and limited future access to international debt markets (see, for example, Panizza et al. 2009). On the other hand, defaults have direct adverse effects on domestic and foreign private and public investors who, in the worst-case scenario, may also face distress (see, for instance, Arteta and Hale 2008). Moreover, contagion can propagate not only through financial channels but also through real economy channels due to the strong economic interconnections within the common currency area, the European Union (EU), and globally (Gorea, Radev 2014).

To expand the regulatory toolkit for measuring systemic risk, we refine the currently employed measures utilized by the European Central Bank (ECB). Specifically, we introduce dynamic dependence into a set of minimum cross-entropy systemic risk measures developed by Radev (2022b), and Radev (2022c). These measures include the conditional probability of a sovereign defaulting given the default of another sovereign, the conditional probability of a sovereign defaulting given the simultaneous defaults of two other sovereigns, and the multivariate conditional probability of at least n sovereigns defaulting given the default of a specific sovereign. The first two conditional measures are vital for investigating and monitoring specific channels through which default risk is transmitted within the sovereign system. In contrast, the multivariate conditional measure captures the overall risk in the system by considering the complete dynamic dependence structure inherent among euro area sovereigns.

Our approach consists of three steps. Firstly, we employ credit default swap (CDS) spreads to infer the perceived individual default risk of ten euro area sovereigns. This is accomplished using a CDS bootstrapping technique (Hull, White, 2000; Gorea, Radev, 2014; Radev, 2022a). By utilizing derivatives such as CDS that are more sensitive to default risk, we address the issue of the infrequent occurrence of sovereign defaults in Europe. Additionally,

our bootstrapping procedure enables us to estimate the expected probability of default based on a single CDS spread observation, thereby significantly reducing data requirements.

To model the multivariate probability density of the euro area sovereign system consistently with individual probabilities of default (PoDs), we employ the minimum cross-entropy procedure proposed by Kullback (1959) and extended by Segoviano (2006) and Segoviano and Goodhart (2009). Segoviano (2006) refers to this method as Consistent Information Multivariate Density Optimization (CIMDO). The cross-entropy approach draws on the Merton Model's insight that an institution defaults on its debt when its assets can no longer cover its liabilities. However, by utilizing traded default-sensitive credit default swap (CDS) data, it avoids the need to rearrange assets to fit within the Merton Model framework, as required by Gray, Bodie, and Merton's Sovereign Contingent Claims Analysis (2007) and Gray's work (2011). Our paper presents a significant modelling innovation in comparison to the measures proposed by Segoviano and Goodhart (2009), Radev (2022b), and Radev (2022c) by introducing dynamic correlation into the measurement of conditional systemic risk of sovereigns using rolling windows of changes in 5-year CDS spreads. This approach enables us to derive measures that more accurately reflect the level of systemic risk at any given time. Subsequently, after obtaining the dynamic multivariate probability density of the sovereign system, we progress to the final stage of deriving a series of systemic risk indicators that analyze the sovereign system's vulnerability to default events.

Our findings indicate a substantial increase in sovereign systemic fragility since mid-2007. Various events appear to influence this dynamic, including the Subprime Crisis, Greek fiscal issues, and subsequent efforts by European authorities to mitigate the Sovereign Debt Crisis in the euro area. The dynamic dependence versions of our measures offer a more comprehensive depiction of conditional default risk in the European sovereign system and, in many instances, exhibit distinct dynamics compared to their static counterparts. This underscores the significance of acknowledging changes in dependence that may occur during crisis periods when assessing systemic default risk in the sovereign system.

We conduct essential extensions and robustness checks to enhance the applicability of our paper to policymakers and regulators. Due to data limitations, we are unable to update the full sample of sovereigns in our analysis to the present day. However, we managed to update the measures until mid-2017 for several prominent euro area sovereigns operating across the continent, namely Spain, the Netherlands, and Italy. The updated results demonstrate the impact of the later stages of the Sovereign Debt Crisis, such as Mario Draghi's "whatever-it-takes" speech and the Cypriot Banking Crisis of 2012 and 2013, on euro area sovereigns.

Our paper contributes to the literature on systemic risk measures and cross-entropy-based measures of sovereign risk. Measures such as CoVaR (Adrian, Brunnermeier, 2016), Marginal and Expected Systemic Shortfalls (Acharya, Richardson, 2009; Acharya et al., 2017), and SRISK (Brownlees, Engle, 2017) have been widely used but failed to capture the complete dependence structure among banks in the financial system. Segoviano and Goodhart (2009) introduced multivariate CDS-based measures using the CIMDO approach (Segoviano, 2006). However, these measures assume Gaussian distributions and independence among banks, limiting their informational content. Gorea and Radev (2014) addressed this limitation by discussing correlated joint probabilities of default during the Sovereign Debt Crisis. Radev (2022b) and Radev (2022c) extended the set of systemic risk

measures with the Conditional Joint Probability of Default and the unconditional Systemic Risk Measure (SFM) using the cross-entropy approach. Radev (2022d) expanded the Systemic Fragility Measure by incorporating the LOO approach (Hue et al., 2019). These measures offer valuable insights into systemic risk. In our paper, we introduce dynamic dependence into conditional measures of systemic default risk of sovereigns. By considering the evolving dependence structure, we aim to provide a richer depiction of conditional default risk in the sovereign system.

We make several significant contributions to literature. Firstly, we contribute to the broader research agenda focused on understanding the vulnerability of the European financial system during recent crises, as explored in studies by Gorea and Radev (2014), Acharya and Steffen (2015), Radev (2022b), Radev (2022c), and Radev (2022d). Secondly, our work enhances the multivariate probability measures of sovereign systemic risk developed by Segoviano and Goodhart (2009), Radev (2022b), Radev (2022c), and Radev (2022d) by incorporating dynamic dependence into the modelling of conditional systemic risk.

The paper is organized as follows: Section 2 outlines our methodology for deriving marginal and joint probabilities of default. In Section 3, we introduce our probability measures and provide guidelines for their calculation. Section 4 provides a brief overview of our dataset, while Section 5 presents our empirical findings. Finally, Section 6 concludes the paper.

2. Methodology

Our multivariate conditional probability estimation approach involves three steps. Firstly, we obtain probabilities of default (PoDs) from CDS spreads using the CDS bootstrapping procedure outlined in Hull and White (2000). Secondly, we employ a minimum cross-entropy method, following the work of Kullback (1959) and Segoviano (2006), to construct a multivariate probability distribution that aligns with the individual PoDs. Additionally, we account for the dynamic dependence among sovereign entities within the system, as discussed in Radev (2022d). Lastly, we calculate various systemic distress measures to assess the risk within the sovereign system of the euro area.

2.1. Deriving Marginal Probabilities of Default

This paper employs a CDS bootstrapping procedure to estimate probabilities of default (PoD) based on the approach outlined in Hull and White (2000) and used in Radev (2022a). The method utilizes a cumulative probability model that incorporates recovery rates, refinancing rates, and cumulative compounding. By leveraging CDS contracts with varying maturities, hazard rates are calibrated for specific time horizons, enabling the estimation of cumulative default probabilities.

The rationale behind the CDS bootstrapping procedure lies in utilizing default-sensitive contracts traded in the insurance market, such as credit default swaps, which aim to protect the buyer against underlying asset defaults. This enables the reverse-engineering of PoDs that satisfy the no-arbitrage condition, ensuring fair market value without any arbitrage

advantage. While there are several approaches and proxies available for deriving PoDs from CDS contracts, the modelling procedure described by Hull and White (2000) stands out as popular, robust, and consistent, particularly when utilizing the complete term structure of CDS spreads for individual entities. Additional details on the CDS bootstrapping procedure can be found in the online appendix.

The aforementioned method is applicable for estimating probabilities of default for both sovereign and corporate entities. The resulting risk measures represent risk-neutral probabilities of default, meeting the no-arbitrage condition in financial markets (Hull, 2006). Risk-neutral probabilities refer to the probabilities that render market participants indifferent to buying or selling an asset given the prevailing market conditions. It is worth noting that risk-neutral probabilities differ from actual (or physical) probabilities, which consider the risk aversion of market participants. Empirical approximations of risk aversion, such as Sharpe's Ratio (Sharpe, 1966), can be used to derive physical probabilities from risk-neutral probabilities. In this analysis, we present risk-neutral probabilities as they tend to be larger than their physical counterparts, providing more conservative estimates of default risk. Given the rarity of the events examined in this paper, it is argued that policymakers should employ more conservative estimates to effectively monitor the default risk of the sovereigns falling under their purview.

We utilize the complete range of maturities spanning from 1 to 5 years of CDS spreads to estimate sovereign probabilities of default (PoDs). To account for quarterly premium payments and accrual interest, as suggested by Adelson, Bemmelen, and Whetten (2004), appropriate adjustments are made. For risk-free rates, we consider all available maturities of AAA Euro Area bond yields within the 1 to 5-year range. The recovery rate is consistently set at 40%, aligning with the prevailing assumption in both literature and practical applications.³ The resulting series represents cumulative probabilities of default. To obtain probabilities with a one-year horizon, which is of particular interest to policymakers, an annualization process is performed using the following formula:

$$PoD_t^{\text{annual}} = 1 - (1 - PoD_t^{\text{cum}})^{\frac{1}{T}}, \quad (1)$$

where T is the respective time horizon ($T=5$ for 5-year PoD) and PoD_t^{annual} is the annualized version of the cumulative PoD_t^{cum} .

2.2. Recovery of the Multivariate Probability Density

Given the scarcity of traded joint credit events in the insurance market, it becomes necessary to impose a specific structure on the multivariate probability density of the system in order to facilitate the transition from individual probabilities of default (PoDs) to joint probabilities. Our methodology is rooted in the concept of cross-entropy, originally introduced by Kullback (1959). By minimizing an objective function based on cross-entropy, we iteratively update a

³ For a discussion on how different recovery rates affect the PoD estimates, please refer to Gorea and Radev (2014).

prior distribution to derive a posterior distribution that satisfies a set of constraints designed to ensure the consistency of the joint probabilities with the individual PoDs.

Cross-entropy exhibits close ties and shares much of its terminology with Bayesian statistics. The main objective of this method is to obtain a reasonable approximation of the unknown joint asset distribution, capturing the inherent characteristics of the available data, including dependence, fat tails, skewness, and more. This is achieved by adjusting a prior multivariate distribution, which serves as an initial estimate, to align with the data. In practical terms, the outlined procedure redistributes the probability mass from the central region of the joint distribution towards its tails beyond a predetermined threshold, mimicking the Merton-like properties. Importantly, this adjustment is performed in a manner that ensures the tail mass remains consistent with the individual PoDs derived from individual credit default swap (CDS) spreads. Since financial markets are incomplete and traded baskets of CDS for all possible scenarios are not readily available, these approximations are considered reasonable and widely employed.

Within banking literature, it is common to adopt a prior distribution of normal shape without considering cross-entity correlation (Segoviano, 2006; Segoviano, Goodhart, 2009). However, empirical evidence presented by Gorea and Radev (2014) and further analytical proofs by Radev (2022a) highlight the significance of selecting an appropriate correlation structure for the prior distribution, especially considering the correlation between bank and sovereign assets. Consequently, the authors advocate for using a static correlation matrix as a prior distribution, representing an improvement over the zero-correlation model proposed by Segoviano (2006). Building upon this, Jin and De Simone (2014) extend the research by incorporating time-varying covariance using the BEKK model developed by Engle and Kroner (1995) for a portfolio of five banks operating in Luxembourg. Additionally, Gorea and Radev (2014) conduct sensitivity checks, demonstrating that employing a prior distribution with fatter tails, such as a t-distribution with a low number of degrees of freedom, only leads to marginal differences in joint probabilities of default. This observation arises from the fact that the focus of multivariate probability measures in the literature lies primarily in summarizing the tail mass of the joint distribution rather than its precise shape. Considering the limited benefits and the substantial computational burden associated with more intricate distributions, particularly in higher dimensions, Radev (2022a) argues in favour of utilizing a joint normally distributed prior as a pragmatic choice.

To proceed, let the financial system be represented by a portfolio of n sovereigns: $\mathbf{X}_1, \mathbf{X}_2, \dots, \mathbf{X}_n$, with their log assets being $\mathbf{x}_1, \mathbf{x}_2, \dots, \mathbf{x}_n$. The cross-entropy approach then minimizes the following Lagrangian:

$$\begin{aligned}
 L(p, q) = & \int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} \cdots \int_{-\infty}^{+\infty} p(x_1, x_2, \dots, x_n) \ln \left[\frac{p(x_1, x_2, \dots, x_n)}{q(x_1, x_2, \dots, x_n)} \right] dx_1 \cdots dx_{n-1} dx_n \\
 & + \lambda_1 \left[\int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} \cdots \int_{-\infty}^{+\infty} p(x_1, x_2, \dots, x_n) \mathbf{I}_{[\bar{x}_1, \infty)} dx_1 \cdots dx_{n-1} dx_n - PoD_t^1 \right] \\
 & + \lambda_2 \left[\int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} \cdots \int_{-\infty}^{+\infty} p(x_1, x_2, \dots, x_n) \mathbf{I}_{[\bar{x}_2, \infty)} dx_1 \cdots dx_{n-1} dx_n - PoD_t^2 \right] \\
 & + \cdots \\
 & + \lambda_n \left[\int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} \cdots \int_{-\infty}^{+\infty} p(x_1, x_2, \dots, x_n) \mathbf{I}_{[\bar{x}_n, \infty)} dx_1 \cdots dx_{n-1} dx_n - PoD_t^n \right] \\
 & + \mu \left[\int_{-\infty}^{+\infty} \int_{-\infty}^{+\infty} \cdots \int_{-\infty}^{+\infty} p(x_1, x_2, \dots, x_n) dx_1 \cdots dx_{n-1} dx_n - 1 \right]
 \end{aligned} \tag{2}$$

The first integral in Equation (2) represents the cross-entropy probability difference (see Kullback (1959)) that minimizes the distance between a prior distribution guess $q(x_1, x_2, \dots, x_n) \in R_n$ and a posterior distribution $p(x_1, x_2, \dots, x_n) \in R_n$ that reflects empirical market data on individual probabilities of default. PoD_t^1, PoD_t^2 to PoD_t^n stand for the expected probabilities of default of the respective entities, derived from CDS prices. With $\mathbf{I}_{[\bar{x}_1, \infty)}, \mathbf{I}_{[\bar{x}_2, \infty)}$ to $\mathbf{I}_{[\bar{x}_n, \infty)}$ we denote a set of indicator variables that take the value of one if the respective entities' default thresholds $x_1, x_2,$ to x_n are crossed and zero otherwise. The default thresholds are the same as in the classic structural model (Merton, 1974). $\mu, \lambda_1, \lambda_2$ to λ_n are the Lagrange multipliers of the constraints. The optimal posterior distribution is then:⁴

$$p^*(x_1, x_2, \dots, x_n) = q(x_1, x_2, \dots, x_n) \exp \left\{ - \left[1 + \mu + \sum_{i=1}^n \lambda_i \mathbf{I}_{x_i, \infty)} \right] \right\} \tag{3}$$

Hence, to obtain the most favourable posterior distribution, three key components are required: a prior distribution with a suitable dependence structure (such as a multivariate Gaussian density with an empirical correlation matrix), optimal Lagrange multipliers, and individual default thresholds.⁵ The resultant posterior joint distribution exhibits two significant characteristics. Firstly, it captures the market's collective perspective regarding the default region of the unobservable asset distribution within the system. Secondly, it possesses fat tails, even when the initial assumption is based on a multivariate Gaussian distribution.

⁴ See Radev (2022a) for a complete solution of the multivariate minimum cross-entropy problem.

⁵ Data and codes to replicate the bivariate case of the cross-entropy method are available at: <https://sites.google.com/site/dexanradev/data-and-online-appendices>.

2.3. Dynamic Dependence

Following Radev (2022d), we employ dynamic correlation matrices to compute our multivariate conditional measures by calculating pairwise correlations based on the 5-year CDS spreads observed three months (60 days) prior to period t . By introducing a dynamic dependence structure to our approach, in conjunction with the dynamics of individual probabilities, we can derive measures that more closely reflect the level of systemic risk at any given time.

3. Dynamic Measures of Sovereign Systemic Risk

This section describes the conditional bivariate and multivariate measures, introduced in Radev (2022c). Section 5 will compare visually the dynamic correlation measures to their static versions in Radev (2022c).

3.1. Dynamic Probability of A Defaulting Given B Defaults

We start with the simplest extension beyond the unconditional joint probability framework: the probability of default of sovereign A (say Italy) given sovereign B (say Spain) defaults ($P(A|B)$), introduced in Radev (2022c). Deriving $P(A|B)$ is a direct application of the Bayes rule:

$$P(A | B) = \frac{P(A, B)}{P(B)}, \quad (4)$$

where $P(A, B)$ is the joint probability of default of sovereigns A and B, while $P(B)$ is the marginal probability of default of sovereign B.

This measure is useful in analyzing particular channels of contagion from one sovereign to another or vice versa. Since $P(A | B)$ is rarely equal to $P(B | A)$,⁶ we can discern which of both sovereigns in the couple is more vulnerable to a default of its counterpart. For policymaker purposes, it can be incorporated in tables or heat maps with average conditional PoD containing all possible bivariate couples, akin to correlation tables. In contrast to correlation tables, however, the corresponding values across the main diagonal of the PoD table will not be equal.

3.2. Dynamic Probability of A Defaulting Given B and C Default

The next indicator introduced in Radev (2022c) measures the conditional probability of default of a sovereign, given two other sovereigns default simultaneously. In the Bayes' framework, mentioned above, this probability of default is defined as

⁶ Actually, both measures are equal if and only if the individual unconditional probabilities are equal.

$$P(A | B, C) = \frac{P(A, B, C)}{P(B, C)}, \quad (5)$$

with $P(A, B, C)$ and $P(B, C)$ being, respectively, the joint probabilities of sovereigns A, B and C, and of sovereigns B and C defaulting. For instance, this will measure the probability of default of Italy, given Spain and France *jointly* default.

The procedure for the calculation of the measure is similar to the method in the previous subsection, but this time it involves 3- and 2-dimensional joint probabilities of default. The measure is particularly useful when measuring the risk of a sovereign run on several sovereigns to spread further throughout the system.

3.3. Dynamic Conditional Probability of at Least N Sovereigns Defaulting

Our final (and most complex) probability measure is the probability of at least n sovereigns defaulting, given a particular sovereign default (PAN). This measure is a generalization of the probability of at least one (PAO) bank defaulting, introduced in Segoviano and Goodhart (2009) and in our case aims at gauging the expected severity of a crisis stemming from a particular sovereign, and hence, the rate of *contagion penetration* in the financial system. In contrast to the Systemic Fragility Measure introduced in Radev (2022c), which reflects the overall *unconditional* fragility of the system, the PAN is a *conditional* measure that gauges the level of systemic fragility in case of a default of one of its sovereign participants.

To define the measure, let us consider again a system of three sovereigns, A, B and C.⁷ The probability of at least one additional sovereign defaulting given a particular sovereign (say C) defaults is then

$$PAN(\text{ at least } 1 | C) = P(A | C) + P(B | C) - P(A, B | C), \quad (6)$$

where $P(A | C)$, $P(B | C)$ and $P(A, B | C)$ are the respective conditional probabilities for all possible default contingencies. Using this intuition, it is easy to proceed one step further and derive the probability of at least two sovereigns (in this case A and B) defaulting given sovereign C defaults:

$$PAN(\text{ at least } 2 | C) = P(A, B | C). \quad (7)$$

In the limit (i.e. for $N-1$ additional entities defaulting), the PAN converges to the Conditional Joint Probability of Default (CoJPoD), introduced in Radev (2022b):

$$\text{CoJPoD}(\text{ System } _c | C) = P(\text{ System } _c | C), \quad (8)$$

⁷ The extension to higher dimensions, although more involving, is straightforward, as long as we keep account of the default contingencies to be added or subtracted.

where $\text{CoJPoD}(\text{System}_{-C} | C)$ is the probability of the remaining sovereigns in the system to default, given sovereign C defaults.

3.4. Practical Considerations for Policymakers

This paper improves upon the family of sovereign risk measures introduced by Radev (2022c) by applying a dynamic dependence structure to the prior distribution in the CIMDO procedure. For the purposes of practical implementation of the discussed measures, it is important to note that since their calculation involves a different number of sovereigns, they are distinct measures and not variations of a single measure. Therefore, these measures should be interpreted with care. Although we use a 10-dimensional distribution of sovereigns in this paper, to arrive at the simpler conditional measures in Equation (4) and (5), we reduce the dimensions to the needed joint probabilities and individual probabilities by integrating over the values of the sovereigns that we do not need. For instance, $P(A | B)$ involves a portfolio of two sovereigns, A and B, and assumes independence with the rest of the sovereigns in the system, and hence is based on a bivariate distribution, achieved by integrating over the remaining 8 sovereigns. $P(A | B, C)$ involves three sovereigns and therefore is based on a trivariate distribution, achieved by integrating over the remaining 7 sovereigns. $\text{PAN}(\text{at least } 1 | C)$ is based on all 10 sovereigns and therefore stems from a 10-dimensional distribution.

Since the number of dimensions of the multivariate distribution matters in probability theory, the values of these three measures are not directly comparable. To see this, consider the numerators $P(A, B)$ and $P(A, B, C)$ in equations (4) and (5), respectively. Intuitively, increasing the number of defaulting sovereigns means that it is less likely that *all* sovereigns will default, and therefore $P(A, B, C)$ is smaller than $P(A, B)$. However, since we use a bivariate distribution in the latter case, we assume the independence of sovereigns A and B with sovereign C. Therefore, in the bivariate setting of equation (4), adding sovereign C in the joint PoD will be represented as $P(A, B) \cdot P(C)$, which is different to the $P(A, B, C)$ in Equation (5) which is derived from a trivariate distribution with a non-zero correlation structure. However, we can compare the values of PAN for a different number of defaulting sovereigns, because they will all stem from the same 10-dimensional distribution, where we sum up the regions where at least n sovereigns default given a particular sovereign, say BNP Paribas, defaults.

To sum up, we can compare the values of the pairwise probabilities $P(A | B)$ across different pairs, because they stem from bivariate (albeit different) distributions. We can also compare the different combinations of $P(A | B, C)$ probabilities since they come from trivariate (albeit different) distributions. But we cannot compare the levels across $P(A | B)$ and $P(A | B, C)$ probabilities. These measures serve different purposes for policymakers and, e.g., may measure the vulnerability of a sovereign to the default of a particular sovereign or the joint default of a couple of sovereigns. Since there may be unlimited contingencies policymakers may be interested in, there is an unlimited probability measures that may be developed.

4. Data

We recover marginal probabilities of default using CDS premia for contracts with maturities from 1 to 5 years for the period 01.01.2007 and 31.12.2011. The bootstrapping procedure requires as additional inputs refinancing interest rates, which we choose to be the AAA euro area government bond yields for maturities from 1 to 5 years. The CDS spreads and the government bond yields are at daily frequency, which is also the frequency of the resulting probabilities of default. Our analysis covers 10 EA sovereigns used by the European Central Bank to calculate various probability-based systemic risk measures, such as the Systemic Fragility Measure (Radev and Alves, 2012). The sample is presented in Table 1.

Table 1. List of euro area sovereigns used in our analysis

Euro Area Sovereigns		
	Country code	Name
1	AT	Austria
2	BE	Belgium
3	FR	France
4	DE	Germany
5	GR	Greece
6	IE	Ireland
7	IT	Italy
8	NL	Netherlands
9	PT	Portugal
10	SP	Spain

Table 2 presents the descriptive statistics of the 5-year CDS spreads of the 10 sovereigns in our sample. The average 5-year CDS spread in the cross-section ranges from 32,26 basis points for Germany to 843,07 basis points for Greece. We also notice a substantial increase of CDS premia even for the safest sovereign at the beginning of the sample, France, from 0.5 to 247,08 basis points. However, this does not compare to the dynamics of the price for protection against the default of Greece, which starts at 4,40 basis points at the beginning of the period and reaches a maximum of 14395,72 basis points. We also notice that, on average, French, German and Dutch sovereigns exhibit the lowest volatility in the price for protection against default.

Table 2. Descriptive statistics of the 5-year CDS spread series of 10 sovereigns

	AT	BE	FR	GE	GR	IE	IT	NL	PT	ES
Minimum	0.50	1.40	0.50	0.60	4.40	1.75	5.30	1.00	3.40	2.47
Mean	66.45	84.73	52.28	32.26	843.07	259.38	128.37	38.29	254.63	133.88
Maximum	273.00	403.01	247.08	120.59	14395.72	1286.91	595.68	136.21	1308.51	490.86
Std. dev.	56.98	84.09	52.14	26.74	1780.04	277.35	124.46	32.50	342.73	123.42
Nr. of obs.	1305	1305	1305	1305	1305	1305	1305	1305	1305	1305

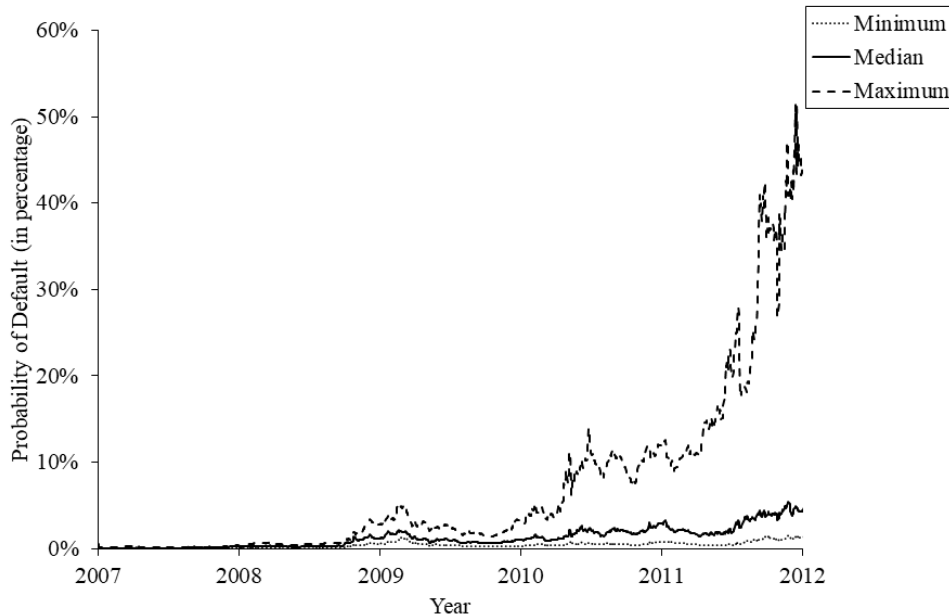
Descriptive statistics of the 5-year CDS spread series of 10 sovereigns: Austria (AT), Belgium (BE), France (FR), Germany (GE), Greece (GR), Ireland (IE), Italy (IT), Netherlands (NL), Portugal (PT), Spain (ES). The data are in basis points. Period: 01.01.2007 – 31.12.2011.

5. Empirical Results

5.1. Marginal Probability of Default Results

This section presents the findings regarding the probabilities of default for each individual sovereign in our sample. Figure 1 displays the annualized probabilities of default derived from 5-year CDS spreads for the 10 sovereigns in our study. The series illustrates that prior to the onset of the Subprime Crisis in August 2007, the market perceived euro-area sovereigns as relatively low risk in terms of default. However, the first significant increase in marginal default risk occurred around the time of the Bear Stearns bailout in the spring of 2008. Throughout the financial crisis and subsequent global recession, we observe that individual default risk remained relatively stable at around 2%. Notably, the dynamics of the probabilities of default during the latter half of the sample period can be divided into two subperiods: the first being between the escalation of the sovereign debt crisis in the first quarter of 2010 and the second quarter of 2011, and the subsequent period onwards.

Figure 1. Minimum, Median and Maximum of 5-Year Annualized CDS-Implied Bootstrapped Probabilities of Default for 10 sovereigns

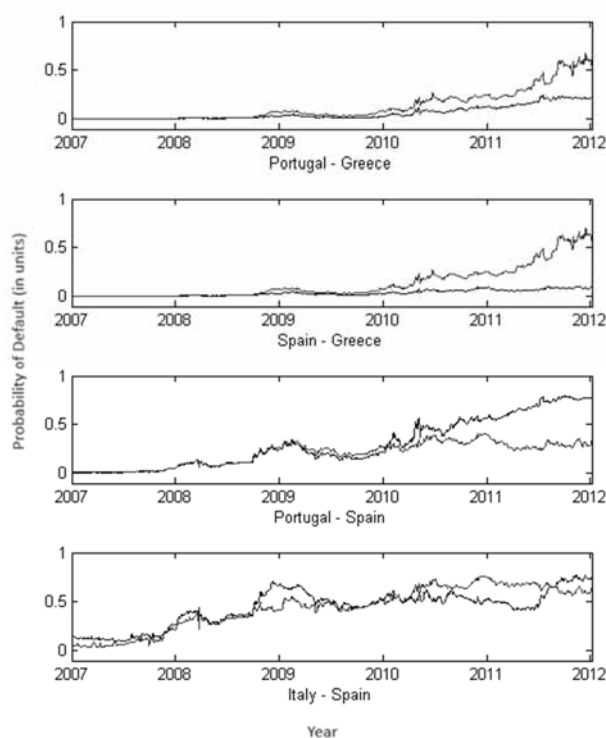


Minimum (dotted line), Median (solid line) and Maximum (dashed line) of 5-Year Annualized CDS-Implied Bootstrapped Probabilities of Default for Austria, Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain. Euro-denominated CDS spreads are used. Period: 01.01.2007 – 31.12.2011. Source: own calculations.

5.2. Conditional Probabilities Results

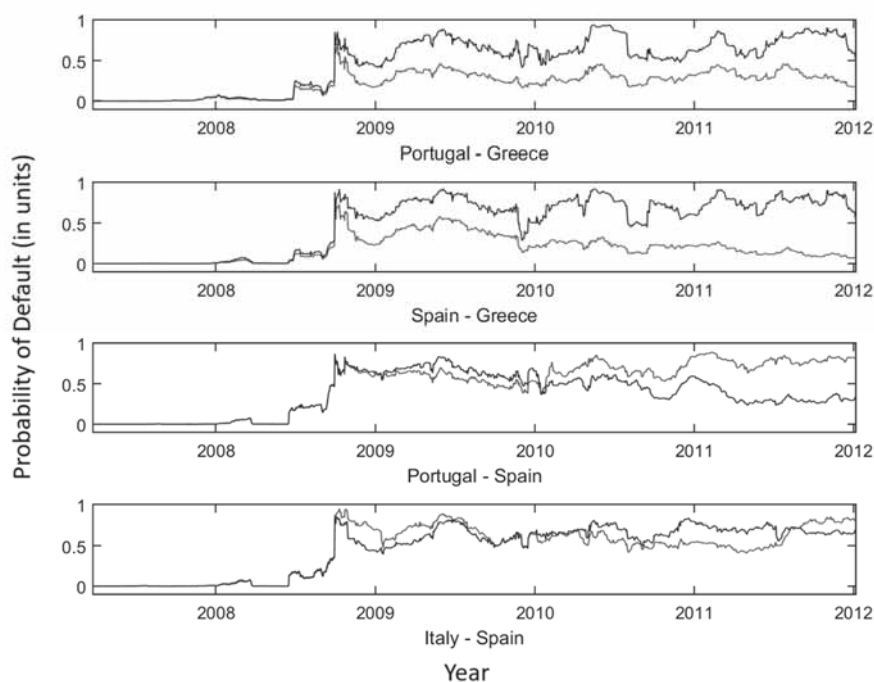
Figure 2 and Figure 3 illustrate the probabilities of default for individual sovereigns in two scenarios: static (Figure 2) and dynamic (Figure 3). In the static case depicted in Figure 2, intriguing patterns emerge in the sovereign measures. In most cases, the conditional probabilities of default within each pair closely mirror each other, indicating a similarity in their individual unconditional probabilities of default (as denoted by the denominator in Equation 4). For instance, the conditional probabilities of default for Portugal and Spain exhibit a close alignment until the beginning of 2011. However, during 2011, the probability of Portugal defaulting given Spain's default becomes higher than its counterpart. This suggests that international investors perceived Spain as a safer sovereign, and in the event of Spain's default, they would anticipate a higher likelihood of Portugal following suit.

Figure 2. Sovereign conditional probability of default given a particular sovereign default: Static Case



5-year annualized conditional probabilities of default of selected sovereign couples in the period 01.01.2007 – 31.12.2011. The black (grey) line corresponds to the probability of default of the first (second) sovereign listed in the couple, given the second (first) sovereign defaults. E.g., the black line in the top plot represents the probability of a default of Portugal given Greece defaults, while the grey line corresponds to the probability of a default of Greece given Portugal defaults. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereign' 5-year CDS spreads. Source: own calculations.

Figure 3. Sovereign conditional probability of default given a particular sovereign default: Dynamic Case



5-year annualized conditional probabilities of default of selected sovereign couples in the period 01.01.2007 – 31.12.2011. The black (grey) line corresponds to the probability of default of the first (second) sovereign listed in the couple, given the second (first) sovereign defaults. E.g., the black line in the top plot represents the probability of a default of Portugal given Greece defaults, while the grey line corresponds to the probability of a default of Greece given Portugal defaults. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads over a 3-month (60 business days) rolling window. Source: own calculations.

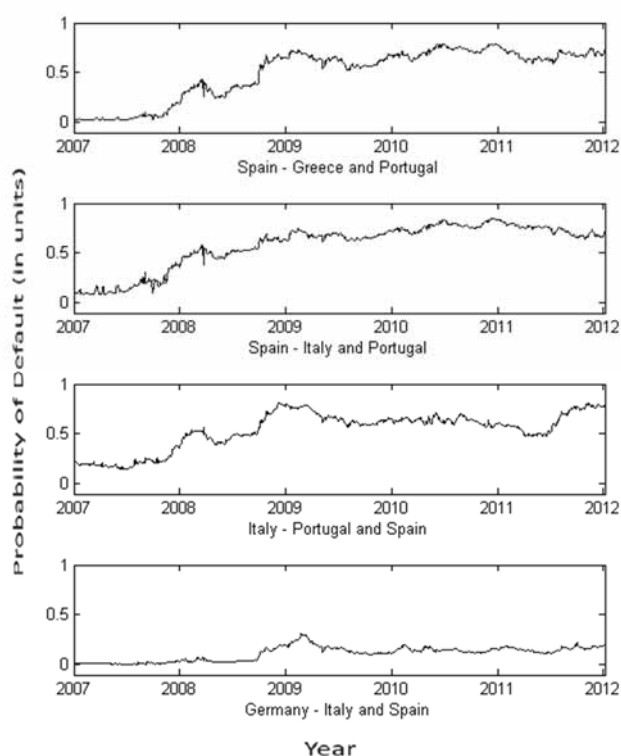
Furthermore, we observe significant disparities in the levels and dynamics of probabilities of default across the subplots, even when involving the same sovereign (e.g., comparing the subplots for Portugal-Spain and Portugal-Greece). These variations can be attributed to distinct levels of dependence among the respective pairs.

The dynamic scenario depicted in Figure 3 exhibits significant deviations from the static scenario presented in Figure 2. Notably, we observe an escalation in the level of default risk and more prominent spikes compared to the static plots. As both figures employ the same input data, we can attribute the contrasting dynamics solely to the incorporation of dynamic correlation, which better captures the evolving patterns of dependence during both crisis and tranquil periods.

Furthermore, we observe that the probabilities of default derived from the averaged static correlations are seldom higher than those obtained using a rolling window. This finding indicates that the former approach fails to capture the nonlinear dynamics present in the joint distribution of sovereign assets. By relying on static correlations, we overlook crucial changes in the interrelationships among sovereigns over time.

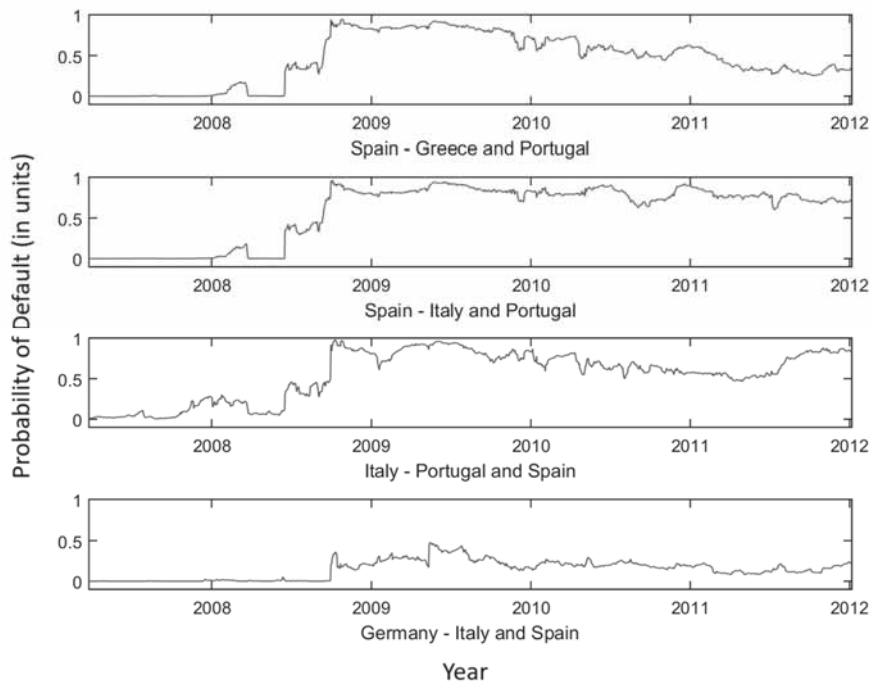
In Figure 4 and Figure 5, we present univariate sovereign probability results, conditional on two sovereigns defaulting, for the static and dynamic cases, respectively. The upper subplot in Figure 4 demonstrates a substantial effect on the default perceptions regarding Spain when there is a joint default of Greece and Portugal. This pattern is observed consistently across all triplets, indicating that the simultaneous default of any two sovereigns would have a significant and detrimental impact on the default risk assessment of a third sovereign.

Figure 4. Sovereign conditional probability of default given two sovereigns default: Static Case



5-year annualized conditional probabilities of default of selected sovereigns in the period 01.01.2007 – 31.12.2011. The black line corresponds to the probability of default of the first sovereign listed in the couple, given the remaining two listed sovereigns default simultaneously. E.g., the line in the top plot represents the probability of default of Spain given Greece and Portugal's default. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads. Source: own calculations.

Figure 5. Sovereign conditional probability of default given two sovereigns default: Dynamic Case



5-year annualized conditional probabilities of default of selected sovereigns in the period 01.01.2007 – 31.12.2011. The black line corresponds to the probability of default of the first sovereign listed in the couple, given the remaining two listed sovereigns default simultaneously. E.g., the line in the top plot represents the probability of default of Spain given Greece and Portugal's default. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads over a 3-month (60 business days) rolling window. Source: own calculations.

The inclusion of dynamic correlation in Figure 5 provides a deeper comprehension of joint default risk dynamics. The spikes in default risk exhibit heightened prominence, notably around pivotal events such as the Greek bailout in May 2010. The observed dynamics in Figure 5 significantly diverge from those in the static correlation scenario, particularly within the first and last subplots encompassing Italy-Portugal and Spain, as well as Germany-Italy and Spain, respectively. In the former case, a discernible decline in the conditional default risk of Italy following the First Greek Bailout is evident, a phenomenon that lacks similar emphasis in the static correlation depiction. These fluctuations can be ascribed to the dynamic interdependencies among these sovereigns, which our methodology effectively captures and represents.

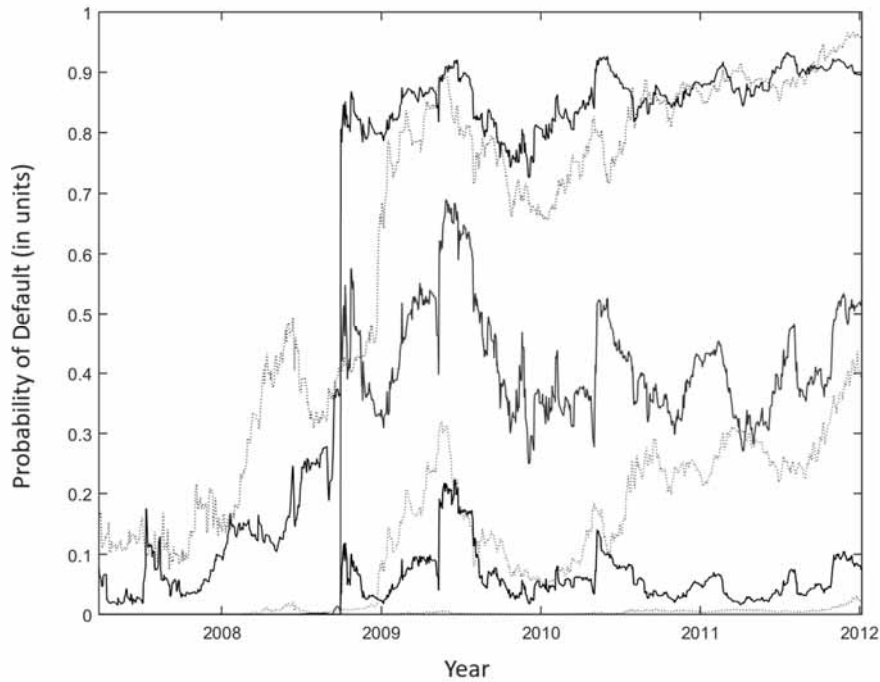
Figure 6 presents our final metric, referred to as the Probability of at least n additional sovereigns defaulting (PAN), given a specific sovereign default. To enhance clarity, we utilize solid lines to denote the dynamic case and dotted lines to represent the static case. Each curve in Figure 6 represents the cross-sectional median values of the respective probability for the sake of presentation.

Given our fixed 10-dimensional sovereign system, it is expected that the likelihood of an additional sovereign default decreases as we require more sovereigns from the system to default. Consequently, within our 10-dimensional sovereign system, the conditional probability of 8 additional sovereigns defaulting is inherently lower than the conditional probability of 7 additional sovereigns defaulting. Notably, the conditional probability of 1 additional sovereign defaulting, depicted by the top two lines, exhibits the highest values in both the static and dynamic cases, surpassing the probabilities associated with at least 5 additional sovereigns defaulting (middle two lines) and at least 9 additional sovereigns defaulting (bottom two lines).

The outcomes confirm the previous findings derived from our various metrics, signifying that distress within the sovereign system commenced as early as mid-2007. The dynamic measures demonstrate greater volatility, characterized by significant spikes in August 2007 (coinciding with the outbreak of the Subprime crisis) and May 2010 (corresponding to the First Greek Bailout). It is worth noting that the conditional probability of at least one sovereign defaulting rapidly approaches the upper limit of the probability domain (with unreported maximum values even closer to 1 than depicted), rendering the dynamics of this measure, often referred to as the probability of spill-over effects (introduced in Segoviano and Goodhart, 2009), relatively uninformative. Consequently, we contend that our generalized approach, which examines different numbers of defaulting sovereigns, offers a more comprehensive depiction of the extent to which default spill-over effects permeate the financial system.

Interestingly, the static case of PAN exhibits higher values than the dynamic case for extended periods. This disparity arises from employing fixed correlation matrices calculated over the entire sample in the static case, while in the dynamic case, we calculate the matrices using a rolling window of 60 days. The dynamic approach enables us to account for fluctuations in dependence, which typically occur during times of crisis and stability (see, e.g., Forbes, Rigobon, 2002; Radev, 2022e). Thus, we posit that dynamic conditional measures present a more precise portrayal of the level and direction of changes in systemic risk.

Figure 6. Probability of at least n additional sovereigns defaulting given particular sovereign defaults: Dynamic and Static Cases



Dynamic Case (solid line) and Static Case (dotted line), involving 10 euro area sovereigns in the period 01.01.2007 – 31.12.2011. The median values across the cross-section of the respective probabilities are reported. The top two lines correspond to the probability of at least 1 additional sovereign defaulting for the dynamic case (solid line) and static case (dotted line). The middle two lines correspond to the probability of at least 5 additional sovereigns defaulting for the dynamic case (solid line) and static case (dotted line). The bottom two lines correspond to the probability of at least 9 additional sovereigns defaulting for the dynamic case (solid line) and static case (dotted line). The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads over a 3-month (60 business days) rolling window (solid line) and between changes of the respective sovereigns' 5-year CDS spreads (dotted line). Source: own calculations.

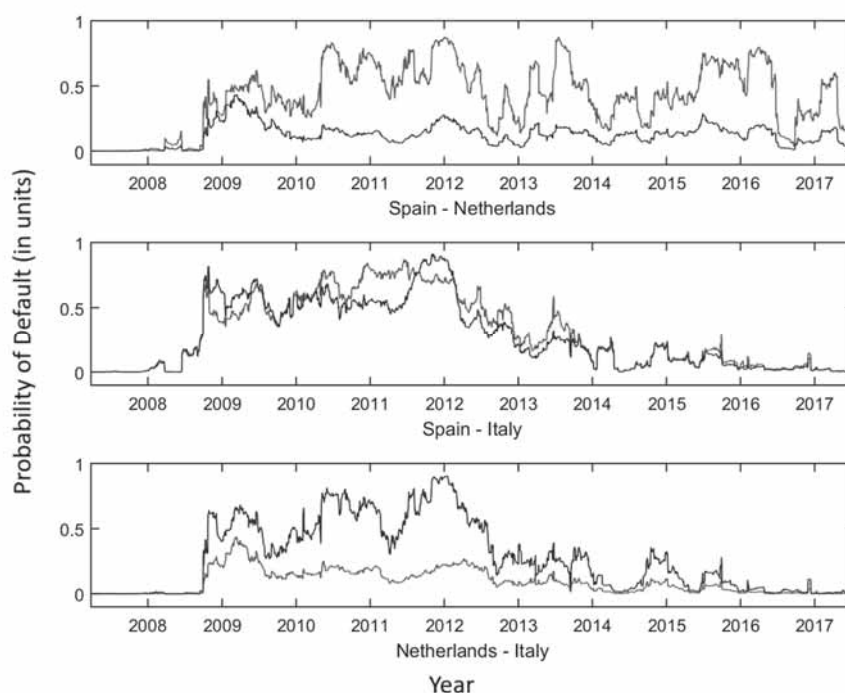
5.3. Extension of Time Period

In this section, we incorporate additional data for some of the sovereigns to extend the estimation period until 30.06.2017. Thomson Reuters has provided us with in-house credit default swap (CDS) data for certain sovereigns in our sample, allowing us to update several of our probability measures. Specifically, we have obtained CDS data for Spain, the Netherlands, and Italy until 30.06.2017.

While our data is limited in sample size and time period, it provides insights into the dynamics of our lower-dimensional measures beyond December 2011. For instance, we

examine the probability of a sovereign defaulting given the default of another sovereign (Figure 7), as well as the probability of a sovereign defaulting given the joint default of two other sovereigns (Figure 8). In the upper subfigure of Figure 7, we observe that Spain is more vulnerable to the default of the Netherlands than the reverse case. Interestingly, the conditional probabilities of default for Spain and Italy (second subplot) closely track each other, indicating that both sovereigns have similar individual unconditional probabilities. In the third subplot, the conditional probabilities of the Netherlands and Italy exhibit a narrower tracing pattern. Overall, Spain and Italy appear to exhibit higher riskiness compared to the Netherlands and are more sensitive to the hypothetical default of the latter.

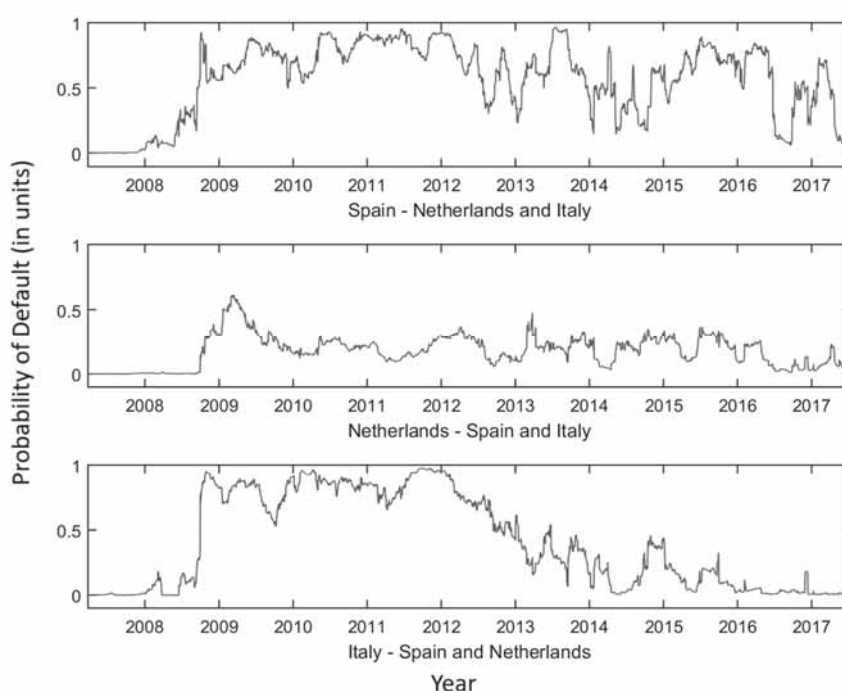
Figure 7. Sovereign conditional probability of default given particular sovereign defaults: Dynamic Case



5-year annualized conditional probabilities of default of selected sovereign couples in the period 01.01.2007 – 30.06.2017. The black (grey) line corresponds to the probability of default of the first (second) sovereign listed in the couple, given the second (first) sovereign defaults. E.g., the black line in the top plot represents the probability of default of Spain given the Netherlands defaults, while the grey line corresponds to the probability of default of the Netherlands given Spain defaults. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads over a 3-month (60 business days) rolling window. Source: own calculations.

Moving to Figure 8, we note that Spain demonstrates greater sensitivity to the joint default of the Netherlands and Italy compared to the other two constellations. Furthermore, Italy exhibits the least sensitivity to the joint default of the remaining two sovereigns.

Figure 8. Sovereign conditional probability of default given two sovereigns default: Dynamic Case



5-year annualized conditional probabilities of default of selected sovereigns in the period 01.01.2007 – 30.06.2017. The black line corresponds to the probability of default of the first sovereign listed in the couple, given the remaining two listed sovereigns default simultaneously. E.g., the line in the top plot represents the probability of default of Spain given the Netherlands and Italy jointly default. The probabilities derivation incorporates empirical correlation, calculated between changes of the respective sovereigns' 5-year CDS spreads over a 3-month (60 business days) rolling window. Source: own calculations.

Observing the overall dynamics, we find that the riskiness of conditional probabilities is influenced by significant events within the euro area throughout the extended period. Notable spikes occurred around the time of the Private Sector Involvement agreement in late 2011 and early 2012, which signalled the de facto default of Greece on its government debt. Additionally, the "whatever-it-takes" speech delivered by Mario Draghi in mid-2012, which reassured the markets and essentially pledged ECB support to safeguard the euro, also impacted the conditional probabilities. Moreover, the Cypriot Banking Crisis in late 2012 and early 2013 contributed to fluctuations in these probabilities. In all cases, the conditional probabilities exhibit a decline by the end of the time period, particularly after mid-2016.

6. Conclusion

This research enhances existing default risk measures for euro area sovereigns through a consistent approach for assessing individual and joint default risk. We introduce dynamic dependence into the cross-entropy method underlying our framework, allowing us to better capture changing dependence patterns across different market conditions. Our analysis reveals an escalation in sovereign default risk since the Subprime Crisis, particularly around the First Greek Bailout in May 2010. We also effectively capture significant events like Mario Draghi's "whatever-it-takes" speech in mid-2012 and the 2012-2013 Cypriot Banking Crisis. Our dynamic dependence measures provide a more comprehensive view of conditional default risk within the euro area sovereign system, often showing different dynamics compared to static measures.

This study contributes to the ongoing discourse on joint default risk measures, enhancing our understanding of market perceptions of default risk and the implications of regulatory interventions and economic reforms. The incorporation of dynamic dependence and our proposed measures expands policymakers' tools for assessing systemic sovereign risk. Furthermore, our approach holds promise for evaluating the impact of financial system reforms, such as bank resolution regimes and Basel III, as well as major crises and global events like Brexit, the COVID-19 pandemic, and the War in Ukraine, offering fertile ground for future research.

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DECONSTRUCTION OF MANAGEMENT CONTROL SYSTEMS AND THE ROLE OF CULTURE IN TRADITIONAL BANKING INSTITUTIONS⁵

This study aims to know the existence of culture and its deconstruction in management control systems in traditional banking institutions. This research uses a mixed method with Explanatory Sequential Design by taking a traditional banking institutions in Indonesia and exploring it using interview and observation techniques at one of the traditional banking institutions to form a deconstruction of the new MCS concept. The results of this research reveal a significant influence between culture and MCS. Furthermore, a culture-based MCS deconstruction was discovered and formed, which found a kindness implemented in the Standard Operational Procedure, Assets implemented in the Work Plan, budgeting, and expenditure and a desire for its implementation through performance. Lastly is happiness, implemented in reporting and auditing.

Keywords: Management Accounting; Management Control System; Explanatory Sequential Design

JEL: M40; M41

1. Introduction

The concept of MCS emerged during the 1980s era of global competition, spurred by Japan's innovative practices and technological advancements (Barros, Ferreira, 2019). This transformation changes the role of accounting practices and management control from standardization and control of production activities to primarily contributing to flexibility

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and autonomy. There is ongoing debate regarding the role of MCS (Management Control Systems) in a company's competitive advantage. The two main functions that are often discussed are monitoring and empowerment. This topic continues to be explored through academic research, including literature reviews and empirical evidence (Langfield-Smith, 2007; Tessier, Otley, 2012).

Financial institutions pose the highest level of risk. Existing management control systems (MCS) used in banking institutions have been under scrutiny due to several criticisms. The traditional pyramid-shaped organizational structure used by banks has a negative impact on business development (Haileleul, 2021). According to a study by Borgström (2021), there is still a lack of understanding and awareness among commercial banks in Sweden about the benefits of integrating control systems. Ullah and Ahmad's (2019) research on Pakistan's banking sector suggests that poor management control systems may have contributed to the global financial crisis. A study by Akinbowale et al. (2021) warns that high financing costs may cause the management control systems of several banks worldwide to be at risk of loss. Furthermore, inappropriate use of MCS may negatively impact employee productivity and efficiency (Akinola, Okundalaiye, 2022). Establishing a well-organized management control system (MCS) is crucial in the banking industry, as Susanto and Meiryani (2019) pointed out. Clear values, beliefs, and norms are essential aspects of Management Control Systems (MCS) which are influenced by culture, as pointed out by Dollija et al. (2020). Alsharari and Lasyoud (2019) suggest that external factors such as culture can act as a catalyst for change in management accounting practices.

Many traditional banking institutions in Indonesia have concerns regarding their Management Control System. The article by Dewi (2021) highlights the importance of examining differences in service coverage, profit distribution, formation objectives, and legal basis. An effective management control system (MCS) is crucial for traditional banks, considering the various factors that can affect them. However, few studies in the last five years have explored the influence of organizational culture on MCS, especially in traditional financial institutions. To enhance a banking institution, three critical aspects must be focused upon: people, management, and spirituality. The spiritual aspect pertains to the closeness of human beings to God (Nursanty et al., 2021). Apart from God, faith also encompasses individual relationships with others and the world, which are an integral part of culture.

Conducting research is crucial as traditional banks empower communities (Ramantha et al., 2018; Ardyani, Suarmanayasa, 2021; Kurniasari, 2022). These institutions serve functions aligned with the MCS, which empowers (Hasyim et al., 2021; Efferin, 2021). Related to institutional theory, Management Control Systems (MCS) aim to legitimize an organization and gain support from society (Ramadhan, Arza, 2021). It is crucial to maintain the existence of traditional banking institutions, and the Management Control System (MCS) plays an essential role in achieving this. The modern MCS assumes that humans are rational beings, as exemplified in agency theory. The agent will, therefore, try to achieve the best possible financial performance for the principal, irrespective of the methods employed. However, such practices can lead to the emergence of creative accounting, as observed by Soeherman in 2017. Big corporations, particularly those that possess complete legitimacy in the society, necessitate a higher level of monitoring. Traditional banking institutions, which rely on cash as their primary resource, must establish control measures to guarantee the safety of customer

funds and organization-owned assets. It is essential that their reports can be trusted and their performance is consistently improving (Ardyani, Suarmanayasa, 2021).

2. Literature Review

The use of management control systems in Western organizations began with Robert Anthony's book "Planning and Control Systems: a Framework for Analysis" in 1965 (Murhaban, Adnan, 2020). For decades, Management Control Systems (MCS) research has been based on contingency theory, which Otley explains has influenced the development of modern MCS (Otley, 1980; 2016). This theory explores how organizational factors influence the design of Management Control Systems (MCS) within Management Accounting. In MCS research, contingency theory helps understand factors affecting MCS design and implementation in organizations. According to the theory of contingency, a company's organisational structure is shaped by various factors such as technology, level of decentralization, external environment, company size, strategy, and culture (Pavlatos, 2021). The design and utilization of management control systems (MCS) is dependent on the organizational context. However, the application of contingency theory in MCS often follows a static and simplistic approach, which hinders the comprehension of the dynamic nature of control in diverse organizations (Martin, 2020).

In Langfield-Smith's (1997) definition, Management Control Systems (MCS) refer to the procedures by which managers ensure that resources are obtained and used efficiently and effectively in the accomplishment of the organization's objectives. In 1987, Simons defined Management Control Systems (MCS) as formal procedures and systems that use information to modify or improve various organizational activity patterns. As a part of the Lever of Control (LoC) framework introduced by Simons in 1987, 1990, and 1994a, the concept of Management Control Systems (MCS) is a dynamic capability that can be utilized to achieve a competitive advantage. However, it is important to note that the LoC framework overlooks the active role of employees in control management, as highlighted by Tessier and Otley in 2012. Hermawan (2021) and his team identified four Leverage, Opportunity, and Capability (LoC) levers that companies can use together, under the right conditions, to effectively execute strategies. On the other hand, Euske and Riccaboni, in 1999, defined the Management Control System (MCS) as a system that management uses to regulate behaviour in social, cultural, political, and economic environments. The term has a broad meaning and refers to a set of processes and tools that help a company achieve its goals.

The study of management control systems has been categorized since the 19th century in Table 1. Various models have emerged, providing a framework for developing MCS research. However, many of these models' MCS are not entirely separate, and different ideas often coexist and influence each other during the same period.

Table 1. Representation of Several MCS Models

Development Theory	Theorist	MCS Assumption
Classical Management Theory	Follet (1868); Taylor (1911); Fayol dan Max Weber (1974); Simon (1954, 1987, 1990, 1994, 1995)	Control management is the most critical process and event in an organization and emphasizes solutions and evolution theorists.
Behavioural Approach	Hopwood (1972, 1974a, 1974b); Otely dan Berry (1980)	Stating the importance of spontaneous, unplanned behaviour in organizations emphasizes the organic structure of informal arrangements.
Systems and Contingency Approaches	Anthony (1965); Ouchi (1979); Otley (1980, 2016); Langfield-Smith (1997)	Emphasizes the organization's high dependence on the environment by highlighting the goals
Radical Views	Ansari dan Bell (1991); Euske & Riccaboni (1999)	Environmental factors can also be operated and managed while complying, starting to focus on the values or impact of culture on the behaviour of organizational members.
Rational Views	Efferin (2019)	Educational process to combine commercial and social performance in an organization. Focusing on care centres to carry out activities with good intentions towards stakeholders (investors, employees, suppliers, customers, the general public, and nature)

Source: Prepared by Author (2023).

In order to achieve success and ensure long-term growth, companies must have strong systems and a capable workforce (Sawitri Ningrum et al., 2017). With the advent of economic globalization, companies that lack a robust management control system structure are at risk of falling behind (Murhaban, Adnan, 2020). As explained by several experts in the previous section, there are various MCS concepts that the organization can use to plan, execute, evaluate, and monitor its operations. The main goal of these concepts is to assist the management in effectively controlling the organization, thereby achieving its vision and mission, and gaining a competitive advantage (Radianto, 2021). I have checked the text for spelling, grammar, and punctuation errors and made necessary corrections. Since the 19th century, the study of management control systems has been classified in Table 1. Over time, several models have been developed to provide a framework for conducting MCS research. However, it's important to note that many of these models are not entirely distinct, and various ideas often coexist and influence each other during the same period.

2.1 Research GAP

There is a debate that the current MCS in financial institutions in developing countries must achieve goal congruence. There is no clear explanation of the specific MCS elements necessary for the successful implementation of the company's strategy. Indonesia's strong traditions and religious influence inhibit the establishment of a clear direction for the company without compromising local identity. Traditional banking institutions also serve as research sites for empowerment, just like MCS. The support provided by conventional banking institutions to village communities is highly legitimate, to the extent that it becomes

necessary to implement MCS in these institutions. This article aims to explore the following research questions:

1. To what extent does organizational culture affect MCS in traditional banking institutions?
2. Upon establishing the impact of culture on MCS, the subsequent step is to break down MCS in traditional banking institutions.

In the future, this research can highlight the significance of control systems in traditional banking institutions. The goal is to prevent the negative outcomes that can result from weak control systems in financial institutions from occurring in the future. Additionally, it can address issues stemming from the unclear nature of control systems in traditional banking institutions up until now.

3. Material and Methodology

This research uses an explanatory sequential mixed methods design adopting the design methodology from Creswell and Creswell (2018).

Figure 1. Explanatory Sequential Design (Two-Phase Design)



Source: Creswell and Creswell (2018).

The explanatory sequential mixed methods approach is a design that blends both quantitative and qualitative research methods and is particularly suitable for individuals with a strong quantitative background or from fields where qualitative approaches are relatively new. Sequential mixed methods approaches are designs in mixed methods that draw from a robust quantitative environment or from an area that is relatively new to qualitative approaches.

First, data collection took place in two different stages, with quantitative sampling, using the survey method, and sampling with the aim of the second stage, namely the qualitative stage. Second, there is data analysis and integration. Two databases, quantitative and qualitative, were analyzed separately before being integrated and linked. Third, interpret mixed methods by interpreting the follow-up results in the research discussion section. Interpret mixed methods by analyzing follow-up results in the research discussion section, following the reporting of quantitative and qualitative results. Lastly is validity. Researchers must establish the validity of quantitative scores and discuss qualitative findings in mixed methods research.

3.1 Data

This research uses quantitative and qualitative data. The quantitative data used has a population size of 1,327 traditional banking institutions in Indonesia. Researchers used the sample determination formula from Krejcie and Morgan (1970). This research used simple, systematic, stratified random probability sampling Tabachnick & Fidell (1989). The procedure for determining the sample is as follows:

$$n = \frac{\chi^2 \cdot N \cdot P(1-P)}{(N-1)d^2 + \chi^2 \cdot P(1-P)}$$

Based on this formula, the samples used were 298 research samples. The MCS measurement adopts six indicators from Anthony and Govindarajan (2007), and the organizational culture variable adopts four indicators from Denison (2006). They answered in-depth research questions using qualitative data, in-depth interview techniques, participant observation, and document study. Researchers will approach research informants, namely supervisors, employees of administrators, and customers of traditional banking institutions.

4. Results and Discussion

4.1 Organization Culture and Management Control System

The research methodology utilized SEM-PLS to analyze research data by testing the outer and inner models. In the initial stage, the researcher conducted a measurement test (outer model) to assess the convergent validity of the model measurement evaluation using reflective indicators. This was determined by analyzing the loading factor value for each variable indicator and the average variance extracted (AVE).

Table 2 Outer Loading of Measurement Model Estimation Results

	Management Control	Organizational Culture
MC1	0.804	
MC2	0.814	
MC3	0.880	
MC4	0.885	
MC5	0.836	
MC6	0.861	
OC1		
OC2		0.882
OC3		0.906
OC4		0.849
OC5		0.868

Source: Prepared by Author (2023).

Measuring the level of reliability can be seen from the composite reliability value, and Cronbach's alpha has a value greater than 0.70. Next, the inner model test is used to evaluate the model as a whole with analysis tools seen from the R-Square (R²) side.

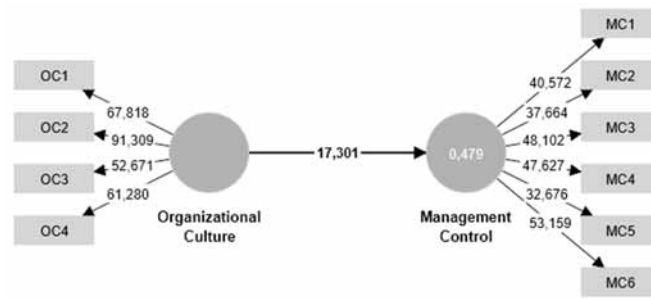
Table 3 Coefficient of Determination (R²)

Management Control	R-square	R-square adjusted
	0.479	0.478

Source: Prepared by Author (2023).

Each variable's coefficient of determination (R²) is at a good value. So overall, with the analysis tool seen from the R-Square (R²) side, the model offered as a whole is declared good. Figure 2 and Table 4 provide the estimated output for testing the structural model where the expected result is that Ho is rejected or a sig value < 0.05 (or a t statistic value > 1.96 for a test with a significance level of 0.05).

Figure 2. Hypothesis Test Results Through Bootstrapping



Source: Prepared by Author (2023)

Table 4. Test Results Through Bootstrapping

Organizational_Culture -> Management_Control	Original Sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (IO/STDEVI)	P values
	0.692	0.694	0.040	17.301	0.000

Source: Prepared by Author (2023).

It can be seen in hypothesis testing that organizational culture significantly influences MCS. So, if the impact is known, what must be done to form an MCS that can be implemented? We continued the testing with further in-depth research to determine what culture exists in traditional banking institutions. Deconstruction of MCS was formed, as well as further discussion.

4.2 Deconstruction of Management Control Systems in Traditional Banking Institutions

The study focuses on empirical testing and forms a new MCS concept for traditional banking institutions.

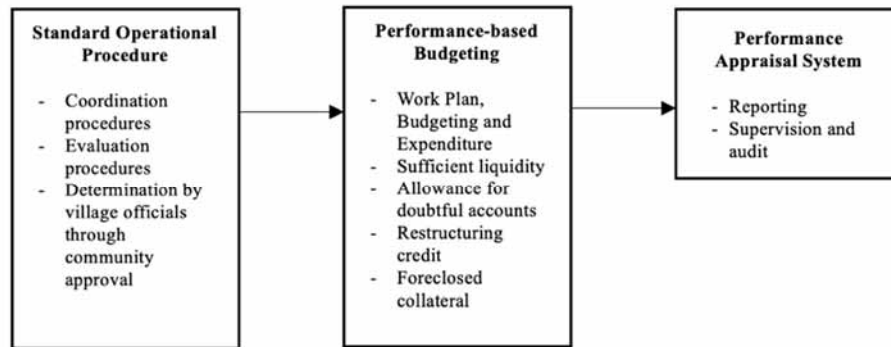
Table 5. Manuscript of Informant

Informant	Interview	Topic	Implementation		
Mr. A	"Our approach should prioritize the needs of consumers, and we should treat them like family."	Sense of Family Open Management Communication – <i>as a form of kindness</i>	Standard Operasional Procedure		
Mr. A	"In case of a credit problem, we adopt a family approach."				
Mr. S	"One team, one goal. Let's share equally and communicate openly."				
Mr. S	"Leadership and management in this organization are open under Mr A's guidance"				
Mr.C	"If a company is involved in production, it is evident that they offer production services.."				
Mr. S	"As the head of credit, I work with a team of five people. There is no difference.."				
Mr. C	"The interest we charge customers depends on the economic situation, so as with Covid, we lower it."			Fairness Efforts – <i>as a form of assets</i>	Work Plan, Budget and Expenditure
Mr. A	"Our organization offers scholarships to children from underprivileged backgrounds."				
Mrs. N	"I have felt sincerity in the way work is done here for decades, which reflects integrity."				
Mr. S	"We have emphasized the importance of honesty to the team. If we remain truthful, financial issues will be resolved"				
Mr. A	"Our employees are aware that we assign workload based on their abilities"	Integrity Empathy Trust – <i>as a form of desire</i>	Performance		
Mr. S	"We made the savings book more flexible by changing the way it was filled out."				
Mr. C	"The trader is happy because he was able to secure a good place without any capital"				
Mr. A	"At the moment, there is no legal action taken for problematic loans."				
Mr. S	"The financial report's credibility is high as it is supported by factual data."				
Mrs. N	"All financial reports are highly credible and trustworthy"				
Mr. C	"All financial reports are highly credible and trustworthy"				
Mr. S	"Although there are big banks here, they cannot turn people away because of their high sense of belonging"				

Source: Prepared by Author (2023).

Running a successful company depends on having adequate knowledge of accounting. To achieve profits, a company must first develop a suitable strategy. One approach is to empower employees, create plans, and report progress up to the evaluation stage. This is where the Management Control System (MCS) is an essential part of management accounting. We can observe the primary form of MCS in traditional financial institutions, as shown in the following picture.

Figure 3. Managemet Control System in Traditional Banking Institution



Source: Prepared by Author (2023).

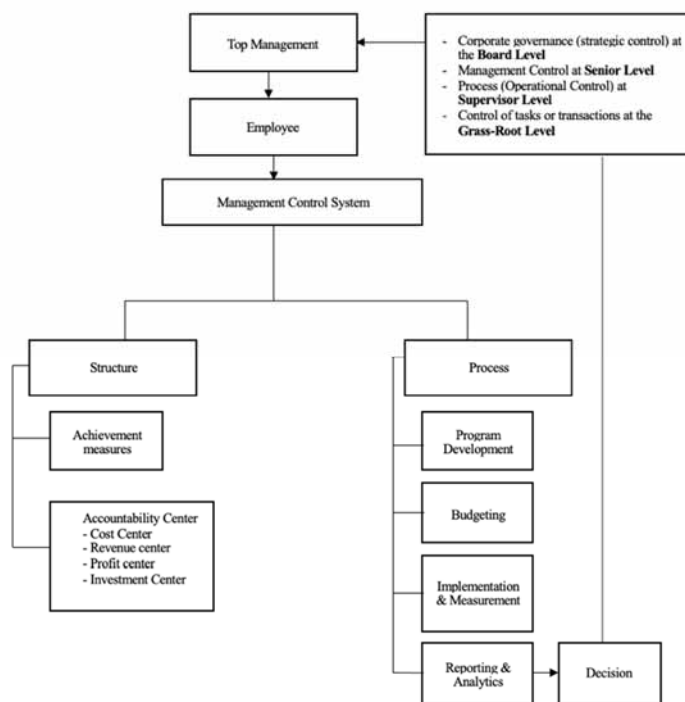
The current form includes Standard Operating Procedures that outline how company management collaborates to execute work according to the approved Work Plan, Budget, and Expenditure. Work Plan, Budget, and Expenditure accomplishments are evaluated quarterly. Performance-based budgeting is a method that links each cost associated with activities to the benefits generated. Per the prudential principle, traditional banking institutions must manage themselves as financial institutions with associated business risks. Providing adequate liquidity to pay for customer deposit withdrawals is crucial for such institutions. Financial institutions, including traditional banks, have the option to place funds for financial institution liquidity with other banks and financial institutions. In the event of liquidity issues, it is important to address them in a step-by-step manner to ensure a timely and effective resolution. It is important for institutions to establish a provision for doubtful accounts based on credit classification to handle problematic loans. Restructuring, rescheduling, and reconditioning are some of the ways to resolve such problematic loans. If all else fails, foreclosed collateral can be dealt with through mutual agreement.

In traditional banking with liquid assets, the structure of MCS still needs clarification due to its complexity. MCS in companies has even more complex parts, including absolute structures and processes. A performance evaluation system incorporates financial measures such as cost centres, revenue, profits, investments, and employee responsibilities and duties. A comprehensive approach that encompasses all company operations, from program and budget preparation to implementation, measurement, reporting, and analysis. In this document, we introduce the concept of a Management Control System (MCS), which is a tool commonly utilized in conventional companies. However, traditional financial institutions cannot fully utilize the modern elements described in a conventional MCS. To illustrate the general concept of an MCS, please refer to the figure provided below.

The diagram clearly demonstrates that the manager is the key decision-maker in the Management Control Systems (MCS). It is evident that the integration of MCS structures and processes commences with controlling tasks or transactions at the grassroots level, which are carried out by lower-level employees. The supervisory level is responsible for operational

control processes, while management control is overseen by the senior level. The board, in turn, is accountable for making the highest-level decisions regarding corporate governance, including control strategy. It is important to note that the actions taken at different levels, from supervisory to task management, are interdependent and require control to meet top-level objectives (Sagara, 2021).

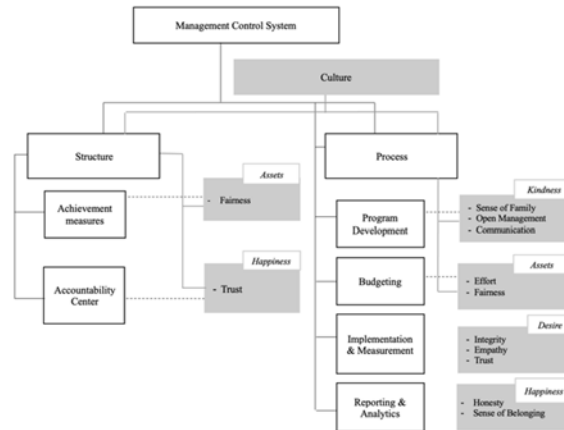
Figure 4. Management Control System



Source: Anthony, Govindarajan, 2007; Kikuchi, Nishimura, Stachurski, 2018.

After thoroughly investigating the research site and reviewing the previous MCS, it is evident that traditional institutions need to implement conventional MCS appropriately. To create an MCS that aligns better with the research site's culture, researchers should seek out local community habits or cultural concepts that complement the MCS. While retaining the existing MCS concept, we propose a deconstruction of the MCS based on an ethnomethodological study. The resulting deconstruction can be explained as follows.

Figure 5. Deconstructing of Management Control System-Based Culture



Source: Prepared by Author (2023).

There will always be structure and process in the control system. However, the structures and processes used by a company may differ. There is a synergy between the management control system (MCS) concept and the company's culture.

There was a prevailing culture of favouring traditional banking institutions, where the values of family-like relationships, transparent management, and effective communication complemented the Standard Operational Procedure of these institutions. According to Thomason (2022), any positive outcome requires well-coordinated efforts. Distinction enables individuals to become more aware of their thoughts, feelings, and desires and empowers them to control their perceptions to adapt to changes (Bialo, 2021). Goodness theory emphasizes how people can adopt a positive attitude to overcome challenges (Youngs et al., 2023). One approach adopted by traditional banking institutions is to reduce conflicts in the local community. Kindness plays a significant role in shaping the goals and decisions of individuals (Dufwenberg, Kirchsteiger, 2019). Positive interventions, such as activities aimed at improving the well-being of the actor and the target (Bolier et al., 2013; Lyubomirsky, Layous, 2013; Ko et al., 2021), also reflect the principles of goodness. Within this context, the term "actor" refers to a conventional banking institution that provides support to the local economy of a village. Simultaneously, the "target" is the community, which is a crucial stakeholder that demands the actor's attention. It is imperative for the actor to prioritize the community's needs and interests to ensure the sustainability and growth of the local economy.

The Work Plan, Budget, and Expenditure work together to fulfil assets, with fairness prioritized to strengthen stakeholder relationships (Nanda et al., 2020). Previous research has shown that fairness is crucial in establishing trust and cooperation when adopting social systems. However, fairness remains an overlooked aspect (Lee et al., 2019). The presence of justice can also reduce adverse reactions arising from social processes, be it in determining wages, working hours or employee satisfaction (Kessler, Leider, 2016). Concentrating

exclusively on enhancing formal aspects of a system or process results in an undue emphasis on quantifiable metrics, which are often too rigid to be practically applied. This approach, which prioritizes measurable outcomes over other factors, can lead to a narrow and incomplete understanding of the system or process in question. In order to achieve a more comprehensive and nuanced understanding, it is necessary to consider a broader range of factors, including qualitative metrics and contextual factors. By taking a more holistic approach, it is possible to develop a more flexible and adaptable system or process that is better suited to real-world conditions (Colquitt, Rodell, 2011; Cugueró-Escofet, Rosanas, 2013; Cugueró-Escofet, Rosanas, 2015; Cugueró-Escofet et al., 2019b). It is imperative for banking companies to generate profits to sustain their operations, but it is crucial that their actions are always in line with their core values and principles (Sageder, Feldbauer-Durstmüller, 2019). To achieve the goals set by the company, it is essential to increase efforts towards shared prosperity. This can be done by implementing a collective agreement, as Nuhu et al. (2019) and Bracci & Tallaki (2021) suggested. To improve the Management Control System's (MCS) performance, it is necessary to consider equity to enhance various aspects of it. Focusing solely on improving incentives based on measurable metrics is not flexible enough to be realistically used, as pointed out by Bialo (2021).

The synergy between performance and desire can be seen through integrity, empathy, and trust. Companies can achieve their goals by empowering their employees to participate in strategic decision-making, rather than restraining them (Van der Kolk et al., 2015; Bracci, Tallaki, 2021). Desire fosters commitment and a sense of responsibility towards completing one's duties (Joneta, 2016; Nugraha, 2017; Meutia et al., 2018). When organizations work cooperatively, share a sense of commitment, and have reduced uncertainty, they are more likely to achieve their desired goals (Duréndez et al., 2016). To maintain solid human relationships, honesty and truth must be at the forefront of our interactions with others (Wells, Molina, 2017).

The ultimate objective of the MCS process is to establish a harmonious relationship between reporting, monitoring, and auditing, while simultaneously fostering a culture of happiness, honesty, and inclusivity. These values are crucial for achieving optimal performance and ensuring the success of the organization. It is common sense that when one feels happy, they will perform better (Pillania, 2021). The ultimate goal of purchasing decisions is not just to gain or lose but to affect human cognition, emotions and religion (Brata et al., 2022). Accounting should strive for the ideal welfare and happiness instead of something relative and artificial (Septyan et al., 2022).

In the context of an organization with many individuals, one must look at the fundamental nature of existence and the reality that accompanies it. In reality, management control systems are trusted by the presence of detectors whose task is to observe what is happening. Next, the assessor compares what happened with the applicable standards or rules. If what happens fails to meet standards, the effector will take specific actions to match expectations. This creates an environment that is controlled by the role of several authorities within it to fulfil the organization's desires. CPA-based MCS has the reality of trying to synergize detectors, assessors and effectors, starting from the element of goodness, the main element in the CPA concept. Carrying out its functions prioritizes all good deeds within the organization, both to colleagues and stakeholders, which will result in rewards in the form of

assets. In the form of CPA-based MCS, wealth is a means to fulfil desires. It is better to restrain excessive desires, with the risk of discrepancies in organizational plans, to avoid work stress and other opportunistic actions that may not be controllable. So detectors, assessors, and effectors in the context of traditional banking institutions are the leaders of traditional banking institutions, supervisors, and village leaders who carry out LPD activities by helping each other for the common good.

MCS, according to Anthony and Govindarajan (2004) states that there is Formal Control and Informal Control. Formal control includes strategic planning, budgeting, and responsibility centres. Informal control is often called informal action; culture, management style, informal relationships and communication exist. The habits, nature and culture brought from the local community's identity are a form of informal control that is in synergy with CPA – derived from the concept of Dharma, which brings equality, brotherhood and social recognition that we are the same. Unlike institutions that experience isomorphism, this control seeks to make the organization itself and not be influenced by similar institutions. Like other organizations, the desired thing is to achieve goals. Formal control synergizes with CPA to achieve goals; there are elements of Artha that are a means to achieve predetermined goals. Achieving goals involves practising integrity and empathy, which are elements of Kama so that all efforts to achieve the desired results remain humanist. The hope is an end in the form of traditional banking institutions' accountability to village manners. We were continuously supervised so that the traditional banking institutions could always be financially supportive and supportive of the village community.

The basic principles contained in MCS and CPA-based MCS also have differences after synergizing. Anthony and Govindarajan (2004) explained that MCS has several elements in achieving the company's desires. Measurement is based on employee performance; the better the employee's performance, the more their income will be. This will create false happiness and gaps between employees (Efferin, 2019). Based on responsibility centres (cost, income, profit and investment centres), there is program preparation as an embodiment of the vision and mission, and budget preparation, which is the operationalization of plans in monetary form. Implementation and measurement are estimates of expenses and income compared to determine results – reporting and analysis where actual revenues and costs are compared with budgets. The basic principles contained are still trapped in monetary shackles. This is also related to decision-making in MCS, which is only based on and fully supports decisions made by top management (Merchant, Stede, 2007; Anthony, Govindarajan, 2007).

MCS is expected to become a system that can create justice, transparency, objectivity and accountability in an organization based on economic benefits. MCS that still relies solely on extrinsic motivators will only create an illusion of happiness. Synergizing two different things to achieve a level of MCS that can be applied in traditional banking institutions, researchers pay attention to the basic principles of MCS itself.

The essence of conventional MCS is organizational goal congruence (Hoopwod; 1974, Ouchi, 1979; Simons, 1994; Flamholtz, 1996; Merchant, 1998, Whitley, 1999; Chenhall, 2003; Alvesson, Karreman, 2004; Malmi, Brown, 2008; Anthony, Govindarajan, 2009; Radianto, 2015). Organizations exist to pursue material success, accumulate capital, and increase the company's value for investors/owners to achieve these goals (Efferin, 2019). The hope to be achieved is to return to the traditional village identity, namely Tri Hita Karana.

Accountability is not only in the horizontal form (human relationships with humans) but also in the vertical form, human relationships with nature and God.

5. Conclusions and Recommendations

This research found that culture is an essential factor influencing the implementation of MCS in banking institutions, especially traditional ones. The test results found that the p values were smaller than alpha. Not stopping at the testing and analysis stage, this research tries to form a new concept of culture-based MCS, which can later be used in traditional banking institutions. The ultimate objective of the MCS process is to establish a harmonious relationship between reporting, monitoring, and auditing, while simultaneously fostering a culture of happiness, honesty, and inclusivity. These values are crucial for achieving optimal performance and ensuring the success of the organization.

The synergistic meeting between the big narrative and the small narrative does not cancel each other out; in fact, the synergy between the two different things provides a solution to what should be a control system. The synergy in aspects of global knowledge and local accounting-based culture means that accounting science no longer has a rigid, ideological and authoritarian consistency. The resulting synergy can make accounting science blend in where it gives rise to inconsistencies because it has been adapted and legitimized by the demands of small narrative characteristics, namely heterogeneous, plural, contextual, local, unique and indigenous.

It is related to the symbiosis of agency theory, where traditional banking institutions, as agents who have more mastery of accounting knowledge, can apply their mastery of accounting knowledge by adding the original culture inherent in the community. The culture used is the mastery of religious knowledge (Hinduism), which is synergized with one of the sciences of management accounting, especially MCS, which has the same meaning and goals as traditional banking institutions, namely empowerment. This idea is related to the substance of culture and religion, namely that not only is the truth of belief absolute but has also seeped into social life. Based on the substantive connection between religious values and accounting science, it can strengthen the social practice of accounting science contextually and practically.

CPA-based MCS is a new theoretical deconstruction of the Management Control System, offering a form of control born from indigenous communities' wombs. The deconstruction of this theory is not to eliminate MCS but to form a postulate that is expected to achieve village community empowerment, which is the initial essence of traditional banking institutions. Applying rules based on accounting science (including the control system included in the grand narrative), which indicates ineffectiveness due to self-control, both external social control and oneself, can give rise to a crisis of confidence. Traditional banking institutions have stakeholders only at the village manner level. If the agent has a negative image, the traditional banking institutions may experience a crisis and bankruptcy. Of course, this consequence will be felt not only by the agent but also by the stakeholders.

Regarding indigenous culture in forming control system postulates, CPA-based MCS is expected to become a reference for traditional banking institutions' operational activities. Activities that not only think about achieving the vision and mission to get a profit in the form of materials but how these materials can make people happy, equalizing and prospering traditional village manners. CPA-based MCS wants to bring people to the realization that the final goal in life is to feel the state of God. The integration of God in every human being will make humans think in a materialist perspective and spiritually so that the implementation of the control system is no longer in humans but in God through the peace that exists in the organization in implementing CPA-based MCS.

Although this research cannot necessarily be applied to several other conventional banking organizations, research with the synergy of big theory and culture can be considered for application. The finding of a more humane control system concept should be a direction that the existence of small things that are still marginalized should obtain attention.

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EVALUATING THE 'BASTAU BUSINESS' PROGRAM: IMPACTS ON ENTREPRENEURIAL COMPETENCIES AND SME FORMATION⁴

The relevance of the problem is since in the state there was a need to create educational programs aimed at the creation of the proper level of entrepreneurial competencies, required to organise their own small or medium businesses. The aim is to investigate the efficiency of the educational program "Bastau Business" in the formation of entrepreneurial competencies, contextualized by existing theories and the changing demands of Kazakhstan's innovation-driven economy. The leading method to study this problem is the questionnaire method, which allows for monitoring the formation of professional entrepreneurial competencies among the graduates of the educational program and to identify the problems they face at the beginning to improve the content and focus of the educational modules. The study showed a high readiness of the graduates of the programme for further independent entrepreneurial activities, which unequivocally indicates its effectiveness. The study also helped identify a range of factors that need to be addressed when improving the educational programme for small and medium business support.

Keywords: entrepreneurial competencies; education; entrepreneurship; medium and small business; entrepreneurial activity

JEL: L26; I25; M13

1. Introduction

Information technology has become deeply integrated into education in the modern world. It enhances teaching and learning in many ways. Information technology tools like computers, software, and internet connectivity allow for more engaging and interactive lessons. Teachers

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can use multimedia content to explain concepts in innovative ways. Students can access digital learning resources, collaborate on group projects remotely, and develop valuable technology skills. Information technology also enables new models of education such as blended or online learning. Leveraging information technology in education leads to heightened student engagement, personalized learning experiences, and the cultivation of technology literacy among students – critical skills for life and careers in the 21st century. With thoughtful integration guided by learning objectives, information technology will continue to transform education for the better.

The article is based on a study of the formation of entrepreneurial competencies among graduates of the “Bastau” training programme. The concept of the project is a training programme aimed at the undoubted financial and social benefits – the possibility of self-employment of graduates, as well as the opportunity to expand professional business competencies for aspiring entrepreneurs (Lackéus, 2020). The aim of the “Bastau” project is to increase the economic activity of the population through involvement in entrepreneurial activities. The basis for the development of entrepreneurial activity is the financial sustainability of the business and further investment in business development (Abudaqa et al., 2021).

The Bastau Business program originated in 2019 as a nationwide government-led initiative to promote entrepreneurship in rural areas. Its curriculum emphasizes hands-on learning and mentorship, aligning with recommendations on impactful entrepreneurship education design (Lackéus, 2020). Human capital theory underscores how programs like Bastau Business can equip participants with entrepreneurial human capital such as skills and knowledge. The theory of planned behaviour suggests entrepreneurial intentions are shaped by attitudes towards entrepreneurship, perceived feasibility, and social norms (Biney, 2023).

The Bastau Business curriculum consists of several modules focused on imparting different aspects of entrepreneurial competencies. This includes a module on business planning where participants learn skills like opportunity identification, financial projection, and business model development. Another module covers interpersonal competencies like negotiation, relationship building, and communication. Participants also complete a hands-on mentorship focused on their own business idea to gain experience-based competencies.

The relevance of the topic was conditioned by the process of entering the Kazakhstan economy into the system of the innovative competitive global environment, which requires finding new approaches to prepare modern youth for entrepreneurial activities. Unlocking and realisation the entrepreneurial potential of the nation is the basis of the institutional resource for the development of a modern economy (Wildan, Sukardi, 2020). The development of entrepreneurship, small and medium businesses in Kazakhstan depends to a large extent on professionally trained professionals (Galvão et al., 2020). An in-depth understanding of contemporary economic issues and the ability to navigate the flow of new innovative technologies significantly increase the competitiveness and professionalism of today's graduates of higher education institutions (Lapidus, 2018). Professionals today must be adapted to the dynamics of demand within the labour market and be ready to implement business projects in any sector of the economy (Cárdenas-Gutiérrez et al., 2021).

Entrepreneurial competencies have been defined as the underlying characteristics such as skills, abilities, and knowledge that enable entrepreneurial performance. Key theories that have shaped our understanding include human capital theory, which emphasizes how education and experience develop entrepreneurial human capital, and the theory of planned behaviour, which examines how attitudes and perceived control influence entrepreneurial intentions and actions (Cárdenas-Gutiérrez et al., 2021).

Hence, modern vocational education should include an entrepreneurial component, which aims to prepare a specialist capable of creating and successfully running a business (Shavrovskaya, Pesha, 2021). The preparation of the population for entrepreneurial activity should create favourable conditions for the motivation and development of private entrepreneurs by providing them with support at the early stages of their formation (Kergroach, 2017; Pinchevska et al., 2022). Thus, practical orientation and the creation of new and unique ideas for student entrepreneurship in the form of academic or practice-oriented outcomes are the features of the process of engaging the population in entrepreneurial activity. Mastering such practice-oriented content is implemented through business training, business games, workshops, sociological and marketing research (Koropets, Fedorova, 2018).

Such innovative forms of entrepreneurial training sessions focus on the practical acquisition of entrepreneurial skills (Hubanov et al., 2018). Their main differences are as follows: high intensity of group interaction, active and autonomous participants, use of life experience and empathy (Coursera, 2020). During such training, the mentors share their thoughts and experiences and involve future professionals in the discussion of problems through stimulation. As a result, a model of behaviour in a specific market situation is being formed (Tolochko et al., 2020). In addition, this approach contributes to the acquisition of professional competencies and helps the specialist to solve problems independently in entrepreneurial activities (Youth Business International (YBI), 2019).

Entrepreneurship education implies such forms of education and training as formal and informal, including training for business in production, which fosters an entrepreneurial spirit and prepares to implement activities with or without commercial objectives (Diaz Vidal et al., 2021). It should be noted that the concepts of “entrepreneurship education”, “entrepreneurship development” and “entrepreneurial competence formation” do not yet have a specific commonly known definition and are often used as identical. In each case, it refers in particular to the development of character traits and personality types of the future entrepreneur, which include certain skills and patterns of effective entrepreneurial behaviour (ability to take economic risks, creativity, planning, problem-solving, managing team projects, etc.) (Chernyshova, 2017). Modern models of entrepreneurship education are implemented in institutions of higher, technical vocational, and general secondary education, through the development of entrepreneurial culture, formation of key entrepreneurial skills, special commercial and production skills on examples of “mini-enterprise” using the full cycle of its development (developing of a business plan, preparation of founding documents, marketing, commerce and the like) (Goryushkina, 2019; Azzaoui, Dyba, 2022).

This study addresses critical gaps by investigating if and how the nationwide Bastau Business training program, which originated in 2019 to promote entrepreneurship in rural areas,

actually unlocks the entrepreneurial potential of participants to meet economic diversification goals. Specifically, through a graduate tracer methodology, the authors examine three research questions surrounding competency augmentation, translation of enhanced capabilities into entrepreneurial action, and persisting challenges that constrain microventure sustainability. Findings will have important theoretical and practical implications for entrepreneurial education models, instructional design, and continuous improvement of Kazakhstan’s entrepreneurial ecosystem.

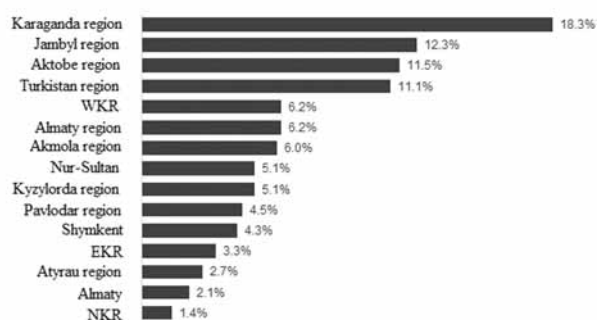
The aim of the article is to investigate the formation of entrepreneurial competencies of different segments of the population after undergoing the “Bastau” training programme. The object of the study: the process of formation of entrepreneurial competencies of young people. The analysis of scientific literature has shown a low degree of development of the problem of using training programs to increase the level of entrepreneurial competencies among the adult population. Therefore, it is necessary to analyse the effectiveness of the use of educational programs for the formation of both the public business climate and individual competencies of each graduate of such a program.

2. Materials and Methods

The following research methods were used to achieve the set objectives, in particular theoretical – analysis, synthesis, comparison, systematisation, generalisation of scientific, scientific and methodological, educational literature, normative legal documents to determine the degree of scientific development of the problem of forming entrepreneurial competence of students; empirical – observation, interviews, questioning, testing, a study of products of student entrepreneurship in order to compare the experience of forming entrepreneurial competence of young students: mathematical – to quantify the results of observations and to record the results of scientific research.

A sociological survey with a representative sample was conducted. Alumni of the “Bastau” training programme participated in the survey. The geography of the survey included 14 regions and 3 cities of national importance. Regional coverage of respondents participating in the survey is presented in Figure 1.

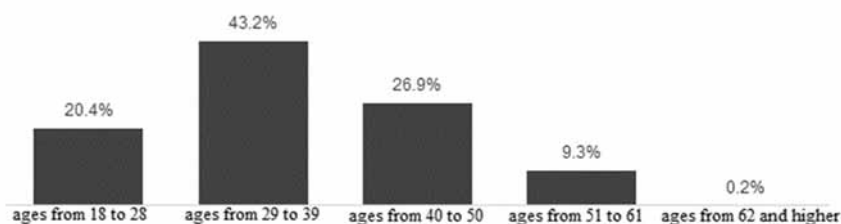
Figure 1. Regional coverage of respondents



Source: compiled by the authors based on the study.

The respondents' ages ranged from 29 to 39. This sample correlates directly with the demographic pyramid of the country's age structure and emphasises representativeness. The age distribution of respondents is demonstrated in Figure 2.

Figure 2. Age distribution of respondents



Source: compiled by the authors based on the study results.

This sample allowed the most representative study to be carried out and produced results that were consistent and unbiased. The research on the problem was carried out in three stages:

Stage I of the experiment (from 2020 to 2021) – indicative. Experimental work at this stage included the study of the process of formation of entrepreneurial competence of students; analysis of factors that may reflect the effectiveness of entrepreneurship education; determination of the criterion to be investigated; and preparation for the study. Stage II of the experiment (2021) – formative.

At the formative stage, the content of the experimental work included the development of the program of experimental work; implementation of conditions of monitoring the effectiveness of formation of entrepreneurial competence of students in the process of passing the program “Bastau”; control over the course of the educational experiment by means of questioning; analysis and processing of the obtained results during the experiment; summarising the results of the experiment.

A sample size of 500 participants was derived from the Bastau Business program's graduate database. Given a graduate population of 5,000 spanning two years, this sample size surpasses the recommended statistical power of 384 to ensure findings that represent the population within a 5% margin of error. Survey responses were meticulously sifted to retain only those participants who embarked on their entrepreneurial journey subsequent to their Bastau training, thereby omitting participants with pre-existing businesses. This filtration yielded a focused subsample of 342 'post-training entrepreneurs', forming the core dataset for in-depth analyses centred on competency evolution and new business initiation.

Stage III of the pedagogical experiment (2021) – final. The content of this stage of the experiment included systematisation and generalisation of the results of the experimental work and formulation of the conclusions of the study. In conducting statistical research, there was a requirement that the error of representativeness with a probability of 0.95% should not exceed 10%. For this purpose, a coefficient of variation of 0.3 was adopted for conducting the survey and collecting the results, an online survey was conducted to ensure the sanitary

and epidemiological safety of respondents concerning anti-covid measures. The survey was conducted electronically.

The main limitations of the study are the difficulty in identifying the results of the study due to the limited ability to attract a larger number of respondents from the regions of Kazakhstan. Due to quarantine because of the COVID-19 pandemic, some difficulties emerged in the process of research materials testing in a real production process. Google Forms were used for the survey. Data entry and processing were done using SPSS Statistics 17.0. All data are in relative terms (% of the number of people interviewed).

3. Results

3.1. Graduates' attitudes towards entrepreneurship

The main objective of the “Bastau” project is to increase the economic activity of the population through involvement in entrepreneurial activities.

Key objectives of the project:

- mass involvement of the population in entrepreneurial activities;
- support for promising entrepreneurial ideas;
- practical training, to equip participants with business skills;
- promoting entrepreneurship among young people;
- forming a business environment in rural areas.

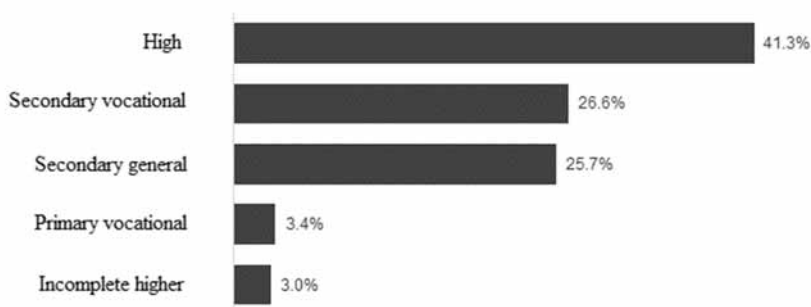
Mass involvement of the population in entrepreneurial activity can be achieved through the popularisation of an educational project among wide layers of the population through the dissemination of information about the project and results of trainees, who passed the training, by the mass media of the Republic of Kazakhstan. Support of promising entrepreneurial ideas by the state is successfully implemented by allocating state grants for business development, which can be received by the project graduates after successfully passing business projects developed by them within a particular area.

As of 31.12.2021, about 15000 people participated in the “Bastau Business” project, of which 12800 successfully completed the training and 2500 started their own business. In the future, through the involvement in the project of wide segments of the population, by opening the next streams of this project and assisting learners in drawing up business plans and their successful implementation in various fields, a qualitative solution is planned for the problem of popularisation of entrepreneurship among all segments of the population of the Republic of Kazakhstan, in particular, among young people and the unemployed population, which in general will contribute to the diversification of the state economy and the gradual increase in business activity of the state population.

Representatives of Kazakhstani businesses have a high level of education and more than 80% chose the answer “I wanted to have my own business”, which means that people go

consciously, not because they cannot find a job or are underpaid there. The contingent who obtains secondary general and secondary vocational education are mostly inhabitants of rural areas. The level of education of respondents is presented in Figure 3.

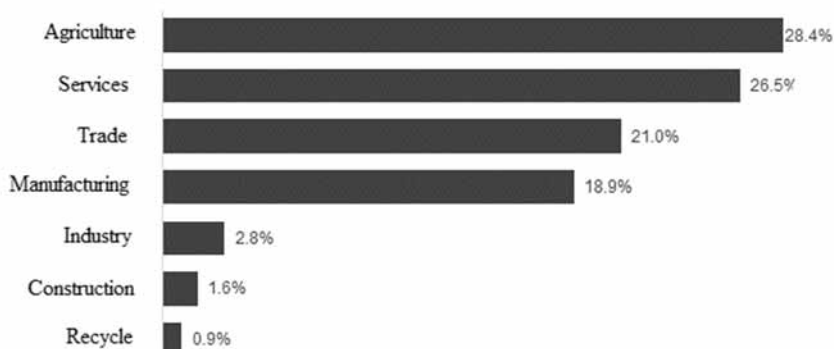
Figure 3. Respondents' level of education



Source: compiled by the authors based on the study results.

The broad coverage of state support in terms of training and financing has helped to diversify the country's economy. The “Bastau” programme was aimed to reduce the unemployment rate mainly in rural areas. Graduates of the training programme had the opportunity to engage in various types of business. The distribution of the areas of activity of the “Bastau” training programme students is demonstrated in Figure 4.

Figure 4. Distribution of students' areas of activity



Source: compiled by the authors from the study results.

Hence, agriculture and the service sector account for more than half of the types of business chosen by the trainees of the educational project. This high share of agriculture is due to the educational programme's focus mainly on the country's rural population, with the purpose of creating a quality business environment in rural areas.

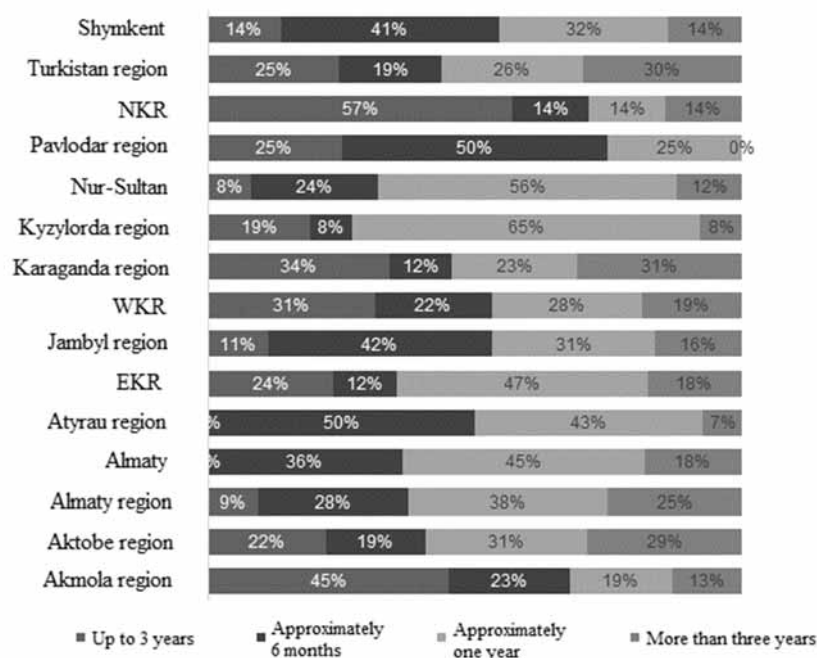
Practical training within the framework of participants' acquisition of business skills is implemented through the step-by-step development of the project trainees' business ideas under the guidance of experienced business mentors. As the agricultural sector is a priority among the “Bastau-Business” programme trainees, special attention should be paid to the practical learning outcomes of the implementation of the business projects developed by the trainees aimed at doing business in the agricultural sector.

The formation of an effective business environment in rural areas implies, above all, the creation of the necessary conditions for entrepreneurial activity in rural areas. In this context, it is necessary to adopt a set of legislative measures aimed at:

- improvement of the existing legal and regulatory framework regulating the main aspects of entrepreneurship development in rural areas;
- improving the taxation system for business entities employed in agricultural activities;
- formation of comprehensive support for business development in the agricultural sector at the state level.

In today's society, amid mobile change, businesses, regardless of their age, carry risks and opportunities to the same extent. Experienced businesses dominate in the manufacturing sector, in terms of capacity, production volume, and product recognition. The age of businesses by region is presented in Figure 5.

Figure 5. The age of businesses by regions

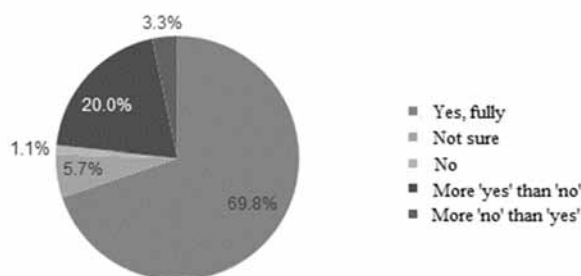


Source: compiled by the authors based on the study results.

Thus, the market conjecture changes on a daily basis, which could also change consumer taste, which could lead to the transfer of the production line. In the service sector, there is a situation of change amid the global trends in a short period. Trading as a traditional business carries minimal fluctuations in the business environment. It is important to note the fact that whatever the business, its development is directly dependent on the entrepreneurial behaviour of its owner.

Respondents were asked about their satisfaction with their choice, the answers to which are shown in Figure 6. About 4.4% of current entrepreneurs are not satisfied with their choice of business activity.

Figure 6. Satisfaction with entrepreneurship choice



Source: compiled by the authors based on study results.

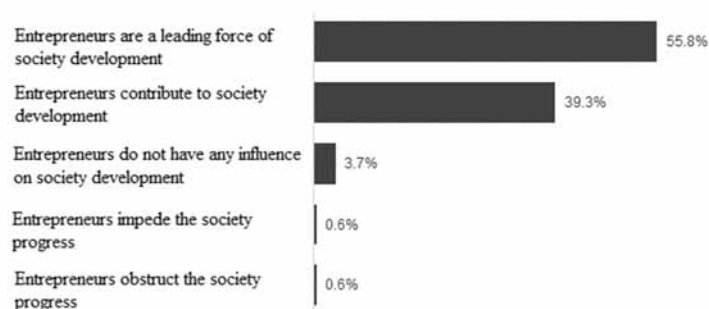
When assessing the level of satisfaction, a correlation between the regional gross product and business development in the region is noticed. If the average indicator is 70%, in the regional context it has a maximum value of 93% – Atyrau region, and a minimum value of 48% – Kyzylorda region. The remaining regions are distributed between these two regions' indicators, but more than 10 regions show a level of satisfaction of more than 70%. Based on the processed data, the overall potential for business development is high. Entrepreneurship is an initiative independent activity of people aimed at generating profit or some personal income, carried out in their own name, on their own responsibility. Therefore, the importance of being in this environment of self-employment plays a great role in the further development of own business and personal characteristics.

At the same time, it can be said that society and its specific strata are also enriched through entrepreneurial activity. In the case of consumers, they have access to new goods and services and can choose between a better or a cheaper product, depending on their income and expenses. Not everyone is ready for entrepreneurial activity, as it requires creative thinking, initiative, a propensity for innovation and non-standard methods of solving problems, the ability to engage in new activities, and a constant willingness to take risks and face uncertainty (Shcherban et al., 2022). Entrepreneurship also plays an important role in the economy of a country. It influences the presence or absence of competition and covers a large area of life. Competition enriches a country, creates new technologies, and develops sectors of the economy. A country with well-developed businesses can play a role in production and

marketing, thus increasing the income of the country and its status in the world market (Abudaqa et al., 2019).

In order to determine the role of entrepreneurship in Kazakhstani society, graduates of the Programme were asked questions in a sociological survey with five levels measuring answers. The results of the survey are presented in Figure 7.

Figure 7. The role of entrepreneurship in Kazakh society



Source: compiled by the authors based on the study results.

On average, the role of entrepreneurship in Kazakh society is assessed positively, i.e. residents of Kazakhstan are attracted to entrepreneurial activity. In Kazakhstan, more than half of the residents of the business environment believe that being an entrepreneur means contributing to the development of society and the economy.

Entrepreneurship development programmes are already being developed and actively implemented at the state level in the Republic of Kazakhstan, aimed at developing the necessary competencies to conduct entrepreneurial activities. In particular, Government Decree No. 968 of 24.12.2019 approved the “State Programme for Business Support and Development “Business Road Map 2025”. The implementation of the programme is designed for the period from 2020 to 2024, and its main tasks are:

1. Improving the conditions for financial support to small businesses.
2. Increase in production volumes in the manufacturing sector.
3. Creation of competitive industries.
4. Developing entrepreneurial competencies.
5. Establishing new business relationships.
6. Ensuring business development in an informative and analytical context.

In addition, there are several key areas of the programme to develop entrepreneurial competence:

- business support in rural areas and small towns;
- support for entrepreneurial activity in specific branches;

- reducing the currency risks of business activities;
- providing non-financial support in starting and running a business.

The state programme is implemented through financial and non-financial support from several foundations, holdings, and lending institutions, which act as operators of the programme. As part of participation in this programme, entrepreneurs have access to free training in various business areas, with the possibility of gaining or improving competencies in such areas as:

- the construction of a business plan and its consistent implementation;
- assessing the risk of doing business in a particular industry;
- receiving state support for entrepreneurial activities;
- recruitment and personnel management;
- promoting the business;
- keeping records and filing tax returns.

3.2. Prospects for graduates in entrepreneurship

Specific activities help build competencies identified as key for entrepreneurial success (Lackéus, 2020). For instance, completing a full business plan develops planning competencies. Roleplaying customer interactions in a retail context builds interpersonal competencies. Troubleshooting case studies impart problem-solving abilities. Receiving ongoing mentor guidance on launching a venture provides concrete experience leading to experiential competencies.

It is important to pay attention to basic investment skills for entrepreneurs. The starting point for building investment competence is the ability to carefully evaluate potential investment opportunities. This requires the development of critical business analysis skills to research markets, assess trends, conduct competitive analyses and identify factors that may affect the profitability of an investment over its lifetime. Budding investors should be able to identify promising opportunities in line with strategic priorities and demonstrate their viability using numerical forecasts and models. Training methodologies that involve interactive case studies of forecasting returns on various investments can sharpen analysis skills.

After identifying attractive ventures, investor-entrepreneurs must determine how to optimise the selection and allocation of investment projects to balance returns and risk. Key skills include quantifying inherent risk factors, understanding when to use aggressive high-yield opportunities and when to use stable assets to offset potential downturns and volatility. Using portfolios to manage investors' risk appetite and strategic objectives requires mathematical knowledge and risk modelling skills. Portfolio modelling exercises that demonstrate diversification strategies in practice allow you to develop these skills.

In addition to selecting investments, entrepreneurs must be adept at negotiating the terms of the deals themselves. Critical skills here include financial structuring, valuation strategies,

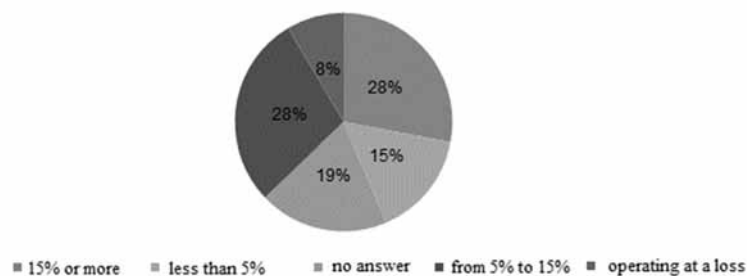
dividing ownership stakes, establishing control points and creating favourable arrangements even when assigning an interest in a venture. Training in deal-making through role-playing IPO negotiation, venture capital offers and joint ventures helps to practise this delicate skill. Finally, even the skills of selecting and structuring profitable investments must be complemented by the competencies of active investment management. This requires the ability to track performance benchmarks, identify underperformance, and determine where to double down and where to cut losses and redirect capital. Entrepreneurs can be trained to pivot through the interactive display of dynamic investment management dashboards.

According to a survey of “Bastau Business” graduates, 73% of respondents invest profits in further business development. At the same time, the share of profits in investment is not significant. Hence, only a third of graduates invest more than 15% of profits in business, i.e. the remaining 43% of graduates invest less than 15 profits, which is a rather low level of investment. This can lead to business stagnation in terms of further development. For example, given that the programme is mainly focused on rural areas where property prices are lower and less liquid compared to urban areas (cities of national importance or regional centres), the loan received will also be lower.

An average “Bastau Business” trainee is estimated to receive a loan of up to 3 million tenge. Given the average level of profitability of an estimated 30% of the investment, i.e. the size of the loan, the estimated business profit on a loan of 3 million tenge would be 900 thousand tenge per year. Therefore, if a graduate invests less than 15% of his/her profits in his/her business, the amount of investment per year would be less than 135 thousand tenge or less than 5% of his/her annual expenses. Thus, there is a risk that almost half of the graduates may face stagnation of their business, i.e. further development, and in case of business shocks (livestock mortality, market decline due to relocation, etc.) may go bankrupt altogether. It is important to invest a larger share of the profits in further business development, as a start-up business with state support will only allow the business to start at a rather low profitability level due to the low volume of the loan (Shahini et al., 2023).

At the same time, given that 8% of respondents indicated that they are already operating at a loss, taking steps to support the further development of “Bastau Business” graduates' businesses becomes relevant. The share of profits invested in the business is demonstrated in Figure 8.

Figure 8. Share of profits invested in business development



Source: compiled by the authors based on the study results.

It is noteworthy that the situation with investment in business development differs significantly across regions, which may be due to the mentality of the population or the different approaches to the training of the business coaching teams in the regions. For example, in Turkestan, West Kazakhstan, Almaty, Aktobe regions, and in Nur-Sultan city, almost every third graduate sets aside more than 15% of his/her profit for further business development.

The situation is much worse in the East and North Kazakhstan regions, where almost every fourth graduate is working at a loss. Special monitoring and a more in-depth analysis of problems are needed in these regions. A rather low level, less than 5%, of the share of profits is invested for business development in Atyrau, Kyzylorda region and the city of Almaty (Table 1).

Table 1. Share of profits invested in business development by region (%)

	15% or more	less than 5%	no answer	from 5% to 15%	operating at a loss
Akmola region	29	10	29	23	10
Aktobe region	34	12	17	29	7
Almaty region	35	19	19	19	6
Almaty	18	36	9	18	18
Atyrau region	21	43	21	0	14
EKR	12	12	12	41	24
Jambyl oblast	27	13	19	37	3
WKR	34	19	9	28	9
Karaganda region	26	15	25	22	13
Kyzylorda region	19	35	4	38	4
Astana	35	19	23	19	4
Pavlodar region	4	4	52	26	13
NKR	14	0	43	14	29
Turkestan region	39	9	11	39	4
Shymkent	24	19	19	29	10

Source: compiled by the authors based on the study results.

The reasons for people to participate in the “Bastau Business” programme may be financial problems, the programme's widespread among the population, or a real desire to run their own business. The survey showed that almost one in four of those who had to participate in the programme because of financial or other problems are now operating at a loss. However, a third of these participants invest more than 15% of their profits in the development of their business.

At the same time, a fairly low level of those operating at a loss is observed among graduates who took part in the “Bastau Business” programme when they received a partnership offer (i.e. had specific marketing) or who deliberately wanted (purposefully) to run their own business. This indicates that citizens who consciously wish to have their own businesses build a better business policy and become more successful compared to those who feel a high level of material need or who became participants in the programme accidentally. The second group of citizens does not run their businesses with medium- and long-term business development in mind, spending the profits on personal needs (Table 2).

Table 2. Share of profits invested in business development, taking into account how the graduate became an entrepreneur (%)

	15% or more	less than 5%	no answer	from 5% to 15%	working at a loss
Forced to do so because of material or other problems	32	5	20	20	23
Received an offer of partnership	25	31	6	31	6
Accidentally, under the influence of circumstances (influenced by family, etc.)	15	19	15	38	15
I wanted to have my own business	29	16	20	28	7

Source: compiled by the authors based on the study results.

As for graduates' plans for business expansion, there is a positive trend. For example, about 66% of respondents say they plan to expand their business. At the same time, one in five say that they do not plan to expand their business, and 4% say they will downsize. Thus, almost one in four graduates has no plans to expand their business. In this regard, it is necessary to introduce short-, medium- and long-term lectures on doing business into the training modules for “Bastau Business” programme participants. This in turn will help graduates to build and maintain a step-by-step business development strategy.

The state of graduates' psychological state of mind regarding satisfaction with the chosen type of business also has a noticeable effect on the value of the share of profits they are willing to invest in business development. For example, graduates who indicated that they are completely satisfied and rather yes, compared to other graduates, save more for business investment from the profits received. At the same time, one in three graduates who indicated that they were not satisfied with their choice of niche operated at a loss. These processes occur, because not being satisfied with running their business for one reason or another, the entrepreneur ends up not planning to develop it further at all and invest in it accordingly.

The "Bastau Business" program appears to utilize a comprehensive entrepreneurship curriculum spanning critical competencies needed for new venture success. The breadth of topics covered across modules suggests thoughtful design aimed at building well-rounded competencies. Specifically, the training program includes dedicated modules focused on business planning, financial management, marketing, interpersonal communication, negotiation, and problem-solving abilities. Walking entrepreneurs through this diverse range of entrepreneurial activities indicates intentional curriculum planning by the program developers.

Additionally, the highly practical, hands-on nature of the instructional methodologies is a strong suit of the Bastau Business educational experience. Relying heavily on experiential learning via real-world simulations, case study analyses, mentor guidance, and learn-by-doing project development is an impactful way to impart entrepreneurial skills. These approaches align with pedagogical best practices that promote active skill-building through applied challenges. The positive self-assessments from graduates regarding improved competence levels validate that these interactive activities were beneficial in unlocking their entrepreneurial potential.

However, the study data also reveals some gaps in the program materials when it comes to adequately promoting longer-term strategic thinking. The finding that 25-45% of graduates struggle with appropriately reinvesting profits and planning business growth trajectories indicates a need for better integration of modules focused on scaling existing operations. While opportunity spotting and initial planning seem well-addressed, materials could be strengthened to stress future-oriented decision-making equal to early-stage considerations.

The Bastau Business teaching methodologies leverage proven approaches like project-based learning via mentorship for impactful entrepreneurial education. And the breadth of critical competencies covered is commendable. As the program continues to mature to address the growth limitations noted by researchers, the instruction is sure to produce even more well-rounded, business-ready graduates through its fundamentally sound experiential approach. Maintaining relevance through continuous improvement while retaining core interactive activities should be the twin priorities moving forward.

4. Discussion

In a developed society, the share of small and medium businesses (hereinafter referred to as SMB) in the structure of the gross domestic product (GDP) is quite high. The study shows that there is a high degree of sympathy for entrepreneurship in society. M. Lackeus (2020) in his study also notes the positive attitude of society towards entrepreneurship. Satisfaction with work is an integrative indicator reflecting well-being or dysfunction in the workforce. This indicator contains assessments of interest in the work performed, satisfaction with relationship with colleagues, management, and the level of aspirations for professional activity. International experience shows that for high school students, it is advisable to introduce the basics of economics through a practice-oriented approach, case studies, and other methods that are used in the study of entrepreneurship in general (Bocheliuk et al., 2022). These results are confirmed by the research of foreign scientists, namely C. Jones, K. Penaluna and A. Penaluna (2019).

The subject “Basics of Entrepreneurship and Business” provides for the acquisition of regular knowledge of the basics of entrepreneurship, economics, management, marketing, and the development of entrepreneurial thinking, an active lifestyle, and the skills needed to organise further independent activities in the modern market environment. “Bastau Business” programme participants should involve their own children in their business in order to effectively pass on the business as a legacy. Children's interest in their parents' businesses contradicts the findings of S. Bridge (2017). One of the important factors of successful business development is the sales market, which in turn depends on the potential of consumers as well as the existence of competition. In this study, “Bastau Business” graduates were asked about the existence of competition in the market. It is worth noting that competition is quite a significant factor that can negatively affect the development of any business, especially start-ups with small budgets. This position of respondents contradicts the data given in the study by H. Advance (2019).

The survey demonstrated a high level of uniqueness of “Bastau Business” projects in the areas. For example, according to the graduates' survey, 12% said that there was no

competition in their chosen niche. Thus, it can be concluded that one in ten projects is unique in its way. In general, this is due to the fact that the majority of projects are located in rural areas where small businesses are poorly developed, especially in the service sector (Shahini et al., 2022). This situation is due to the small market (small number of inhabitants in the villages) and the lack of capital to start a business. Many inhabitants of villages travel to a district or regional centres to purchase goods and obtain necessary services (Almujaini et al., 2021). Unique types of business for rural areas include hairdressing salons, dry cleaners, saunas, household chemicals, treatment rooms, and breeding of traditional pets (rabbits, turkeys, etc.). In addition, most of the above-mentioned types of business projects can have significant competition in big cities. Such data contradict the research of foreign scientists, in particular G. Azanza et al. (2017).

Effectiveness was evaluated by mapping modules and activities to targeted entrepreneurial competencies and surveying graduates on their perceived gains across these competencies. For instance, 79% indicated that the business planning module enhanced their skills in opportunity recognition and risk assessment. This data suggests that the training curriculum is adeptly designed to cultivate a variety of pertinent competencies through practical, hands-on learning. Additionally, a correlation between self-reported competency gains and entrepreneurial outcomes such as starting a business revealed a significant positive impact (Sorokin et al., 2022). This finding underscores that heightened perceived competencies correspond with increased entrepreneurial activity post-program completion.

Businesses were segmented based on their operational age into startups (less than 1 year), emerging ventures (1-3 years), and mature businesses (beyond 3 years), drawing from established growth stage frameworks (John et al., 2023). Challenges differ across these categories, particularly for nascent ventures grappling with processes and market positioning, which implies that the business owner's competencies play a pivotal role during these stages (Grimes, Millea, 2011).

Profit reinvestment categories were delineated through a Delphi method, involving consultation with 10 seasoned microfinance professionals in Kazakhstan. The threshold for low reinvestment was set at less than 15%, influenced by standard profit margins observed in microenterprises and the minimum reinvestment recommendations sourced from our expert panel.

A matrix cross-referencing business motivation against specific training modules completed was created based on in-depth interviews with a representative subset of 100 participants. Patterns emerged from this analysis: participants driven by financial needs predominantly completed the accounting module, whereas those motivated by business opportunities were inclined towards the marketing module (Zahra, Welter, 2008).

At the same time, according to the survey, more than 60% of the respondents note a high level of competition, which may subsequently become a significant psychological barrier to the development of their business. In this regard, the programme concept implies that the main emphasis on the selection of business projects will be aimed at the fact that they should be quite unique and not have a high level of competition. For this purpose, the programme operator, together with the local executive body, needs to conduct an ongoing market analysis and identify niche projects. Worth mentioning, that “Bastau Business” graduates can also be

attracted to existing local business projects. For example, to have a graduate of the programme produce raw materials for a nearby manufacturing facility or provide services to a larger business. This will ensure a steady market for the product.

Concurrent data from 100 participants who were business proprietors prior to the Bastau program highlighted marginal competency enhancement. A mere 22% acknowledged proficiency augmentation in recognizing opportunities, contrasting sharply with 69% of post-training entrepreneurs. Such stark differences bolster the assertion that it is predominantly the Bastau training, rather than inherent participant qualities, that facilitated competency augmentation and entrepreneurship among the majority of the graduates.

Regarding market analysis, the study revealed that 7% of graduates are not aware of the existence of competition in their niche, which is not acceptable for a successful business manager. Therefore, strengthening market analysis as part of the training modules for the programme participants is necessary. Regarding the impact of the entrepreneurial age, there is also a positive correlation in terms of business expansion. The older the business, the higher the share of those who plan to expand and the lower the share of those who plan to downsize. Such a trend is also mentioned in the study by A. Penaluna and K. Penaluna (2021).

As the discussion indicates, nearly one-third of Bastau Business graduates reported difficulties with market oversaturation and high competition. This aligns with thesis 1, suggesting that competency building alone is insufficient if competitive barriers pose significant hurdles to new venture success. Broader interventions may be needed to facilitate market entry and growth for aspiring entrepreneurs, such as access to finance to enable differentiation and policies to ease competitive pressures (Lagotyuk, 2023). Additionally, incorporating content on analyzing industry dynamics into training programs could better equip individuals to navigate competitive landscapes.

Although graduates invest marginally more in the trade sector than in other sectors, their business expansion opportunities are lower than in other sectors. Overall, there are no significant differences in terms of business expansion plans by industry. However, manufacturing, agriculture, and construction have the highest proportion of business expansion as compared to other sectors. This structure of business prospects contradicts the findings of L. V. Lapidus (2018).

It is worth noting that graduates have a fairly correct approach to measures to outperform their competitors. Thus, the majority of respondents note that in order to increase competitiveness in the market it is necessary to improve the quality of goods produced and services provided. At the same time, graduates argue that price reduction and marketing tools can also be effective. Support for graduates of the programme in the future can be taken up by branches of the district chambers of entrepreneurs with the involvement of the regional chamber of entrepreneurs by engaging experts (larger entrepreneurs in the region) and borrowing their experience of effective work. The relevance of sales market issues and availability of competition for “Bastau Business” graduates is confirmed by the results of the survey when asked about the main difficulties in doing business. Almost one in three mentions the problem of oversaturation of the market and high competition. At the same time, graduates mention the problem of high-interest rates on loans. This problem is not relevant, as a loan under the “Bastau Business” programme is issued at a low-interest rate of

about 6% per annum. Given that the question was asked about the difficulties of doing business in the country, it is likely that graduates answered for all entrepreneurs in general.

5. Conclusions

The study concluded that the "Bastau Business" training programme has proven effective in developing professional entrepreneurial competencies among citizens of Kazakhstan. The programme not only contributes to building new skills necessary for business operations, but also aims to improve the overall entrepreneurial environment. The research demonstrated that the acquisition of core entrepreneurial competencies requires abilities like gathering and critically analyzing information, finding compromises, conducting business negotiations, continuous learning, and adapting to changing business conditions. The "Bastau Business" curriculum facilitates the development of these key competencies.

When defining the components of entrepreneurial competence, it is important to consider the specific entrepreneurial activities and niches. The study showed that modern information technologies can be useful tools in developing entrepreneurial skills for diverse populations in the "Bastau Business" programme. Using IT can serve the dual purpose of improving both technology competencies and the latest approaches for organizing and running businesses. Therefore, the "Bastau Business" programme has the potential to become an effective mechanism for enhancing professional entrepreneurial competencies among citizens. While graduates are currently competent in selecting a business niche and drafting plans, the focus can shift to building profitable investment abilities as the next stage of advancing entrepreneurship education. The programme may also benefit from ongoing monitoring and improving the quality of training materials to address the evolving needs of participants. The practical significance of the study lies in the fact that the systematised theoretical ideas and generalised practical experience of forming entrepreneurial competence can be creatively used in the process of forming this competence among students of higher educational institutions.

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MODELLING THE IMPACT OF MACROECONOMIC FACTORS ON COUNTRY'S FINANCIAL STABILITY: EVIDENCE FROM THE RUSSIAN FEDERATION⁵

Promoting financial stability is one of the main priorities for the governments of countries seeking to achieve sustainable economic growth. The article aims to assess and model the impact of macroeconomic factors on the financial stability of the Russian Federation in the period 2010-2030 using ADF, OLS, VAR, ARCH, VECM and other techniques. In addition, the linear causal relationship between a group of 6 macroeconomic indicators and the financial stability of the Russian Federation was studied. The results of this research show that Russia's financial stability depends mainly on exports of crude oil and natural gas, price stability, volume of government debt, deficits and surpluses of the state's budget, exchange rate stabilization of national currency, and effectiveness of the banking system. Additionally, events taking place in Eastern Europe, the Middle East and the African continent may negatively affect Russia's financial security if it fails to take the necessary preventive measures.

Keywords: Macroeconomic modelling; financial stability; inflation rate; government budget balance; Balance of Payment; government debt; Russian Federation

JEL: C32; G01; G21; G28

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1. Introduction

Achieving and promoting financial stability is one of the main priorities for the governments of countries seeking to achieve sustainable economic development (Ozili, Iorember, 2023; Barra, Zotti, 2022) and one of the key factors affecting the functioning of a country's financial system (Shkolnyk, Kozmenko, Kozmenko, Orlov, Shukairi, 2021). Financial stability is dependent on a financial system that can provide financing for production operations, the import of goods and services, risk management and insurance, management of savings, and borrowing of funds. Financial instability will normally, in one way or another, lead to the destruction of the country's production processes, increased indebtedness, inability to pay debts as they become due, and inability to access productivity assets from external sources.

Maintaining financial stability in conditions of economic unrest is an important function of the state (Kondrat, 2011). The goal of financial stability is closely related to its definition: the ability of state institutions to provide financing for domestic and foreign economic activities while maintaining a limited level of inflation and an acceptable level of debt. Adoption of a macroprudential policy, which involves partial prudential supervision, helps to establish the first line of defence against the accumulation of financial imbalances (European Central Bank, 2023) that threaten financial stability.

Financial stability insurance for the economy of the Russian Federation depends mainly on exports of crude oil and natural gas (World Bank, 2015). According to BP (British Petroleum Company, 2021), the oil reserves of the Russian Federation in 2020 amounted to 107.8 billion barrels of oil, or approximately 14.8 % of the world's crude oil reserves. Russia ranked 6th in the world in terms of oil reserves. According to OPEC Russia's natural gas reserves amounted to 187 trillion cubic meters, and the Russian Federation ranked 1st in the world (OPEC, 2013). Since 2003, Russia has become less dependent on exports of natural resources, and despite the rise in global energy, oil and gas prices, these only account for 3.7% of Russia's GDP.

In 2014, the Russian financial system faced the risk of a decline in the real value of Russian exports as a result of the drop in global oil prices, and accordingly to ensure financial stability and stabilize the exchange rate a number of policies were adopted. For example, the Ministry of Finance sold foreign exchange in the amount of US\$1.5 billion, and the CBR introduced 28- and 365-day foreign currency loans to 11 banks with capital of over RUB100 billion etc. (World Bank, 2022).

The instability of global energy supplies, as a result of their vulnerability to factors such as the conflict in the Middle East, the global financial crisis, the Ukrainian crisis, and the emergence of renewable energy alternatives, may constitute a major threat to the financial stability of oil-exporting countries, including the Russian Federation. In government policy terms, the primary goal of financial stability is to maintain financial soundness and, ensure the stable financing of the government's domestic and foreign economic activities while keeping inflation and debt sustainable through a combination of tools and policies.

The researchers I. A. Sergeeva and A. Yu. Sergeev (2016) showed that the main problems facing Russian financial stability relate to the depreciation of the national currency, rising

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inflation, Western economic sanctions, capital outflow from Russia and the shadow economy (Fedotov, 2021), and the introduction of the digital ruble in business relations between individuals and companies (Norets, 2022).

To minimize the risk of financial instability, particularly the types of economic stability that determine the integral development of the socio-economic space of Russia, it is necessary to protect the interests of the country (Gadzhiev, Kiseleva, Skripkina, Konovalenko, Trofimov, 2022). Given the great importance of financial stability in the Russian economy, we seek in this research to model the main factors affecting the Russian financial stability index. The level of financial stability is determined by a complex group of relative macroeconomic indicators, including the ratio of public debt to GDP, the inflation rate, the ratio of the state budget to GDP, return on bank assets, the ratio of balance of payments to GDP, and U.S. Dollar to Russian ruble exchange rate.

2. Theoretical Background

The main purpose of macroeconomic modelling is to study the causal relationship between variables that affect the resulting indicator, i.e. financial stability, in the short or long term. J. Tinbergen (1939) was the first to apply mathematical models in this area. Since then, to meet the growing demand for modelling processes in order to assess financial stability, a large number of macroeconomic mathematical models have been developed.

According to T. Vasylieva, O. Jurgilewicz, S. Poliakh, M. Tvaronavičienė and P. Hydzik (2020), a methodology based mainly on calculating a weighted average of the country's overall compliance with key international standards, rules and principles in a given segment can be used to determine the country's quality management index for a financial or any other market (Yossifov, Das, Sundararajan, 2003). This methodology allowed the researchers to create benchmarks for comparing different countries, by determining the financial position of each country.

In the view of V. Robertas and A. Vasiliauskaitė (2022) financial stability can be considered from a variety of perspectives, their research proposes that microeconomic and macroeconomic indicators should be taken into account when assessing financial stability. The results of this research make it possible to identify the regulatory measures that would most effectively contribute to ensuring financial stability in individual OECD countries.

The question of how to model the impact of macroeconomic factors on financial stability has attracted the attention of many researchers and other experts interested in the field of economic mathematical modelling, and this in turn has led to the use of many different modelling methods. Among the most important contemporary methods used in mathematical modeling are: SOFSM, VAR, ECM and GMM.

In their research, P. Sarlin and T.A. Peltonen (2013) used a Self-Organizing Financial Stability Map (SOFSM) to create a two-dimensional representation of a multidimensional financial stability space, which allows individual factors impacting systemic risks to be separated from each other. They tested the robustness of the model by varying the thresholds, the policymaker's preferences, and the forecasting horizons.

In order to investigate the causal relationship between economic performance and financial stability in the European Union, J. Creel, P. Hubert and F. Labondance (2015) used the seminal framework of Beck and Levine (2004) and a GMM panel with instrumental variables, and concluded that financial instability has a negative effect on economic growth.

To study the causal relationship between financial stability and US monetary policy before and during the Great Recession, A. Wischnewsky, D. Jansen and M. Neuenkirch (2021) used text-mining techniques based on Taylor's rule models. They concluded that perceptions of negative financial stability coincided with situations in which monetary policy was adjusted by an amount greater than that indicated by the standard Taylor rule factors.

A model developed by H. Mabkhot and H.A.H. Al-Wesabi (2022) used panel cointegration analysis, which depends mainly on the stability of time series variables of the same order in order to reveal the impact of macroeconomic factors (gross domestic product, inflation, exchange rate, oil sector revenues and other factors) on financial stability in the Gulf Cooperation Council countries to reveal economic and financial imbalances in those countries.

In order to determine the level of access and efficiency of Ukraine's financial system in the period 2007-2019, based on 29 financial indicators, I. Shkolnyk, S. Kozmenko, O. Kozmenko, V. Orlov, and F. Shukairi (2021) used a matrix of characteristics relating to the stability of the financial system, which was created by experts from the IMF. To determine the integrated indicator that characterizes the state of financial stability, the authors used Harrington's desirability function. This methodology allowed them to conclude that the stability of the financial system in Ukraine in the period 2007-2019 was acceptable.

In research conducted by I. Kozlovteva, A. Ponomarenko, A. Sinyakov and S. Tatarintsev (2019), the authors studied the relationship between a commodity-export economy, commodity price volatility and fiscal policy and the latter's impact on financial instability using panel structural VARs and local projection models. They concluded that a commodity-exporting economy should have a countercyclical fiscal policy in order for inflation targeting to become countercyclical in a commodity cycle. To apply this to the specific case of the Russian economy, we note that it is considered an oil-exporting economy. Therefore, it should be noted that in the event of sharp fluctuations in international oil prices, adverse measures must be taken to reduce the effects of inflation and thus neutralize the risks to the financial stability of the state.

In a study by T.T.K. Oanh, L.T.T. Van, and L.Q., Dinh (2023) using the PVAR method, the causal relationship between financial inclusion, monetary policy, and financial stability was studied in 58 countries, including, high and low development financial countries. Using this method, the researchers concluded that in high-financial development countries, financial inclusion negatively affects the rate of inflation and the volume of the money supply while affecting financial stability. In developed countries with low financial resources, it was observed that financial inclusion positively affects financial stability and reduces inflation. In the same way, by applying the panel vector autoregressive (PVAR) methodology, simple panel data models, and the generalized least squares model, J. Jungo, M. Madaleno and A. Botelho (2022) were able to model the causal relationship between financial inclusion and monetary policy, and the ways in which they affect financial stability and inflation control in

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countries in sub-Saharan Africa and Latin America and the Caribbean. Using threshold vector autoregression methodology. This methodology was used by T. T. V. Tran (2022) to derive an explanatory model of the impact of financial stability or its absence on the economic activities of Asian countries. Based on this model, an early warning technique was developed, extracted from the financial stress index, in order to reduce financial instability and its impact on the country's economic activities.

Using the Nonlinear Autoregressive Distributed (NARDL) model in order to determine the relationship between monetary policy and financial stability in the Gulf Cooperation Council countries, A. H. Elsayed, A. N. Naifar, and S. Nasreen (2023) concluded that monetary authorities react significantly to negative or positive shocks to financial stability, both in the short and long terms.

One of the common methods used to model macroeconomic financial stability indicators, which has been applied in many modern studies, is the error correction model (ECM), which aims to avoid spurious regression resulting from the presence of cointegration between the series. Some of the most notable modern studies that applied this model are described below.

Using the ECM, A. Hudaya and F. Firmansyah (2023) were able to assess the positive impact of interest rates on financial stability in Indonesia by the growth relationship 1 to 4 respectively, this means a 1% increase in interest rates increased financial stability by 4%.

The ECM was also used by O.F. Chukwudi & J.T. Henry (2019) to study the causal relationship between monetary policy and financial stability in Nigeria. This method enabled the researchers to identify a significant balanced relationship between monetary policy and financial stability, which is able to adapt to imbalances adapt in the long term to imbalances.

T. M. Hlongwane, & J. P. S. Sheefeni, (2022) used a vector ECM to determine the causal relationship between shocks in the South African macroeconomic stability and stability. This methodology revealed the impact of economic activity and inflation-related shocks on financial stability in South Africa in the short and long term. The same methodology was used by M. R. Magwedere & G. Marozva (2023) to measure the causal relationship between household debt, income inequality and financial stability in South Africa. Using this method, the researchers were able to measure the negative effects of increased household indebtedness on the financial stability of the country. To measure the impact of gold prices on financial stability in India, the ECM was also applied by R.N. Mishra, & G. J. Mohan (2012).

K. Shehzad, L. Xiaoxing, F. Bilgili and E. Koçak (2021) applied an ARDL-based ECM to assess the impact of the economic and health crisis caused by COVID-19 on financial stability in the United States, Their study concluded that the long-term financial imbalance caused by the pandemic-related economic and health crises contributed to financial instability in the United States.

An analysis of previous studies reveals a wide range of methods that can be used to model the impact of macroeconomic factors that affect the stability of the financial system. One of the most effective methods of these is the multiple ECM. This method has been used by many contemporary researchers, including A. I. Anwar, N.R. Kurniaty, S. Wulandari, R. Fitrianti (2020) and M. R. Ridha (2020).

We can therefore conclude that the ECM is one of the most important methods to eliminate the problem of spurious regression as a result of cointegration in time series and to find ways to resolve this problem in time series analysis, as effectively applied in many contemporary studies (R. F. Engle & C. W. J. Granger, 1987, C. W. J. Granger & P. Newbold, 1974). In our research, we therefore mainly rely on these studies when using the multiple ECM method.

3. Methods and Date

To measure the stability of the financial system in the Russian Federation, in our research, we rely on the main indicators used to measure the financial performance of the state in the period 2010-2022, as presented in the State Strategy for the Economic Security of the Russian Federation in 1996. These are as follows: Price stability, Volume of external and internal government debt (total debt), Deficits and surpluses of the state's general budget, stability of the banking system, stability of the national currency exchange rate, and status of the Balance of Payments:

- 1) Price stability plays an important role in maintaining the purchasing power of the national currency, which in turn contributes to improving the financial and economic security of the state and sustaining maximum employment over the medium term (Williams, 2022).
- 2) The ratio between government debt Tagkalakis, A.O. (2014). and a country's GDP determines the extent to which the state is able to pay its obligations. The lower the debt-to-GDP ratio, the better the state is able to fulfil its obligations towards domestic and international creditors. Geopolitical and economic considerations, including interest rates, war, recession, and other variables, influence a country's borrowing practices and its decision to increase debt.
- 3) Deficit/surplus in the state budget (Cuadrado-Ballesteros, Bisogno, 2022). The budget deficit is defined as the excess of total spending over total receipts (revenues), excluding loans taken out in the current year. This is the amount that the government would have to borrow to cover all its due debt. There is a direct relationship between the deficit and the amount of borrowing: the larger the budget deficit, the higher the government-borrowing rate.
- 4) One of the most important indicators determining the stability of the banking system (H.B. Ghassan, S. Fachin, 2016) is the rate of return on assets. This rate reflects how much one ruble of assets brings in net profit or loss. If the banking system achieves an annual profit, then the banking sector is classed as efficient.
- 5) The balance of payments (Gadanecz, Jayaram, 2009) is a record of all international commercial and financial transactions carried out by the population of a country and consists of three components: the current account, the financial account, and the capital account. The balance of payments shows whether a country is saving enough money to finance its imports. It also shows whether the country has enough economic production to finance its growth.

- 6) The stability of the exchange rate (Eichengreen, 1998) of the national currency against international currencies such as the US dollar, euro, pound sterling and Japanese yen plays an important role in foreign trade and financial exchanges, thereby ensuring the country's economic and financial security. Given the importance of the US dollar in global commercial and financial exchange, in this study, we will analyze the relationship between the national currency and the US dollar.

In order to model the impact of these indicators on financial stability we used statistical methods, such as vector autoregressive models (VAR-models), analysis of cause-and-effect relationships, analysis of ARCH volatility, etc.

Returning to the practical reality of each of the previous indicators, there are several actual situations that countries can go through, as shown in Tables 1 and 2. For the purposes of measuring financial stability, we divided these situations into 15 standard categories.

Table 1. Possible levels of indicators: Inflation rate (%), gross government debt as a proportion of GDP (%); Government budget balance as a proportion of GDP (%)

Cases	Inflation rate (%)		Gross government debt as a proportion of GDP (%)		Deficits and surpluses of government budget balance as to GDP (%)	
	Level	Interpretation	Level	Interpretation	Level	Interpretation
15	[0;1]	No influence	[0;1]	No influence	[11;+∞]	Very optimal
14	[2;3]	Weak	[2;4]	Weak	[8;10]	Optimal
13	[4;5]	Noticeable	[4;6]		[5;7]	Very good
12	[6;7]	Moderate	[6;8]	Noticeable	[2;4]	Good
11	[8;9]	High	[8;10]		[1.5;1.99]	Very stable
10	[10;11]	Very high	[11;12]	Moderate	[1;1.49]	Sustainable
9	[12;13]	Strong	[13;15]	High	[0.5;0.99]	Quite a balance
8	[14;15]	Very strong	[16;20]	Very high	[0;0.49]	Equilibrium
7	[16;17]	Serious	[21;30]	Strong	[-0.1;-0.99]	Weak
6	[18;25]	very serious	[31;50]	Very strong	[-1;-2]	Very weak
5	[25;50]	extremely serious	[51;75]	Serious	[-3;-5]	Noticeable scarce
4	[51;100]	Destructive	[76;125]	Very serious	[-6;-10]	Moderate deficit
3	[101;500]	Highly destructive	[126;175]	Beginning of financial collapse.	[-11;-15]	High deficit
2	[501;1000]	Very highly destructive	[176;300]	Threat of loss of state sovereignty	[-16;-25]	Unstable
1	[1001;+∞]	Devastating	[301;+∞]	High threat of loss of state sovereignty	[-26;-∞]	Very unstable

Source: Prepared by the authors.

Table 2. Possible levels of indicators: ROI (%), Deficits /surpluses in BOP as a proportion of GDP (%), Growth of RUB to USD rate (%)

Case	ROI (%)		Deficits /surpluses in BOP as a proportion of GDP (%)		Growth of RUB to USD rate (%)	
	Level %	Interpretation	Level %	Interpretation	Level	Interpretation
15	[11;+∞]	Optimal	[11;+∞]	Optimal	[-26;-∞]	Optimal
14	[8;10]	Extremely good	[8;10]	Extremely good	[-20;-25]	Extremely good
13	[5;7]	Very good	[5;7]	Very good	[-14;-20]	Very good
12	[2;4]	Good	[2;4]	Good	[-8;-13]	Good
11	[1.5;1.99]	Very stable	[1.5;1.99]	Very stable	[-4;-7]	Very stable
10	[1;1.49]	Sustainable	[1;1.49]	Sustainable	[-1;-3]	Sustainable
9	[0.5;0.99]	Quite balanced	[0.5;0.99]	Quite balanced	[-0.01;-0.99]	Quite balanced
8	[0;0.49]	Effective	[0;0.49]	Equilibrium	[0;0.49]	Equilibrium
7	[-0.01;-0.99]	Inefficient	[-0.01;-0.99]	Weak	[0.5;0.99]	Weak
6	[-1;-2]	Noticeably ineffective	[-1;-2]	Very weak	[1;2]	Very weak
5	[-3;-5]	Moderately ineffective	[-3;-5]	Noticeable scarce	[3;4]	Noticeable scarce
4	[-6;-10]	Highly inefficient	[-6;-10]	Moderate deficit	[5;8]	Moderate deficit
3	[-11;-15]	Extremely inefficient	[-11;-15]	High deficit	[9;15]	High deficit
2	[-16;-25]	Position close to bankruptcy	[-16;-25]	Unstable	[16;25]	Unstable
1	[-26;-∞]	Position very close to bankruptcy	[-26;-∞]	Very unstable	[26;+∞]	Very unstable

Source: Prepared by the authors.

In Table 2, level No. 15 is the best performance score and level No. 1 is the worst

The formulae used to determine the score for each performance indicator are as follows:

$$WINF_R = \left(\frac{INF_R}{INF_R_{max}}\right)^2 \quad (1)$$

$$WGD_GDP = \left(\frac{GD_GDP}{GD_GDP_{max}}\right)^2 \quad (2)$$

$$WGB_GDP = \left(\frac{GB_GDP}{GB_GDP_{max}}\right)^2 \quad (3)$$

$$WG_ROI = \left(\frac{G_ROI}{G_ROI_{max}}\right)^2 \quad (4)$$

$$WPOB_GDP = \left(\frac{POB_GDP}{POB_GDP_{max}}\right)^2 \quad (5)$$

$$WRUB_USD = \left(\frac{GRUB_USD}{GRUB_USD_{max}}\right)^2 \quad (6)$$

Where:

WINF_R: Country's weighted index for inflation rate %

WGD_GDP: Country's weighted index for general government debt as a proportion of GDP (%)

WGB_GDP: Country's weighted index deficits and surpluses as determined by the government budget balance as a proportion of GDP (%)

WG_ROI: Country's weighted index return on assets (%)

WBOP_GDP: Country's weighted index for deficits and surpluses in the balance of payments as a proportion of GDP (%)

WGRUB_USD: Country's weighted index for the annual growth of the Russian ruble to USD rate (%)

INF_R: Country's actual inflation rate (%)

GD_GDP: actual general government debt as a proportion of GDP (%)

GB_GDP: actual deficits and surpluses in the government budget balance as a proportion of GDP (%)

G_ROI: actual return on assets (%)

BOP_GDP: actual deficits and surpluses in the balance of payments as a proportion of GDP (%)

GRUB_USD: Country's weighted index for growth of the Russian ruble to USD rate (%)

INF_R_{max}, GD_GDP_{max}, GB_GDP_{max}, G_ROI_{max}; POB_GDP_{max}; RUB_USD_{max}: The critical indicators in Level No. 15 are shown in Tables 1 and 2.

Thus the indexes: WINF_R; WGD_GDP; WGB_GDP; WG_ROI; WPOB_GDP; WGRUB_USD must be within the range $\in [0.01 - 1]$; where 1 is the best, and 0.01 is the worst performance indicator

By multiplying together the financial indicators and applying the multivariate comparative analysis method, we get the assumed financial stability index (LF_STAB) for the country as follows

$$LF_STAB = \sqrt[6]{\left(\frac{INF_R}{INF_R_{max}}\right)^2 * \left(\frac{GD_GDP}{GD_GDP_{max}}\right)^2 * \left(\frac{GB_GDP}{GB_GDP_{max}}\right)^2 * \left(\frac{G_ROI}{G_ROI_{max}}\right)^2 * \left(\frac{POB_GDP}{POB_GDP_{max}}\right)^2 * \left(\frac{GRUB_USD}{GRUB_USD_{max}}\right)^2} \quad (7)$$

$$LF_STAB = \sqrt[6]{(WINF_R)^2 * (WGD_GDP)^2 * (WGB_GDP)^2 * (WG_ROI)^2 * (WPOB_GDP)^2 * (WGRUB_USD)^2} \quad (8)$$

The output of the Financial Stability Index calculation must be within the range LF_STAB $\in [0 - 1]$.

In this way, we can impose levels of financial stability of the state based on the results of the multiplication of the previous financial indicators, as shown in Table 3.

Table 3. Critical levels of financial stability and their interpretation

Level	Weak	Noticeable	Moderate	High	Very high
Interpretation	$f \leq 0.01 - 0.2$	$f \in [0.2, 0.4]$	$f \in [0.4 - 0.6]$	$f \in [0.6 - 0.8]$	$f \in [0.8 - 1]$

Source: Prepared by the authors

Moreover, the level of financial stability of the country is determined in the range from 0.01 to 1. The higher this indicator, the more stable the sovereignty of the state. 0.01 represents the worst possible financial stability score.

4. Empirical Analysis and Results

Based on the calculation of elevated macroeconomic indicators using the above models, we obtain the results shown in Table 4, below.

Table 4. Weighted indexes for the financial stability of the Russian Federation in the period 2010-2022

Year	WINF_R	WGD_GDP	WGB_GDP	WG_ROI	WBOP_GDP	WRUB_US	LF_STAB
2010	0.54	0.54	0.22	0.54	0.75	0.54	0.49
2011	0.64	0.54	0.64	0.64	0.75	0.54	0.62
2012	0.64	0.54	0.54	0.64	0.64	0.07	0.42
2013	0.64	0.54	0.22	0.54	0.44	0.11	0.35
2014	0.36	0.44	0.11	0.36	0.64	0.02	0.20
2015	0.36	0.36	0.16	0.28	0.75	0.00	0.16
2016	0.64	0.36	0.11	0.44	0.54	0.04	0.25
2017	0.87	0.28	0.22	0.44	0.64	0.64	0.46
2018	0.75	0.28	0.64	0.54	0.75	0.07	0.40
2019	0.75	0.28	0.64	0.54	0.64	0.11	0.42
2020	0.75	0.22	0.44	0.54	0.64	0.04	0.32
2021	0.54	0.22	0.44	0.44	0.75	0.11	0.35
2022	0.75	0.22	0.44	0.44	0.75	0.54	0.49

Source: Prepared by the authors

In theory, the linear relationship between variables is demonstrated using the least square method. Using this method to study the relationships between financial indicators and the financial stability index (LF_STAB) in the Russian Federation in the short and long terms we obtain this equation:

$$LF_STAB = 0.176224 - 0.125622 * EINF_R - 0.045247 * EGD_GDP + 0.261041 * EGB_GDP + 0.442407 * EG_ROI - 0.155195 * EBOP_GDP + 0.407526 * EGRUB_USD \quad (9)$$

Table 5 shows the output data of the mathematical model calculated using Eviews 12.

Table 5. Output data of the linear mathematical model

Coefficients	Parameters	Std. Error	t-Stat.	P-value
C	0.176224	0.114438	1.539908	0.1745
WINF_R	-0.125622	0.094302	-1.332129	0.2312
WGD_GDP	-0.045247	0.094107	-0.480805	0.6477
WGB_GDP	0.261041	0.055392	4.712591	0.0033
WG_ROI	0.442407	0.132195	3.346620	0.0155
WBOP_GDP	-0.155195	0.105687	-1.468436	0.1924
WRUB_USD	0.407526	0.038073	10.70377	0.0000
R ²	0.992783	Mean dep. VAR		0.379231
Adj. R ²	0.985566	S.D. dep. VAR		0.127440
Std. Error	0.015311	AIC		-5.216748
Obs.	0.001407	SIC		-4.912545
F	40.90886	HQC		-5.279276
Significance F	137.5582	DW stat.		2.787374

Source: Prepared by the authors.

According to the data in Table 5, the relationship between financial variables and the financial stability index of the Russian Federation is very close to linear. One common method to improve the linearity of the mathematical model is to convert the model into logarithmic form (J.G. MacKinnon and L. Magee, 1990, A. Al Humssi, M. Petrovskaya and M. Abueva, 2023), as shown in the following model:

$$LF_STAB = \beta_0 + \beta_1 * WINF_R + \beta_2 * WGD_GDP + \beta_3 * WGB_GDP + \beta_4 * WG_ROI + \beta_5 * WBOP_GDP + \beta_6 * WGRUB_USD \quad (10)$$

→

$$\log(LF_STAB) = \beta_0 + \beta_1 * \log(WINF_R) + \beta_2 * \log(WGD_GDP) + \beta_3 * \log(WGB_GDP) + \beta_4 * \log(WG_ROI) + \beta_5 * \log(WBOP_GDP) + \beta_6 * \log(WGRUB_USD) \quad (11)$$

After transforming the mathematical model into a logarithmic form, we get the results in Table 6.

Table 6. Output data linear mathematical model in logarithmic form

Coefficients	Parameters	Std. Error	t-Stat.	P-value
C	0.032276	0.046488	0.694291	0.5135
LOG(WINF_R)	0.122079	0.057160	2.435752	0.0466
LOG(WGD_GDP)	0.065015	0.033350	2.494947	0.0491
LOG(WGB_GDP)	0.122858	0.020005	6.141390	0.0009
LOG(WG_ROI)	0.453911	0.069600	6.521757	0.0006
LOG(WBOP_GDP)	0.155025	0.062949	2.462710	0.0489
LOG(WGRUB_USD)	0.175186	0.007170	24.43370	0.0000
R ²	0.998588	Mean dep. VAR		-1.030765
Adj. R ²	0.997177	S.D. dep. VAR		0.382402
S.E. of regress.	0.020318	AIC		-4.650897
SSR	0.002477	SIC		-4.346694
Log-likelihood	37.23083	HQC		-4.713425
F-stat.	707.4561	DW stat.		2.638414
Prob.(F-stat.)	0.000000			

Source: Prepared by the authors

We notice that the linearity of the model has improved significantly, as shown in the following model:

$$\begin{aligned} \text{Log(LF_STAB)} = & 0.032275966 + 0.122079005 * \text{log(WINF_R)} + \\ & 0.0650150 * \text{log(WGD_GDP)} + 0.1228580 * \text{log(WGB_GDP)} + 0.4539113 * \text{log(WG_ROI)} + \\ & 0.1550248 * \text{log(WBOP_GDP)} + 0.175185976652 * \text{log(WGRUB_USD)} \end{aligned} \quad (12)$$

The main problem with this model is that it is not suitable for long-term forecasting purposes, so we will have to apply some additional tests to it. The starting point is the stationarity model, applied to the time series of variables. One of the methods used to detect the unit root is the Augmented Dickey-Fuller (1979) model, which takes the following form (9):

$$\Delta Y_t = \delta_0 + \delta_1 Y_{t-1} + \delta_2 T + \sum_{i=1}^m \Delta Y_{t-1} + u_t \quad (13)$$

Where t – time index; δ_0 – constant; $\delta_2 T$ – linear time trend coefficient; Y_t the time trend; δ_1 – a-1, a Δ – first-order difference operator $\Delta y_t = y_t - y_{t-1}$; m – order of the first order autoregressive process; u_t error.

Using ADF methodology, we get the results shown in Table 7, in which S stands for stationary and N stands for nonstationary.

Table 7. Output of the stationarity test using the ADF approach

	WINF R	WGD GDP	WGB GDP	WG ROI	WBOP GDP	WRUB USD	LF STAB
Level 0	N	N	N	S	S	N	N
Difference 1 st	S	S	S	S	S	S	S
Difference 2 ^d	N	S	S	S	S	S	S
Result ADF test	1 st	1 st ; 2 ^d	1 st ; 2 nd	0; 1 st ; 2 nd	0; 1 st ; 2 nd	1 st ; 2 nd	1 st ; 2 nd
Stationary in							

Source: Prepared by the authors.

Using the Engle and Granger approach for cointegration, in Table 7 it was found that the time series of the variables are stable and of the same degree at the first difference, with a probability (P-value) of 5-10%.

The next step is to check the stationarity of the residuals of the model. To find the unit root of the test (i.e. to test the stationarity) of the residuals of the model, we used the ADF test (Table 8).

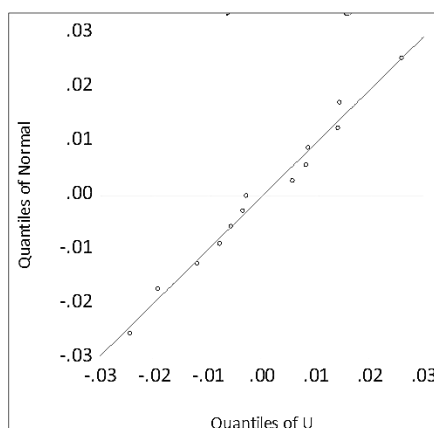
Table 8. Output of stationarity test using the ADF approach

Null Hypothesis:	Time-series of model residuals has a unit root (Lag Length 0)		
	1% level	5% level	10% level
Test critical values:	-4.121990	-3.14492	-2.71375
t-Statistic	-4.868160	-	-
Probability	Critical P-value < 5 %		Actual P-value 0.31 %
Result	Reject the null hypothesis		

Source: Prepared by the authors.

It is clear from Table 8 that the time series of the residuals are stable at level 0, and this is confirmed by the graph in Figure 1, which shows that the residuals are normally distributed.

Figure 1. Scatterplot graph for log-transformed Model Log(LF_STAB)



Source: Prepared by the authors.

We thus adjust the equation for the long-term mathematical model as follows:

$$\begin{aligned}
 [\text{Log}(\text{LF_STAB}_t) - \text{Log}(\text{LF_STAB}_{t-1})] = & 0.0147186642438 + 0.132339077913 * [\\
 & \text{Log}(\text{WINF_R}_t) - \text{Log}(\text{WINF_R}_{t-1})] + 0.217146284739 * [\text{Log}(\text{WGD_GDP}_t) - \\
 & \text{Log}(\text{WGD_GDP}_{t-1})] + 0.098977440478 * [\text{Log}(\text{WGB_GDP}_t) - \text{Log}(\text{WGB_GDP}_{t-1})] + \\
 & 0.499929407611 * [\text{Log}(\text{WG_ROI}_t) - \text{Log}(\text{WG_ROI}_{t-1})] + 0.2659181487 * \\
 & [\text{Log}(\text{WBOP_GDP}_t) - \text{Log}(\text{WBOP_GDP}_{t-1})] + 0.175255881767 * [\text{Log}(\text{WRUB_USD}_t) - \\
 & \text{Log}(\text{WRUB_USD}_{t-1})] - 0.0618976157839 * U(-1)
 \end{aligned} \tag{14}$$

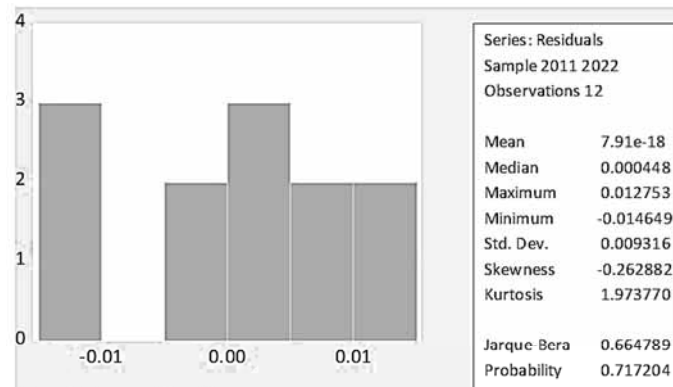
The outputs of the log-transformed Model for the long term are shown in Table 9.

Table 9. Outputs of the log-transformed Model (ECM model)

Coefficients	Parameters	Std. Error	t-Stat.	P-value
C	0.014719	0.008900	3.653786	0.04735
D(LOG(X1))	0.132339	0.043662	3.030976	0.0387
D(LOG(X2))	0.217146	0.084701	3.036367	0.0424
D(LOG(X3))	0.098977	0.015436	6.411955	0.0030
D(LOG(X4))	0.499929	0.056421	8.860757	0.0009
D(LOG(X5))	0.265918	0.062578	4.249355	0.0132
D(LOG(X6))	0.175256	0.004947	35.42660	0.0000
U(-1)	-0.0618976	0.594570	-3.041049	0.03566
R ²	0.999314	Mean dep. VAR		1.85E-17
Adj. R ²	0.998113	S.D. dep. VAR		0.355649
S.E. of regress.	0.015448	AIC		-5.267935
SSR	0.000955	SIC		-4.944664
Log-likelihood	39.60761	HQC		-5.387621
F-stat.	832.3158	DW stat.		1.795992
Prob.(F-stat.)	0.000004			

Source: Prepared by the authors.

In order to test for heteroskedasticity we applied a log-transformed model. In this research, we used the Breusch-Pagan-Godfrey (1979) Harvey (1976) and ARCH (Engle, R. F.,1982) tests, as shown in Figure 2.



Heteroskedasticity Test: Harvey

F-statistic	0.735375	Prob. F(7,4)	0.6617
Obs*R-squared	6.752736	Prob. Chi-Square(7)	0.4551
Scaled explained SS	25.90114	Prob. Chi-Square(7)	0.0005

Heteroskedasticity Test: ARCH

F-statistic	0.462040	Prob. F(1,9)	0.5138
Obs*R-squared	0.537140	Prob. Chi-Square(1)	0.4636

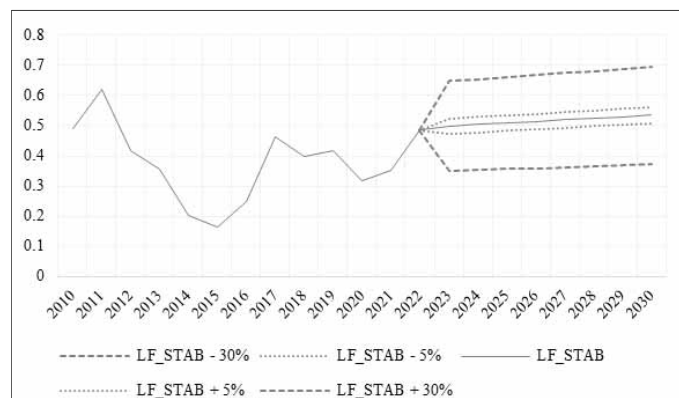
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.609950	Prob. F(7,4)	0.3380
Obs*R-squared	8.856510	Prob. Chi-Square(7)	0.2631
Scaled explained SS	0.479122	Prob. Chi-Square(7)	0.9995

Source: Prepared by the authors.

Applying the Harvey and ARCH tests, we concluded that no heterogeneity was present in the log-transformed Model. We can therefore use this model in order to forecast the financial stability of the Russian Federation in the short and long term. Assuming the continuation of the current conditions affecting the development of the Russian economy, including COVID-19, military conflict in the Middle East and North Africa (Chaplyuk, Akhmedov, Zeitoun, Al Humssi, 2023; Chaplyuk, Alam, Abueva, Hossain, Al Humssi, 2021), and the special operation in Ukraine, etc., the level of financial stability of the Russian Federation will be within the range [0.50 – 0.53] as shown in figure 3. This means that in the near future, the financial stability of the Russian Federation will be at an average level.

Figure 3. Forecast of the index of financial stability of the Russian Federation for the period 2023-2030



Source: Prepared by the authors.

Based on the above calculations, we can conclude that if the Russian economy can continue to maintain an annual growth rate of 1%, then the indicator of financial stability will be stable and secure.

If we take into account the current events in the Eastern European region, the Middle East and the African continent, these factors may negatively affect the financial stability of the Russian Federation in the coming period, as shown in Figure 3 (the hypothetical case LF_STAB – 30%). The development of a set of economic measures aimed at the formation of an effective socio-economic policy is the main prerequisite for ensuring the long-term financial stability of the country.

5. Discussion of Results

Analyzing data on the financial stability of the Russian Federation in the period 2010-2022, we can see that it is dependent on many internal and external factors. The internal variables include the volume of government spending and revenues, fluctuations in the exchange rate of the national currency, and the policy adopted to tackle inflation, while the external ones include the global financial crisis, sharp fluctuations in global energy prices, COVID-19, and economic sanctions.

By applying the model established in this research (the ECM), it can be seen that achieving financial and economic stability as a whole in the Russian Federation depends mainly on achieving stability in all macroeconomic areas, such as budget policy, taxes, investment, foreign trade, price inflation rate, indebtedness, the credit and banking system, financial circulation, cash supply, stock markets and insurance and exchange rates.

The ECM demonstrates that there is a linear relationship between anti-inflation policy and financial stability, and thus whenever decision-makers seek to rein in inflation to acceptable

limits, price stability in relation to goods and services in the domestic market will positively affect financial stability.

The ECM also explains the impact of government borrowing policy on financial security. This is a positive correlation, as a decrease in government loans will alleviate the burden resulting from loans and thus from fulfilling obligations to lenders, whether domestic or international. In other words, the decision-makers' efforts to reduce debt to a minimum level will create an incentive for the state to find alternative sources of income, such as stimulating investment and production activities and attracting foreign direct investments.

According to the ECM, government budget policy plays an important role in ensuring the financial security of the state through rational reduction of government spending and the increasing and diversifying of sources of income.

The ECM also demonstrates that the banking and borrowing policy of the Central Bank and other banks operating in the country plays a vital role in ensuring not only financial stability but also economic stability in the country, and the maintenance of a balance between money supply and money demand will lead enable the country to achieve sustainable financial stability and secure the financing needed for its economic activities.

The ECM shows that the relationship between the growth of a surplus in the balance of payments and financial stability needs to be coordinated. This is explained by the fact that conducting an effective foreign trade policy by increasing exports, compensating for imports and attracting foreign investments will enable Russia to avoid an imbalance in the balance of payments and thus achieve financial stability.

The ECM also shows if the Russian ruble exchange rates were stable it would have this effect on the financial stability of the country, as it would help to maintain continuity in financing imports, fighting inflation, and attracting investments, and this, in turn, would lead to achieving financial and economic security for the Russian Federation in general.

The optimal use and coordination of these tools may be sufficient to mitigate the negative effects of the current economic sanctions and are within the capabilities currently available to the Russian Federation.

Limitations of using the model

The model discussed here (the ECM) may help decision-makers in the Russian Federation to make short- and long-term future economic plans related to Russia's financial and economic security in the period up to 2030.

The model was created based on open-access data available to the authors during the study period, which may differ from the actual data, and the authors were unable to access the actual data fully, and this may affect expectations of future results of using the model.

6. Conclusion

The purpose of the study was to model and predict the impact of macroeconomic indicators on the financial stability of Russia. These indicators include the inflation rate (%), government debt as a proportion of GDP, the state budget as a proportion of GDP (%), return on bank assets, the balance of payments as a proportion of GDP (%), the rate of the national currency (RUB) as against the US dollar in the period 2010-2022. The ADF, OLS, ARDL and Granger analysis were used.

Analyzing the financial stability status of the Russian Federation in the period 2010 – 2022, we can conclude that it is dependent on many internal and external factors. The internal variables include the volume of government spending and revenues, fluctuations in the exchange rate of the national currency, and the policy adopted to tackle inflation, while the external ones include the global financial crisis, sharp fluctuations in global energy prices, COVID-19, and economic sanctions.

Our research shows that assuming the continuation of the current conditions of the Russian economy, the level of financial stability of the Russian Federation will be within the range of 0.50 – 0.53 in the period 2023 – 2030. This means that in the near future, the financial stability of the Russian Federation will be at an average level. Thus, it can be concluded that if the Russian Federation is able to maintain an annual growth rate of 1%, this will have a positive impact on the level of financial stability of Russia, and ensure economic stability.

Achieving financial and economic stability as a whole depends on achieving stability in all areas of the economy, such as budgetary policy, tax, investment, inflationary price, currency, the credit and banking system, financial and monetary circulation, and the stock and insurance markets. The use of these instruments will ensure that the sanctions that Western countries have placed so much faith in will not be able to significantly affect the financial stability of the Russian economy.

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FACTORS FOR REDUCING THE GLOBAL GENDER GAP⁵

Gender inequality generates negative consequences for the economy, social sphere, and often the environment at the level of individual countries and the world. In this way, inequality creates a gender gap. The issue of reducing the gender gap was highlighted in the Sustainable Development Goals and drew scientists' attention from various fields and international organizations to a multifaceted study of the gender gap phenomenon at different levels.

The article analyzes available indicators that measure the gender gap and the conducted earlier research on the factors that influence gender equality. We chose the Global Gender Gap Index. We found a statistically significant impact on the gender gap: the share of women in the total population, the level of achievement of the Sustainable Development Goals, the level of democracy, and GNI per capita. Thus, by accelerating the achievement of sustainable development goals and implementing democratic reforms, countries are reducing the gender gap in society.

Our study did not confirm the statistically significant inverse relationship between fertility rates and the gender gap, which was previously established based on incomplete statistical information. Also, the gender gap is not affected by the country's population growth or by the country's belonging to one of the four groups by per capita income. The impact of migration processes on gender equality requires an in-depth and additional analysis based on data showing the impact of migration movements influenced by the war between Russia and Ukraine.

Keywords: Sustainable Development; Country's Income Level; Migration; Population Growth; Level of Democracy; Fertility; Economic Growth Management; Gender equality

JEL: F63; J11; Q01; O15

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1. Introduction

Gender inequality can be viewed as a difficult practical problem and a multifaceted concept (Sen, 1990). World Bank (WB) experts believe that "no society can develop sustainably without supporting opportunities, resources, and choices for men and women so that they have equal power to shape their lives and contribute to their families, communities, and countries" (World Bank, 2023a). The gender gap (GG) is the difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes (Harris, 2017).

Gender equality is the state of equal ease of access to resources and opportunities regardless of gender, including economic participation and decision-making; and the state of valuing different behaviours, aspirations and needs equally, regardless of gender (ESSEC, n.d.). It should be noted that the connection between various factors that determine gender equality and the gender gap is not always direct.

The issue of gender inequality has taken on new significance in the context of globalization. The World Inequality Report (Chancel et al., 2022) states that globalization generates inequality in income and wealth, causes an increase in economic and political inequality, and as a result, gender inequality remains significant at the global level, while its reduction at the national level is quite slow. In addition to social and economic inequality, certain groups of men face racial and gender discrimination, and "women bear the brunt of poverty, violence, and inequality" in the labour force. Moreover, gender inequality affects most of the world's cultures, religions, nations, and income groups (Hausmann, Tyson, Zahidi, 2007) and all spheres of society (Hudoshnyk, Krupskyi, 2022).

The Sustainable Development Goals (SDGs) adoption at the United Nations (UN) General Assembly (2015) brought the issue of gender equality to the forefront as the fifth goal (SDG 5) (UN, 2015). In the same time, academic research began to address the link between gender gap and equal opportunities in the context of achieving the SDGs. Researchers note some progress in several areas of discrimination (more girls in education, fewer girls forced into marriage, more women in leadership positions) and, at the same time, point out that policy decisions in education, healthcare, and other sectors keep being made in gendered contexts (Pavlova et al., 2019; Morgan et al., 2020; Sardak et al., 2021b). Dugarova notes that approximately half of the population is deprived of equal opportunities, equal participation in decision-making, and equal access to resources, education, and employment is not conducive to sustainable development and global prosperity (Dugarova, 2018). The works (Bhandari, 2022; Leal Filho et al., 2022) present the manifestations and gender inequality connection with the Sustainable Development Goals.

The importance of reducing the gender gap for the global economy and countries is confirmed by the scientists' research results and reports by leading international financial and economic organizations. World Bank notes the positive impact of reducing the global gender gap on GDP. According to their estimates, eliminating the gender gap in employment will allow countries to increase their GDP by an average of 20%. Studies estimate the economic benefits at around \$5-6 trillion if women started and expanded new businesses as much as men (World Bank, 2023a). Eliminating the global gender gap in education significantly improves maternal health in low- and lower-middle-income countries (Choe, Cho, Kim, 2016; Dinter,

Grässle, Mosenhauer, 2022). Women's empowerment has a positive impact or catalyzes improvements in human development (Odera, Mulusa, 2020), health and well-being (Morgan et al., 2020), and the Human Development Index (Stoet, Geary, 2019).

Gender equality can be seen as a two-stage process: "first get in the club, then attain equality within the club" (Charles, Grusky, 2007). Most indicators focus on achieving membership in the "club": enrollment in school, participation in the labour force, and membership in the national legislature. In these indicators, gender parity is only part of the story, as, for instance, men and women enter labour markets with strong gender segregation, at least in industrialized countries; organizational cultures wherein leadership is gendered possess such segregation (Hudoshnyk, Krupskyi, 2023). Campbell (2014) expresses that closing the gender gap is illusory and that there is "no evolutionary path to equality, peace, and prosperity." The author considers the current era as an era of "neo-patriarchy" where "there is a new articulation of male social power and privilege" as she believes that "the new world order is not neutral and innocent of sexism: it modernizes it. Masculinities and femininities are created and remade as polarized species (Campbell, 2014, p. 4).

Nevertheless, women worldwide remain an underutilized labour force resource. Labour force participation averages around 80% for men but only 50% for women – almost half of the women's productive potential still needs to be explored, compared to one-fifth for men (Novta, Wong, 2017; Dabla-Norris, Kochhar, 2019). Thus, it is essential to pursue policies that could help create an enabling environment for women to enter and remain in the labour market (Novta, Wong, 2017).

Researchers point to a growing gender gap in occupation opportunities and employment regarding labour force participation rates, labour force participation ratios, unemployment rates, and wages (Tewari, Chouhan, Sanjeev, 2020). The International Monetary Fund (IMF) confirms significant gender gaps in the world while recognizing countries' progress in reducing them and points out the need to make efforts to prevent women from leaving the labour market and ending their careers.

The World Bank Group recognizes the progress and experience in eliminating gender-based violence and promoting the empowerment of girls and women over the past decades and updates. It launches its strategy "Accelerating Gender Equality for a Sustainable, Resilient and Inclusive Future" in 2024 (World Bank, 2023a). The WB's efforts aim to develop human capital and combat violence, expand and create economic opportunities for employment and entrepreneurship among women, and engage women as leaders in public life.

Determining the prospects for an equal society requires identifying the factors that can reduce the global gender gap. At the same time, to the political, legislative, and economic mechanisms for bridging this gap, known and defined by the scientific circle, we add information, cultural factors, and concepts of mass culture and corporate relations that currently influence gender imbalance, on the one hand, by forming a mass stereotype, and by actively destigmatizing it, on the other hand, (Hudoshnyk, Krupskyi, 2022). We should note that the factors of reducing national gender gaps are long-term and can generate positive social, economic and environmental effects.

2. Analysis of Recent Research and Publications

In discussions on reducing the gender gap, authors provide various assessments of its reduction: from positive (Dorius, Firebaugh, 2010; Koca, 2022) and cautious and moderate (Charles, Grusky, 2007; Boffey, 2017) to negative (Campbell, 2014).

The readiness for competition and the importance of understanding how productivity affects wages in the labour market led to increased interest in gender differences (Gneezy, Haruvy, Roth, 2003; Sutter, Glätzle-Rützle, 2010; Niederle, Segal, Vesterlund, 2013). The literature focuses on the study of gender differences in the labour market and argues that men dominate the competitive environment and that this advantage is manifested in the amount of wages (Balafoutas, Kerschbamer, Sutter, 2012). Nevertheless, it can be said that appropriate policy interventions aimed at narrowing or eliminating this gap, depending on the presence, type, and type of gap between the sexes in each field, are essential for women to make them more successful in the labour market (Sutter, Glätzle-Rützle, 2010). The representation of women in top positions and business and politics, in the public and private sectors, type of employment, position, salary and career are areas where women are discriminated against. Increasingly, the issue of the gender of applicants for vacant positions is also considered from the perspective of talent management of organizations (Edeh et al., 2022).

Researches were devoted to closing the gender gap at the regional level (Boffey, 2017; Cascella, Williams, Pampaka, 2021; Koengkan et al., 2022). Progress in overcoming the gender gap was demonstrated in the Middle East, North Africa, South Asia, and Sub-Saharan Africa. However, the gap among countries has yet to be proven to be narrowed (Dilli, Carmichael, Rijpma, 2018). The Middle East and North Africa show tremendous achievements and improvements in women's lives in health and education but less progress in employment and persistent legal inequalities, such as restrictions on women's participation in politics and civil society (Dalacoura, 2019). For instance, Boffey (2017) concludes that there is a "wide and persistent" employment gap in the EU, with a full-time employment rate of 40% for women and 56% for men. The income gap narrowed, but women still earn 20% less than men on average, and the average masks huge differences across the EU.

An international team of authors (Mateos et al., 2020) assessed the gender inequality impact on the gender gap in life expectancy among 152 countries. The results showed a direct link between gender equality and the gender gap in life expectancy in Europe and in North and South America. It was proven that gender equality leads to a reduction in the gender gap in those regions. On the contrary, the opposite relationship was proven in the countries of the African continent. The regression model considered gross national income (GNI), democratic status, and rural population.

Dilli and colleagues (2018) proposed an original approach – a historical approach to the gender equality index, where the main obstacles to gender "convergence" are economic development and long-term institutional and historical features. Bose (2015) identified gender-oriented social institutions (e.g., laws on violence/physical integrity, family codes, civil liberties, and property rights) and implicit gendered political and economic structures (e.g., IMF debt, armed conflict, former colonies, and electoral democracy) as factors in the formation of gender regimes (forms of patriarchal structures) at the regional level.

According to Robinson (2018), the leading factors in reducing gender inequality are education and overcoming violence in various manifestations (honour-based violence, domestic violence, sexual violence in conflict-affected countries, migration, asylum seeking and refugee crisis, etc.). The author points to the popularity in academic circles of the concept of intersectionality (i.e., how the variables of class, sexuality, race, and ethnicity, for instance, intersect about people's gender experience), research on manifestations of masculinity and feminism, inequality based on ethnicity and sexuality.

Changes in gender roles, deepening division of labour, and growing military and political conflicts led to increased international migration. In Central Asia, one of the world's most active migration regions, women migrants account for up to 30% of the migrant population and face security, economic, and social protection issues (Bui, Vo, Bui, 2018; Sardak et al., 2021a), the number of female-headed households is growing, and women's burden in managing economic practices is increasing (Thieme, 2008).

Academics have concluded that the COVID-19 pandemic also spreads gender inequality (Shulla et al., 2021), lockdowns increase the burden on women at home and put them at increased risk of domestic violence (Huiskes, Dinis, Caridade, 2022), high risks to women's health persist, as 70% of health workers are women (UN Department of Economic & Social Affairs, 2020), and lead to a widening gender gap.

Since gender inequality manifests itself in social, economic, political, information, and other spheres, attempts to combine different manifestations of gender inequality are reflected in comprehensive indicators. Table 1 presents up-to-date indicators of gender inequality and their areas of application.

For our study, we chose the Global Gender Gap Index (GGGI) due to the advantages of this indicator. Thus, Hausmann and colleagues (2007) noted that the GGGI captures the framework of gender differences and indicates what national gender differences and disparities exist and their evolution over time. The index content enables tracking and comparative analysis of gender inequality by economic, political, educational, and health criteria. National rankings and country profiles indicate the strengths and weaknesses of gender equality in countries and can be used to develop, improve, and implement national policies.

Despite the difficulties in considering certain features of gender inequality and the subjective nature of choosing the weight of individual indicators in sub-indices (Benatar, 2006; Hakim, 2006; Pinker, 2010; Lubinski, Benbow, Kell, 2014), we assume that the GGGI is constructed correctly and use it as a baseline indicator. We believe that all the factors of reducing the global gender gap are long-term, so a regression analysis of the relationship between the GGGI and a trend factor will indicate the presence/absence of a relationship among them.

Table 1. Modern composite indices of gender inequality and their scope of application

Indicator (index)	Introduced by the institute, the researcher	Indicator content
Gender-Related Development Index (GDI)	UNDP	is used as a component of the UNDP Human Development Index to measure the achievements of countries in terms of gender equality in reproductive health; civil rights and opportunities; and the degree of economic activity
Gender inequality index (GII)	UNDP	demonstrates the loss of human development potential due to gender inequality between women and men regarding reproductive health, empowerment, and labour market participation.
Global Gender Gap Index (GGGI) https://www.weforum.org/reports/global-gender-gap-report-2022/	WEF	is used to identify gaps in access to resources and opportunities for different genders without indicating the availability of these resources in countries
Africa Gender Equality Index (GEI) https://www.afdb.org/en/topics-and-sectors/topics/quality-assurance-results/gender-equality-index	African Development Bank (AfDB)	reflects the status of women in Africa based on the dimensions of economic empowerment, social, institutional, and legal development.
The OECD Development Center's Social Institutions and Gender Index (SIGI) https://www.genderindex.org/ or https://www.oecd.org/stories/gender/social-norms-and-gender-discrimination/sigi	OECD Development Center	measures discrimination against women in social institutions in 179 countries, considers legislation, social norms, and practices of gender inequality in discrimination in the family, restrictions on physical integrity, access to productive and financial resources, and civil liberties, and is used to monitor SDGs 5
Gender Equality Index https://eige.europa.eu/gender-equality-index/2022	European Institute for Gender Equality	is used to compare gender equality in the following dimensions: work, education, finance, time, power, health, and violence (additional indicator)
Social Watch Gender Equality Index (GEI) https://www.socialwatch.org/taxonomy/term/527	Social Watch	allows countries to be classified and ranked according to a selection of indicators of gender inequality in three dimensions: education, economic participation, and empowerment.
Women Economic Empowerment Index, WEE Index https://asiapacific.unwomen.org/en/countries/pakistan/wee/wee-participant/wee-index	UN Women	is used to characterize women's gender equality at the regional level in Asia and the Pacific in the following dimensions: labour force participation, education, decision-making, health, and political participation.
Regional Gender Gaps Index (eRGGI) https://link.springer.com/article/10.1007/s11205-021-02764-x	C. Cascella, J. Williams & M. Pampaka	Measures the gender gap based on the distribution of gender attitudes and gender equality among regions in industrialized countries.
Basic Index of Gender Inequality (BIGI) https://doi.org/10.1371/journal.pone.0205349	Gijsbert Stoet, David C. Geary	Measures opportunities to lead a long, healthy, and satisfying life based on educational opportunities, considering gender differences (a sexual division of labour).
Historical Gender Equality Index https://doi.org/10.1080/13545701.2018.1442582 or https://clioinfra.eu/Indicators/HistoricalGenderEqualityIndex.html	Selin Dilli, Sarah G. Carmichael & Auke Rijpma	assesses countries' performance in closing the gender gap in health, socioeconomic resources, politics, and the household since 1950.

The methodology for calculating the Global Gender Gap Index a priori includes four determinants – sub-indices – that explain the reasons for unequal opportunities for women in the modern world. In Mehdi (2020), the authors investigated the stochastic efficiency of dominance to analyze the sensitivity of the Global Gender Gap Index. They determined that two components contributed most to reducing the gender gap: Educational Attainment and Health and Survival. Shifting the index's weight towards these two components decreased the average index level for four groups of countries by income level as it declined. Shifting the index toward the importance of its other two components: Economic Participation and Political Empowerment – revealed a much higher level of the gender gap, with the low-income group performing better than the two middle-income groups.

The authors also studied gender inequality in four dimensions according to the Global Gender Gap Index. They found that low-income countries have the largest gender gap in economic participation and opportunities, and high-income countries have the largest gender gap in political opportunities (Koca, 2022).

A group of Ukrainian scientists studied the dependence of gender equality on the region of location, the level of economic development of the country, unemployment, shadow economy, education, and support for research by the parallel regression method (Stavytskyi et al., 2020). The authors conclude that the gender gap is gradually decreasing, with the main factors being internal determinants represented in the subindices. Dorius and Firebaugh (2010) point to a reduction in gender inequality in the four traditional dimensions of the Gender Gap Index and attribute the decline to various religious and cultural traditions.

Among the main reasons for the available global gender gap, WEF experts in 2022 point to the low level of women in leadership and management positions (the value of the political empowerment sub-index was 22%), the wage gap, occupational segregation, and the "pushing" of women out of jobs for highly skilled workers (the value of the economic participation and opportunity sub-index was 60.3%) (WEF, 2022). Testing of 144 countries on 14 indicators in four areas of gender inequality showed that countries have virtually eliminated gender gaps in health and life expectancy, halved the gap in economic participation and educational achievement, and did not close the gaps in political empowerment (Koca, 2022).

Our work aims to determine the impact nature of fertility decline, the level of sustainable development, the level of democracy, and a number of other factors on the condition of the gender gap.

3. Data and Methodology

The Global Gender Gap Index ranks countries according to their proximity to gender equality (Hausmann, 2007). Our study is based on the hypothesis that proximity to gender equality in the country leads to decreased fertility and, consequently, a slowdown in population growth.

The top ten countries with a high level of GGGI include seven countries with low fertility rates of 1.4-1.7. Nevertheless, it is complemented by Rwanda, with a fertility rate below 4 (the birth rate has halved since 1960). As a result of the 1994 genocide, approximately one

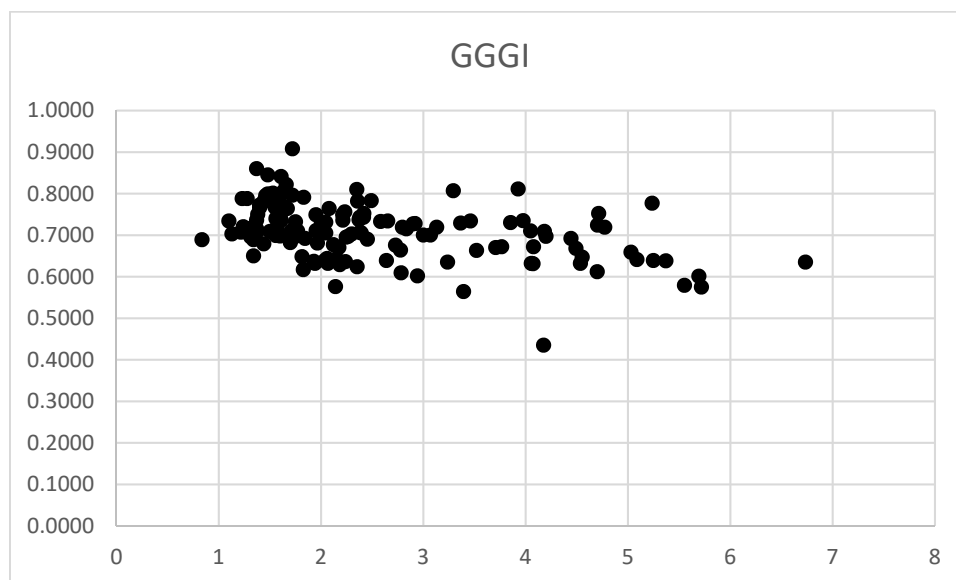
million people, mostly men, died in the country, and more than two million emigrated. As a result, Rwanda ranks 1st in the world regarding labour-force participation rate, enrollment in primary and secondary education, the sex ratio at birth, women in parliament, and women in ministerial positions. With other low indicators, this allows Rwanda to rank 6th among the top countries with a high level of GGGI. Nicaragua, which also experienced a large-scale civil war in the 80s of the last century, is in seventh place in the gender equality ranking. Although it did not lead to critical extermination of the population, it greatly reduced economic performance. Nicaragua's fertility rate decreased thrice from 1960 to 2020 (from 7.3 to 2.4). Nicaragua is ranked 1st in the Educational Attainment sub-criterion of the Global Gender Gap Index and first in the indicators: Women in parliament, Women in ministerial positions, Sex ratio at birth, and Professional and technical workers. Namibia is the third country with a high birth rate in the top GGGI ranking. It ranks 1st in the Health and Survival sub-criterion of the Global Gender Gap Index and in the following indicators: Enrollment in primary and tertiary education, Professional and technical workers. In Namibia, the fertility rate decreased almost twice from 1960 to 2020 (from 6.1 to 3.3).

The group of 10 countries with the lowest level of GGGI includes nine countries with fairly high fertility rates ranging from 2.1 to 5.7 and Qatar, with a fertility rate of 1.8. It is worth noting that in 1960, Qatar's fertility rate was 7, and in 2020 it was 2.1.

Thus, the analysis of the two borderline countries regarding the Global Gender Gap Index, 20 out of 146 countries ranked, confirms our hypothesis. However, the data of all countries on the Global Gender Gap Index and the fertility rate (births per woman) showed a rather low level of negative correlation – up to -0.5 (Figure 1). At the same time, it is worth noting that the average fertility rate in the world has decreased by over two times since 1963 (5.3) by 2020 (2.3). Throughout the Global Gender Gap Index's existence (since 2006), the average fertility rate in the world has decreased (from 2.6 to 2.3) by 11.5% (World Bank, 2023b). Since the number of countries in the Global Gender Gap Index has increased since 2006 from 115 to 147 in 2022, we cannot apply the dynamics of the average index value. The maximum value of the GGGI increased from 2006 (0.8133) to 2022 (0.908) by about the same amount (11.64%).

We also hypothesized that countries' progress in achieving the Sustainable Development Goals affects the GGGI. Since countries striving to achieve Sustainable Development Goals are concerned with social issues and develop the concept of sustainable development, including the broad involvement of women in all social processes (Aragonés-Beltrán et al., 2022; Leal Filho et al., 2022). To analyze the impact of this factor, we used the SDG-Score (Table 2).

Figure 1. Correlation of the Global Gender Gap Index (vertical axis) and the fertility rate (births per woman) (horizontal axis)



Source: WEF, 2022; World Bank, 2023b.

Based on the earlier scientists' research analysis, we also enhanced our analysis with a group of influence factors:

The democracy level in the country, as democratic values developed in society, encourages women's participation in all spheres of life. To analyze this factor, we used the Democracy Index (Table 2).

The percentage of women in the country's total population, as a larger number of women in society, potentially creates an opportunity to increase their representation in various spheres of life in the country. Globally, the share of women in the total population is 49.7%. In several countries, the share of women in the population is declining or steadily low, mostly in the Middle East and North Africa: Bahrain – 35%, Kuwait – 39%, Maldives – 37%, Oman – 34%, Qatar – 25%, Saudi Arabia – 42%, Emirates – 31% (World Bank, 2023c). In some countries, the share of women is either increasing or stable: Zimbabwe – 52%, Ukraine – 54%, Portugal, Estonia, El Salvador, Belarus, Armenia – 53%, Nepal – 54%, Moldova, Hungary, Georgia – 52%, Lithuania, Latvia – 54%. In order to analyze this factor, we used the average Population indicator, female (% of the total population) for countries for the period 1960-2020 (Table 2) (World Bank, 2023c).

Table 2. List of variables used to test the hypotheses

Designation	Variable	Year	Source
GCCI (2022)	Global Gender Gap Index	2006-2022	Global Gender Gap Report
PGRR (1970-2020)	Population growth, % (1970/2020)	1970-2020	World population review https://worldpopulationreview.com/countries
AV_FR	Fertility rate, total (births per woman)	1970-2020	World Bank, https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?view=chart
AV_POPF	Share of women in the country's population (% of the population)	1970-2020	World Bank https://data.worldbank.org/indicator/SP.POP.TOTL.FE.ZS?view=chart
IMS_T	Number of international migrants, total	1960-2015	World Bank International migrant stock, total Data (worldbank.org)
N MIG	Net migration	1960-2017	https://data.worldbank.org/indicator/SM.POP.NETM
DEM_I	Level of democracy Democracy Index	2021	https://www.jagranjosh.com/general-knowledge/democracy-index-2021-1644567197-1
SDGS	SDG-Score	2022	Sustainable Development Report 2022 (sdgindex.org)
GNI(2021)	GNI per capita, Atlas method (current USD)	2021	World Bank https://data.worldbank.org/indicator/NY.GNP.PCAP.CD
L1, L2, L3, L4	Dummy variables for the income groups of country's: L1 = 1 if the country has a high-income level (High), L2 = 1 if the country has an upper-middle income level (Upper-Middle), L3 = 1 if the country has a lower-middle income level (Lower-Middle), L4 = 1 if the country has a low-income level (Low)	2021	World Bank

The level of a country's income per capita, since a higher level of wealth can be achieved by more efficient and full use of the labour force, i.e., the involvement of women in reproductive processes. To analyze this factor, we used the GNI per capita Atlas method (current US\$) (Table 2) (Koengkan, 2022; World Bank, 2023d). We also determined whether there is a correlation between the GGGI and the income group into which all countries are divided (low, lower-middle, upper-middle, and high income).

The number of migrants in the country, as better opportunities attract economically active migrants (including women) to countries with a smaller gender gap. To analyze this factor, we used two indicators: International migrant stock, total, and Net migration (Table 2).

Thus, the Global Gender Gap Index is the dependent variable in our study. All other factors are predictors (independent variables). Due to incomplete statistical information, some of the objects (observations) were excluded from the study, so the test of the hypotheses is based on data from 131 countries. Descriptive statistics of the variables under consideration are

presented in the table, but they are assessed only for those observations for which all information is known (Table 3).

Table 3. Descriptive statistics

Variables	Average	Standard deviation	Maximum	Minimum
GCCI (2022)	0,7125	0,06710	0,908	0,435
GNI (2021)	16303,5878	21941,77298	122470	220
AV FR	3,6128	1,68519	7,51166667	1,27
AV POPF	50,3862	1,96966	54,2243991	33,279745
IMST (2015)	1491075,2672	4422718,25212	46627102	141
NMIG (2017)	42422,3664	666808,14664	4774029	-3266243
PGRR (1970-2020)	155,3052	224,54018	3015,66169	-92,15503
DEM I	5,7352	2,18901	9,75	0,32
SDGS	68,5844	9,71393	86,51	39,05

First, we analyze the correlation matrix presented in Table 4. Superfluously correlation coefficient values may indicate potential multicollinearity between variables, which significantly distorts the regression analysis results – the coefficient estimates and their *p*-values will be considered unreliable.

Table 4. Correlation matrix

	GCCI	GNI	AV_FR	AV_POPF	IMST	NMIG	PGRR	DEM_I	SDGS	L1	L2	L3	
Pearson correlation	GCCI	1,00	0,48	-0,50	0,32	0,12	0,24	-0,35	0,59	0,51	0,39	0,10	-0,31
	GNI	0,48	1,00	-0,61	-0,10	0,35	0,38	-0,08	0,66	0,64	0,83	-0,26	-0,39
	AV FR	-0,50	-0,61	1,00	-0,21	-0,20	-0,20	0,50	-0,69	-0,92	-0,63	-0,20	0,38
	AV POPF	0,32	-0,10	-0,21	1,00	0,00	0,10	-0,80	0,16	0,13	0,01	0,02	-0,04
	IMST	0,12	0,35	-0,20	0,00	1,00	0,70	-0,06	0,19	0,18	0,27	-0,10	-0,10
	NMIG	0,24	0,38	-0,20	0,10	0,70	1,00	-0,02	0,26	0,22	0,33	-0,02	-0,31
	PGRR	-0,35	-0,08	0,50	-0,80	-0,06	-0,02	1,00	-0,36	-0,43	-0,13	-0,13	0,09
	DEM I	0,59	0,66	-0,69	0,16	0,19	0,26	-0,36	1,00	0,68	0,65	0,01	-0,37
	SDGS	0,51	0,64	-0,92	0,13	0,18	0,22	-0,43	0,68	1,00	0,68	0,10	-0,33
	L1	0,39	0,83	-0,63	0,01	0,27	0,33	-0,13	0,65	0,68	1,00	-0,42	-0,41
	L2	0,10	-0,26	-0,20	0,02	-0,10	-0,02	-0,13	0,01	0,10	-0,42	1,00	-0,39
	L3	-0,31	-0,39	0,38	-0,04	-0,10	-0,31	0,09	-0,37	-0,33	-0,41	-0,39	1,00
	Significance	GCCI		0,00	0,00	0,10	0,00	0,00	0,00	0,00	0,00	0,00	0,13
GNI		0,00		0,00	0,13	0,00	0,00	0,19	0,00	0,00	0,00	0,00	0,00
AV FR		0,00	0,00		0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,01	0,00
AV POPF		0,00	0,13	0,01		0,49	0,13	0,00	0,04	0,07	0,48	0,42	0,31
IMST		0,10	0,00	0,01	0,49		0,00	0,27	0,02	0,02	0,00	0,13	0,12
NMIG		0,00	0,00	0,01	0,13	0,00		0,43	0,00	0,00	0,00	0,41	0,00
PGRR		0,00	0,19	0,00	0,00	0,27	0,43		0,00	0,00	0,07	0,07	0,16
DEM I		0,00	0,00	0,00	0,04	0,02	0,00	0,00		0,00	0,00	0,45	0,00
SDGS		0,00	0,00	0,00	0,07	0,02	0,00	0,00	0,00		0,00	0,12	0,00
L1		0,00	0,00	0,00	0,48	0,00	0,00	0,07	0,00	0,00		0,00	0,00
L2		0,13	0,00	0,01	0,42	0,13	0,41	0,07	0,45	0,12	0,00		0,00
L3		0,00	0,00	0,00	0,31	0,12	0,00	0,16	0,00	0,00	0,00	0,00	

However, judging by the correlation matrix, in this case, the values are acceptable, indicating a slight or moderate correlation between the variables in the model. The only exception is the

coefficient of -0.92 between the variables featuring the fertility rate and the level of achievement of sustainable development goals. Excluding any of these factors would contradict the purpose of the study, so all selected variables are allowed to be used in the analysis.

In addition, to assess the regression model adequacy, it is essential to refer to the part of the report related to the variance analysis (Table 5). Regression statistics provide numerical information about the variation and how well the model explains the variance of the given observations.

Table 5. Analysis of variance

	Sum of squares	Degree of freedom	Middle square	F	Significance
Regression	0,288	11	0,026	10,478	0,000
Balance	0,297	119	0,002		
Total	0,585	130			

Here, the value of the *F*-statistic and its significance, which is less than 0.05, indicate that the built model explains most of the variance of the variables and is, therefore, adequate. In other words, the null hypothesis that all coefficients before the built regression model variables are equal to zero is rejected.

4. Results and Discussion

The decision to accept the hypothesis is made based on the significance of the predictor in explaining the variation in the dependent variable. That is why Table 6, devoted to regression coefficients, is the centerpiece of this part of the study.

Table 6. Regression model coefficients and their features

	Non-standardized ratios		Standardized ratios	T	Significance
	B	Statistical error	Beta		
(Constant)	-0,387	0,277		-1,395	0,165
GNI (2021)	1,278E-06	0,000	0,418	3,122	0,002
AV FR	0,006	0,008	0,160	0,798	0,426
AV POPF	0,016	0,004	0,479	3,665	0,000
IMST (2015)	-6,933E-10	0,000	-0,046	-0,455	0,650
NMIG (2017)	8,801E-10	0,000	0,009	0,081	0,935
PGRR (1970-2020)	7,377E-05	0,000	0,247	1,670	0,098
DEM I	0,012	0,003	0,378	3,567	0,001
SDGS	0,002	0,001	0,353	1,849	0,067
L1	-0,041	0,035	-0,285	-1,191	0,236
L2	0,012	0,025	0,080	0,465	0,643
L3	-0,006	0,019	-0,038	-0,304	0,762

Table 6 shows that only three factors have significance levels below 0.05: GNI per capita, the share of women in the population, and the level of democracy. The coefficient before the variable featuring the level of achievement of the country's sustainable development goals can also be considered significant (the *p*-value is quite close to the critical value). Thus, the

hypothesis of a zero correlation between these predictors and the global gender gap index is rejected.

Before accepting or rejecting the presented hypotheses, evaluating the regression model quality is vital by referring to the corresponding Table 7.

Table 7. Features of the regression model quality

Model	R	R-square	Adjusted R-squared	Estimation error	Durbin-Watson
1	0,701	0,492	0,445	0,04998	2,140

Based on Table 7, the multiple correlation value is 0.701, which indicates a fairly close relationship between the selected factors and the global gender gap index. The determination coefficient or R-squared of 0.492 represents that the variation in the values of this index is 49.2%, explained by the variation in the independent variables. However, one should focus on the adjusted R-squared, as it adjusts the statistics based on the number of variables in the model. The value of this estimate is 0.445, which features the model's average quality, given the degree of information availability and the fact that the study is based on data from completely different countries. The value of the Durbin-Watson criterion of 2.140 indicates the absence of autocorrelation, which does not lead to a deterioration in the quality of the estimates of the regression parameters and does not indicate an overestimation of the test statistics used to check the quality of the model (i.e., no artificial improvement in the quality of the model relative to its actual level of accuracy is created).

The next potential problem may be heteroscedasticity, which refutes all assumptions about the model coefficients' significance. The estimates coefficient variance increases, but the least squares procedure (LSP) does not detect such an increase. To detect heteroscedasticity in this study, it is adequate to analyze the scatter plot of the residuals. Since all the residuals are uniformly distributed, it is concluded that the model is homoscedastic.

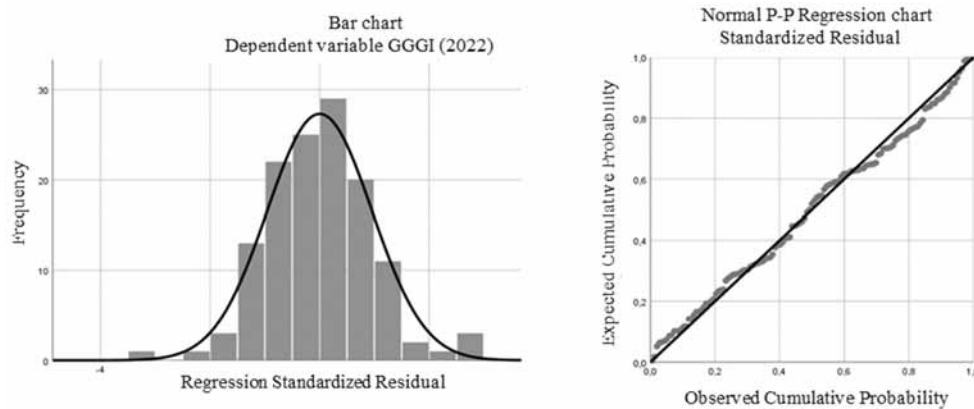
It is also important that the resulting residuals are normally distributed. That can be visually determined from the frequency bar chart and P-P chart shown in Figure 2.

It is difficult to conclude that the distribution is normal from a bar chart. However, from the P-P chart, it is obvious that the deviations of the point values from the line forming a 45-degree angle with the abscissa are insignificant, so the residuals are normally distributed.

All the prerequisites fulfilment for the LSP application (absence of multicollinearity, autocorrelation, heteroscedasticity, and normality of the distribution of residuals) indicate the reliability of the regression analysis results. That is why the conclusions regarding the acceptance or rejection of the hypotheses presented in the table can be considered accurate.

Thus, the statistically significant variables in our model are the share of women in the total population, the level of achievement of the Sustainable Development Goals, the level of democracy, and GNI per capita. The other variables we selected are insignificant and therefore do not affect the gender gap in the country.

Figure 2. Residual frequency bar chart and P-P chart



Thus, based on the mathematical model, we found that the country's fertility rate has no impact on the Global Gender Gap Index and that population growth does not impact the GGGI (the variables were insignificant). The Sustainable Development Goals achievement level has a minor but mathematically significant positive effect. Thus, by accelerating the Sustainable Development Goals achievement, the country also positively impacts reducing the gender gap.

Instead, the Global Gender Gap Index depends on the percentage of women in a country's total population. According to our model, a 1% increase in the share of women in a country leads to a 0.016 increase in the index in the next period. Given the rather significant long-term fluctuations in the share of women in African countries (from 2%), the systemic decline in the share of women in the Middle East (down to 20% since 1970), and the current migration processes that occur during military conflicts in some countries (for instance, Ukraine), this indicator is essential for reducing the gender gap between countries. The model showed that general migration processes, however, do not affect the condition of the gender gap. It is notable, however, that the migration processes whose statistics were used in the model do not correspond to the current migration processes in the aggressor country and Ukraine. Here, migration processes have a clear gender character: women left Ukraine mostly, and men left Russia. In our opinion, this fact can significantly affect the gender gap in the above countries, and we will have a special focus on further studies.

We have also determined the impact of the democracy level in a country on the Global Gender Gap Index. According to our model, a 1% increase in the level of democracy in a country leads to a 0.012 increase in the index in the next period. Given the very large gap in the level of democracy (min – 0.32, max – 9.75 with an average of 5.73), we note that countries that consistently increase the democracy level can significantly reduce the gender gap.

We found a statistically significant but minor effect of a country's GNI per capita on the Global Gender Gap Index. According to our model, a 1% increase in a country's GNI per

capita leads to a 0.000001278 increase in the index in the next period. This minor result is fully confirmed by the fact that in the final model, there is no significant correlation between the GGGI and income group into which the world's countries are divided. The differences are shown by fluctuations in the Global Gender Gap Index for different income groups below 3%, which is not significant. The smallest difference between the groups is in the Health and Survival sub-index, with a level of achievement on average (0.97). The largest difference between the groups is in the Political Empowerment sub-index at the level of achievement: from 0.18 (lower-middle income countries) to 0.32 (high-income countries). Thus, a country's income group does not play a significant role in the condition of the gender gap in general and its sub-index in particular. Political and military conflicts in low-income countries, and widespread poverty, lead to the need to enhance the role of women in society. Therefore, the GGGI of countries in this group is not the lowest.

5. Conclusions

The article assesses the impact of changes in fertility, income level, migration rates, democracy, and the level of Sustainable Development Goals achieved on condition of gender gap. The research was based on the Global Gender Gap Index. Over the past 50 years, the global fertility rate has decreased by over twice. Moreover, over the 16 years of the Global Gender Gap Index statistical database, the fertility rate has decreased by about 11%, which has led to a similar increase in the maximum value of the index under study. Although a clear inverse correlation exists between the top 10 countries with the highest and lowest indexes and fertility rates, we did not find a significant negative correlation across all countries. The econometric model also did not confirm our hypothesis, as it found that the fertility rate was not statistically significant as a factor influencing the gender gap. Population growth in countries worldwide has no impact on changes in the gender gap.

By using additional indicators in the model, we found a significant impact on the gender gap of changes in the share of women in the country, which is especially essential in the context of current migration changes in the population structure of warring countries. We will study this issue separately in our next studies.

The article shows the great potential of countries with low democracy levels to decrease the gender gap through democratic reforms. The econometric model showed a fairly high impact of increasing the democracy level on the GGGI. The Political Empowerment sub-index of the Global Gender Gap Index has the highest potential for improvement. Simultaneously, the lowest level of its achievement is observed not in low-income countries but in countries with lower-middle income. Also, the gender gap is positively influenced by countries' progress towards achieving the Sustainable Development Goals.

Based on data from the last 16 years, we found a minor positive effect of GNI per capita growth in a country on the condition of the gender gap. The impact demonstrated by our model is much lower than that found in the World Bank study. That is because, firstly, we analyzed GNI per capita, which is also determined by changes in the country's population. Secondly, the GDP growth potential of the World Bank model is limited by real

unemployment, which restrains the use of the productive potential of not only all women in the economy but also some men. Low unemployment is known to stimulate high inflation.

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ON THE EFFECT OF MEASURES FOR COMPENSATION ON THE END CONSUMERS OF ELECTRICITY ON THE FREE MARKET²

This article aims to examine the national mechanism applied in Bulgaria to tackle the high electricity prices in the period 2021-2023 and its impact on state-owned enterprises, which are the main source of the compensation funds. The proposed thesis is that with the collection of the revenues of state-owned companies, they are posted in conditions of restriction in terms of development opportunities, which is why the imposed emergency measures should be reviewed in the future. Although the measures themselves are widely discussed, the mechanisms for providing financial support, the financial magnitude of this support, as well as its effect, are yet to be clarified, and the data collected in the material may be useful for further analyses and evaluations.

Keywords: free market; regulation; state-owned companies; compensation

JEL: E640; G38; L11

1. Introduction

The issue of the formation of wholesale electricity prices on European markets, as well as expanding the options for permissible state intervention to support consumers, arose especially acutely after prices rose significantly in the summer of 2021 and sharply exacerbated the unpredictability and volatility of the markets. In Bulgaria, a large-scale exceptional price compensation program has been implemented, which has led to direct or indirect financial support comparable to the amount of planned public spending of the government.

In the literature, the issues of applying different forms of compensation to the electricity market are most often associated with the implementation of specific technology support policies, or with subsidies (IEA/IRENA, 2018; Kojima, 2018). Such are voluntary consent policies for constraints of electricity consumption (Crampes, 2018; Ladenburg, 2022), but also policies for the introduction of renewable energy sources (Payne, 2018). The increase in electricity prices in the period 2021/2022 is the subject of a number of institutional reports on the causes and recommended actions (EC, 2023), (OECD, 2022), as well as scientific analyses on the relationship with natural gas prices (Zhou, 2023). A full overview of the evolution of the price crisis in Europe is made in a report by MIT (Batlle, 2022), which

¹ Anton Ivanov, phone: 0889389976, e-mail: anton.ivanov@yahoo.co.uk.

² This paper should be cited as: Ivanov, A. (2024). *On the Effect of Measures for Compensation on the End Consumers of Electricity on the Free Market*. – *Economic Studies (Ikonomicheski Izsledvania)*, 33(5), pp. 100-113.

defends the thesis that excess profits should not be taken out, stressing that: "Investors in a power system governed by market rules risk their funds in the expectation/hope that the scenarios in which their investments result in profits are more probable than the ones in which losses are borne. These profits, particularly when they happen to be high, stimulate other investments, which adds to the overall competitive pressure resulting in a downward pressure on prices and inframarginal rents. Efforts should focus on further improving the existing market design and reducing the various barriers for new entrants, rather than discouraging new entry via the introduction of windfall profit taxes or mandatory auctions." Thus, the recommendations for the introduction of compensatory mechanisms and, more generally, subsidization, are aimed at their temporary nature, targeting limited groups of recipients and preventing distortions of competition in energy markets.

Considering that the approaches to using different compensation mechanisms have a specific application and are suitable for specific conditions, this article aims to analyze the national mechanism applied in Bulgaria and its impact on state-owned enterprises, which are the main source of compensation funds. The study covers the dynamic environment of the electricity markets in the last two years and the impact on the current state of state-owned companies in the energy sector, taking into account the expected continuation of compensatory practices.

2. State Ownership in the Electricity Sector of Bulgaria

The Bulgarian electricity market is part of the European electricity market and the country is connected and integrated by the day-ahead and intraday electricity markets with its neighbouring countries. Market integration and the presence of developed cross-border connections determine the strong impact of the price levels achieved in Europe on the stock exchange markets in Bulgaria. At the same time, in the conditions of extreme price increase, the reaction at the national level differs significantly from the measures taken to combat high prices in other countries in Europe. This is due to national peculiarities, both in terms of the high share of the regulated market segment and in terms of the high share of state ownership in energy companies.

The electricity sector in Bulgaria is important as a basis for economic development, but also as a sector contributing to the formation of gross domestic production (GDP).

According to data from the Ministry of Energy³, gross electricity production in 2021 is 48 TWh, and gross inland electricity consumption in 2021 amounts to 39 TWh. According to the National Institute for Statistics⁴ (NSI), the net consumption of electricity for 2021 in Bulgaria reaches 34.4 TWh (including network losses), of which 12 TWh is the consumption

³ https://www.me.government.bg/uploads/manager/source/VOP/buletin_systoqnie_energetika/Buletin_Energy-Finish-20.06.2022.pdf.

⁴ <https://www.nsi.bg/bg/content/4169/%D0%BF%D1%80%D0%BE%D0%B8%D0%B7%D0%B2%D0%BE%D0%B4%D1%81%D1%82%D0%B2%D0%BE-%D0%B8-%D0%B4%D0%BE%D1%81%D1%82%D0%B0%D0%B2%D0%BA%D0%B8-%D0%BD%D0%B0-%D0%B5%D0%BB%D0%B5%D0%BA%D1%82%D1%80%D0%B8%D1%87%D0%B5%D1%81%D0%BA%D0%B0-%D0%B5%D0%BD%D0%B5%D1%80%D0%B3%D0%B8%D1%8F>.

Ivanov, A. (2024). On the Effect of Measures for Compensation on the End Consumers of Electricity on the Free Market.

of household consumers on a regulated market and the consumption of non-household consumers who are on the free electricity market is 20 TWh.

A leading market entity in the energy market in Bulgaria is Bulgarian Energy Holding (BEH EAD) – a financial holding company that brings together companies operating in the power production and power transmission, transit and storage of natural gas, as well as lignite production. The Holding presents state-owned companies with non-current assets⁵ (mainly property, plant and equipment) amounting to BGN 20,490 million according to reporting data as of 30.09.2022.

The state-owned electricity sector is represented by the enterprises for production, including coal mining, and transmission of electricity within BEH EAD. The market share of the Power Generation Group within BEH EAD is 51% in 2021, with an installed power generation capacity of 6.3 GW producing 24.4 MW of electricity. In 2022, the Group registered an increase in power production by about 10% compared to 2021, with no change in installed capacity.

The non-current assets of the Power Generation Group within BEH EAD are BGN 12,575 million, and as of 30.09.2022 sales and services for transit and balancing of electricity amounted to BGN 11,640 million, compared to BGN 3,680 for the same period in 2021. The profit reflected in the interim reports as of 30.09.2022 is BGN 3,146 million. This profit is not reflected in an increase in the costs of the companies in the development group, with investment costs for the period of only about BGN 220 million.

More generally, the changes in the national market model over the years have led to cost optimization of state-owned power companies as a result of the measures taken to limit vertical integration, improve accountability, introduce the wholesale exchange market and market coupling with neighbouring countries. As it was the market integration that ensured the high inflow of financial resources in the power sector, taking into account the growth of exports.

3. National End-User Compensation Mechanism

In response to the high prices of electricity on the free market, at the end of 2021, Bulgaria implemented a large-scale emergency price compensation program, which led to direct or indirect financial support comparable to the amount of planned public spending of the Government.

In connection with the sharp rise in electricity prices on the stock exchange markets in the European Union from October 2021, the Bulgarian government, through the Ministry of Energy, initiated the implementation of measures for compensation of the end consumers of electricity on the free market. The aim is to alleviate non-household end-users of electricity

⁵ <https://bgenh.com/page/22/%D0%A4%D0%B8%D0%BD%D0%B0%D0%BD%D1%81%D0%BE%D0%B2%D0%B8-%D0%BE%D1%82%D1%87%D0%B5%D1%82%D0%B8.html>.

in Bulgaria by reducing their electricity costs in the months with the highest consumption and the highest current prices.

These measures are carried out on the basis of the increased revenues from sales and profits of the companies within BEH EAD, which are mainly used to provide compensation to end-customers incl., and by accelerated repayment of liabilities on government loans. According to Order of the Council of Ministers No. 5 of 27.04.2022, the dividend deductions from state-owned commercial companies amount to 100%, after deduction of uncovered losses and deductions for the Reserve Fund.

In connection with Order of the Council of Ministers No142/10.03.2022, the National Electric Company (NEK EAD) presciently repays to the Ministry of Energy a loan received for payment for Belene NPP equipment, amounting to BGN 1,177 million, in connection with which NEK EAD receives assistance within BEH EAD through internal loans. This leads to a decrease in the Company's liabilities from BGN 4 082 million in 2021 to BGN 2 923 million as of 30.09.2022. However, according to the Company,⁶ the problem of the tariff deficit accumulated since 2012 remains unresolved.

It should be pointed also out on the financial statements of the companies which show an increase in costs in the "Other" column – at Kozloduy NPP EAD this cost amounts to BGN 2,135 million for 2022, compared to BGN 247 million for the same period of 2021, and the accounting reports also include grants provided to the Ministry of Finance BGN 450 million in grants under Order of the Council of Ministers No. 739/26.10.2021. This shows that the company participates in the process of raising funds under government programs not only by paying a dividend in the amount of its entire profit of BGN 1,369 million as of 30.09.2022, but also by deductions on other lines.

The TPP Maritsa East 2 EAD reports partial compensation of the accumulated liabilities, which from BGN 1,525 million in 2021 decreased to BGN 1,213 million as of 30.09.2022, and the company reports a profit of BGN 773 million as of 30.09.2022, which was used to raise funds under the Government programs. Preliminary⁷ data for 2022 show that if the entire profit is redirected to cover losses from past periods, the plant will reduce the accumulated losses to about BGN 220 million.

The common aspect for the companies from the Power Generation Group within BEH EAD is that there is no increase in the cost of investment and development of the main activity.

Despite the high increase in natural gas prices, the companies from the Gas Transit and Supply Group within BEH EAD do not participate significantly in supporting the government measures to compensate for high energy prices in Bulgaria due to the fact that they operate with imported raw material and are at high risk in cash flow management.

The Government measures for compensation of high energy prices in Bulgaria went through several stages, being financed mainly by the companies from the Power Generation Group within BEH EAD.

⁶ <https://3e-news.net/bg/a/view/41545/martin-georgiev-naj-goljamoto-predizvikelstvo-pred-nek-prez-2022-g-beshe-hidrologijata>.

⁷ <https://www.segabg.com/hot/category-economy/beh-trudno-mozhe-da-zakurpi-dupkata-haznata>.

The first version of the measure⁸ for compensation of non-household end customers of electricity included payment of aid at a level of BGN 110 per MWh, and the entire amount of compensation to all end customers for October and November 2021 amounted to BGN 387 million. The financial source for this first stage of compensation is the revenues in the Fund “Security of Electricity System” (SES), the State Budget and the donation from Kozloduy NPP. It should be pointed out that the stocks used by the SES Fund are from a buffer of about BGN 500 million from the revenues from CO2 allowances, which appeared due to the high prices of the allowances, as well as the higher revenues under the deductions of 5% of the revenues of the energy companies. The donation from Kozloduy NPP amounts to BGN 450 million, which was partially used in 2021, with the remainder also used for compensation in the coming months of 2022. The measure takes into account that the existing regulated market is protecting household consumers from price growth.

The compensation mechanism applies a deduction of the corresponding amount from the monthly electricity bill for each customer. Under the Government's compensation program for the final non-household electricity consumers who are on the free market, there is no foreseen procedure for application. In order for this to happen, the Ministry of Energy concludes contracts with electricity traders, suppliers of last resort, producers who sell directly to final non-household customers, as well as with the operator of the organized electricity exchange market. It is obvious that the state administration is involved in the process with a non-character function, but thanks to this the program was activated at the initial stage.

At that stage, the measure was consulted with DG Competitiveness of the European Commission, which considered the measure to be non-selective and therefore do not constitute State aid.

Subsequently, the program is extended⁹ with effect until the end of March 2022, with business compensation for December 2021 calculated as 75% of the difference between the base price of BGN 185.59 per MWh and the real average monthly exchange price of the day-ahead segment on the Independent Bulgarian Power Exchange (IBEX) for the respective month, but not more than 30% of the real exchange price for July 2021. This type of support to the business has a total value of about BGN 986 million by the end of the period (December 21 – March 22). This time the measure also includes support to grid operators for their technological costs (July 21 – March 22) estimated on the basis of a real cost above the one recognized by the Energy and Water Regulatory Commission (EWRC), as well as natural gas consumers on the regulated market and grid operators, for which additional costs of BGN 644 million were foreseen. In addition, water and sewerage operators have been further compensated with about BGN 100 million for real costs for the period from 2021 to 03.2022, which finance the real costs compared to those recognized by the EWRC. Programs of the

⁸ <https://www.expert.bg/macrovew/energy/110-te-levamvtch-kompensacija-za-firmite-ne-sadyrjavna-pomosht-1668018.html>.

⁹ <https://www.me.government.bg/bg/news/kompensacii-za-okolo-1-5-mlrd-lv-do-kraya-na-m-mart-2022-g-predlaga-ministerstvoto-na-energetikata-2959.html?p=eyJwZXJpb2QiOiIwIiwia2V5d29yZHMiOiJcdTA0M2FcdTA0M2VcdTA0M2NcdTA0M2ZcdTA0MzVcdTA0M2RcdTA0NDZcdTA0MzBcdTA0NDZcdTA0MzhcdTA0MzgiLCJvcmlldiI6IjAifQ.>

Ministry of Education and Science were also developed to compensate students – a fixed amount per student, support for electricity costs – based on the real cost of dormitories to a regulated market – about BGN 5 million.

The measure has been extended until the end of June 2022 in view of the plans for the adoption of a new State budget, but the main payment function was transferred to the SES Fund. The amount of compensation varies depending on the achieved basic average monthly exchange price of the day-ahead segment of IBEX for the respective month and is as follows:

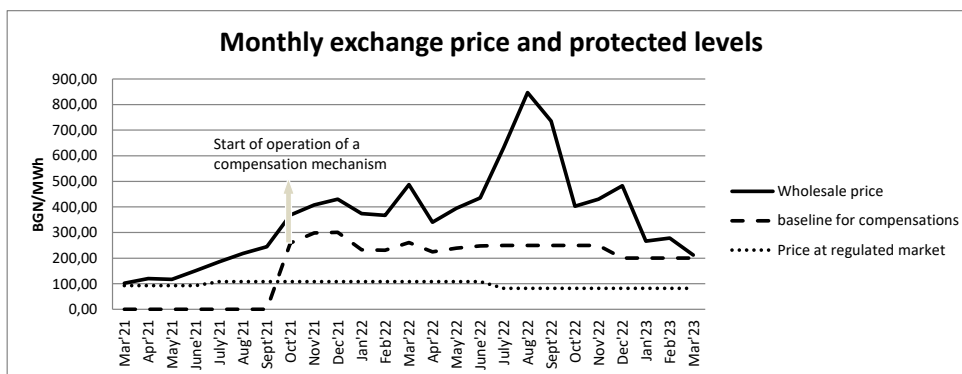
- October 2021 – BGN 110/MWh
- November 2021 – 110 BGN / MWh
- December 2021 – BGN 128.98 / MWh
- January 2022 – BGN 141.21 / MWh
- February and March 2022 – 75% of the difference between the real average monthly exchange price of the day-ahead segment on IBEX for the respective month and the base price of BGN 185.59 / MWh (average baseload price on the day-ahead market on IBEX for July 2021). At prices below the baseline, compensation is not provided.
- April 2022 – BGN 116.08 / MWh
- May 2022 – BGN 155.71 / MWh
- June 2022 – BGN 188.71 / MWh

With the procedure for updating of State budget, the 47th National Assembly introduced a baseline for calculating the compensation of BGN 250 per MWh. The difference between this price and the average price of electricity on IBEX (monthly average price day-ahead segment) is covered by the resources of the SES Fund. With amendments to the Energy Act, all state-owned enterprises that produce electricity pay targeted contributions to the SES Fund to finance these activities. The amount of the contributions shall be determined by the Council of Ministers on a proposal from the Minister of Energy.

On 11.11.2022, a decision of the National Assembly was published, according to which all consumers on the free market should receive compensation for electricity prices over BGN 200 per MWh (baseline for calculating the compensation), and the support should continue until December 31, 2023. An attempt was made to differentiate the compensations by type of consumers and depending on the achieved energy efficiency indicators, but the final decision of the National Assembly continued the practice of compensating all consumers on the free market.

The levels achieved above which stock prices are subject to compensation in favour of the consumers are presented in Figure 1.

Figure 1. Achieved levels of stock prices and secured payment levels at end users



Source: own results of analysis of IBEX statistics and regulatory decisions.

Figure 1 shows that the provided compensations follow the course of prices on the power exchange and provide financial resources for payment to traders within the next month – initially by the Ministry of Energy, and subsequently by the SES Fund. The program for compensation of non-household electricity consumers includes about 633,000 end customers, including companies, educational institutions, temples, theatres, medical institutions, etc.

By 31.10.2022, according to the program to compensate for high electricity prices, which starts in October 2021, consumers on the free market have received over BGN 4.4 billion, as indicated in a written response of the caretaker Minister of Energy to a parliamentary question. Based on the analysis of consumption and the data for the average monthly base load price on IBEX, taking into account the established levels above which compensation is provided, our own assessment has been prepared, which shows that users on the free market (including network operators for technological costs) have received an additional BGN 1.2 billion by 31.03.2023.

Thus, a total of between EUR 5.5 billion and EUR 6 billion has been paid under the compensation program. Taking into account that the main part of the revenues in the SES Fund are used for compensation to the Public Power Provider and for payments under premium contracts (PPA), as well as the fact that the budget funds are directed to support programs outside the support for electricity bills, it is concluded that the main part of the costs for compilation of electricity bills of electricity free-market customers were provided by state-owned companies.

As stated, consumers in a regulated market are also protected from the increase in wholesale electricity prices. In the period of sharp increase in electricity prices, household consumers pay the energy component at a regulated price set by the EWRC in the amount of BGN 108.37 per MWh respectively (determined by Decision No. C-27 of 01.07.2021) and BGN 81.90 per MWh (determined by Decision No. C-19 of 01.07.2022). The difference in market prices is offset through the following three sources:

- by the SES Fund, through the use of funds from carbon allowances sales;

- by the SES Fund, through the use of contributions from electricity producers and other liable persons, amounting to 5% of their revenue;
- from the provision of electricity at a regulated price by state-owned companies.

The contributions to the Fund for 2022 from the state-owned power companies in the BEH group, which are formed on the basis of 5% of their sales revenues, are about BGN 600 million. The difference between mandatory supply prices on a regulated market and the prices achieved on the free market forms a missed income from Kozloduy NPP, NEK and Maritsa East 2 TPP amounting to BGN 2.4 billion for 2022.

In this sense, in total, during the period of high market prices of electricity from July 2021 to March 2023, the state-owned Power Generation Group within BEH EAD have provided financial resources for government support programs amounting to between BGN 9 and 10 billion.

4. Participation and Effect for the Different Trading Participants of the Applicable Compensation Mechanism

In the period of price crisis, private companies in the sector had minimal or no participation in government support programs, mainly as deductions of 5% of their sales revenue (for some private companies) or corporate income tax (for those that report profits), as well as through the revenue ceiling introduced in January 2023. The income from these contributions to the SES Fund does not exceed BGN 500 million or from the extraordinary expenses of private companies are insignificant compared to the contributions provided by the group companies of BEH.

In connection with the implementation of Council Regulation (EU) 2022/1854 of 6 October 2022 on emergency intervention to address high energy prices of 13.10.2022, the Council of Ministers prepared a proposal for a law, including reference values for reference price by type of producers to determine the amount of a target contribution by all producers, not only by state-owned companies. This bill was not considered in the National Assembly. The arrangements for implementation of the provisions of the State Budget of the Republic of Bulgaria Act for 2022, promulgated on 30.12.2022, in force as of 01.01.2023, in connection with the implementation of the Regulation, determined the obliged persons and instructed the Council of Ministers to determine the specific revenue ceiling for the respective type of producer. They are determined by Order of the Council of Ministers No. 29 of 12.01.2023.

In addition, through amendments to the Corporate Income Tax Act, on 06.12.2022 the National Assembly accepted that companies operating in the sectors of crude oil, natural gas, coal and oil refining should pay a mandatory temporary solidarity contribution to the generated excess profits. The taxation is 33%, and the average profit for the last four years, plus 20%, is considered an excess profit. According to the Ministry of Finance, the measure will cover 32 companies, but half of them have not announced such profits and the additional taxation will not affect them, so for 2023 revenues of about BGN 76 million are expected along this line.

Still, questions were raised about the effectiveness of the applied mechanism to compensate all consumers on the free market on equal terms, but with funding mainly provided by state-owned companies. The main argument in favour of the applied mechanism is that it does not require the development of a complex targeted support mechanism that shall receive approval from the European Commission. In addition, in the discussions, it was pointed out by the business organizations that over the years companies in the power sector have received excess revenue¹⁰¹¹, i.e. the claim is that now the violated fairness in pricing for the free market participants in Bulgaria is being restored.

Following this discussion, we should point out that the Bulgarian power market has shown over the years a number of weaknesses – frequent changes in the market model of domestic cross-subsidization, the introduction of an untransparent mechanism for cold reserve or availability costs, which have sparked objections. Despite these weak points, the established electricity system secured supplies to the country and provided protection for consumers in a regulated market. In the last 10 years, the model of "single buyer" has been changed to the current model with "public provider", the system of reporting and traceability of service costs has been significantly improved, and market integration has increased competition. Bulgaria is still delaying the full liberalization of the retail market, but this has made it possible to implement a comprehensive compensation mechanism in a very short timeframe.

The mechanisms for ensuring cold reserve and system services, including balancing models, continue to be under discussion, but they represent services necessary for system security and it is a matter of finding the optimal form for their implementation.

The existence of special conditions to ensure, both investment in the sector and reliability of supply, is a rather normal practice, which is now emphasized by the European Commission's proposals to change the market model. To a large extent, the new proposals have already analogues or practices in Bulgaria. For example, renewable energy projects receive support through premium contracts and there are already long-term contracts for the purchase of electricity (PPA). These contracts are similar to the long-term contracts with two coal plants signed years ago, thanks to which Bulgaria established modern low-emitting generation. The rehabilitation of the other coal-fired power plants was realized with loans and rights to use free allowances for carbon emissions. District heating plants also continue to use special conditions when using highly efficient combined cycles (high-efficiency cogeneration). The corporate practice of supporting TPP Maritsa East 2 for the purchase of carbon allowances after 2018 amounts to about BGN 200 million is also noted in the assessments for provided support.

Based on an analysis of regulatory pricing decisions, it is estimated that after 2011 business users in Bulgaria have paid an additional BGN 4.6 billion in the form of price additions, through which investments in new plants and rehabilitation of existing plants have been

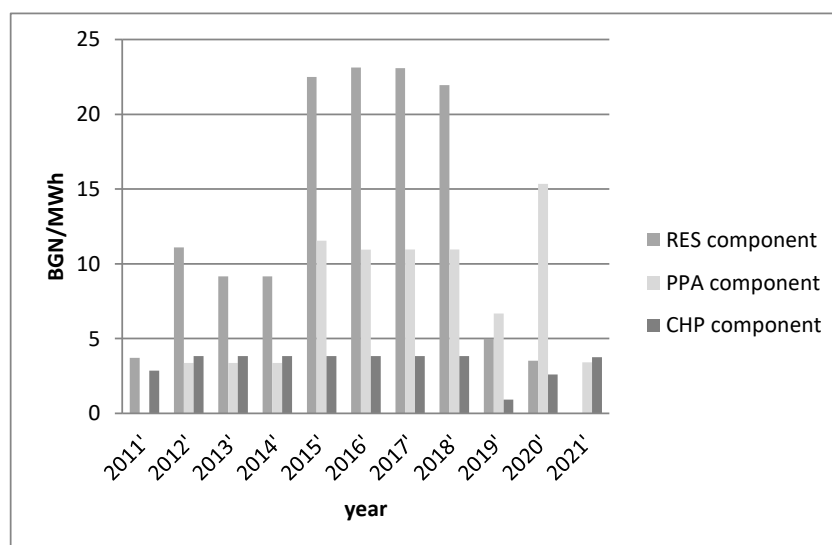
¹⁰ <https://bica-bg.org/bg/article-22124-aobr-s-priziv-kym-bylgarskiq-biznes-za-tushirane-na-cenite-i-spirane.htm>.

¹¹ <https://bica-bg.org/bg/article-21841-aobr-s-pismo-do-instituciite-otnosno-proekta-na-pms-za-prilagane-na.htm>.

ensured. The evaluation takes into account the additives forming an "Obligation to Society" as indicated in Figure 2.

The assessment is based on average consumption for non-household consumers connected to the network low, medium and high voltage of 18.5 TWh per year.

Figure 2. Share of the component components of the supplement "Obligation to Society"



Source: own results of statistical data analysis and regulatory decisions.

The discussion of the costs of maintaining a reliable national energy mix should not be limited to the current financial parameters of the final price, but should take into account also the need for system services and power availability in periods of crises.

Thus, the availability of national generation capacities allowed Bulgaria in times of price crisis to provide compensation for customers on the free market for about BGN 6 billion and separately to provide affordable prices for households.

Both system reserve mechanisms and approaches to securing generation capacities in the electricity sector are necessary conditions for secure supplies, which are realized over a long planning horizon that exceeds 20 years. In years without supply crises or severe weather conditions, those types of costs cause sharp criticism, but in crisis periods they are well come since they ensure the availability of electricity generation and secure and affordable supplies.

Therefore, the protection of the financial and technological stability of state-owned companies, which mainly provide system services and reserves, should be a priority when planning the allocated funds for compensation, having in mind the long-term reliability.

5. Parallel to Actions Taken in the European Union

In the last three years, the discussion of the adequacy market model and the search for the right balance between the free competition requirements and policies for support of green development has been central not only in Bulgaria but also in Europe.

The European Commission proposed¹² a set of measures to counter high energy prices as early as October 2021, initially highlighting the focus on saving energy in terms of natural gas usage and highlighting the need to build more renewable capacities. An analysis of the electricity market model and the carbon trading of ACER was also commissioned. The report¹³ underlined that the market model has brought benefits to end-users and should not be changed due to the current crisis and that there is no significant impact of the financial transactions on the system for carbon trading.

Despite these conclusions, practically all EU countries have started to take various measures¹⁴ to ensure the security of supply and affordable energy prices. Initially, national measures targeted vulnerable groups of consumers and were based on budgetary programs. Some countries have taken more radical measures such as a ceiling on the price of natural gas on the national market (Spain¹⁵) or a general support program (Germany¹⁶). In May 2022, the Commission proposed¹⁷ to develop the framework of the National Recovery and Development Plans with the REpowerEU Plan.

Following the insistence of many governments, at the end of 2022 the Commission proposed by Regulation (EU) 2022/1854 to set a ceiling on the revenues of energy companies, and in March 2023 announced a proposal¹⁸ for the electricity market modification. These proposals aim at expanding the application of long-term contracts, but with priority for renewable and new low-emission generation.

Due to the mild winter in 2023 and low demand for natural gas in Europe, measures to secure supplies from sources outside Russia have borne fruit and energy market prices are now significantly lower than in August 2022. This led to reduced pressure on the works for reform the market and limited the options for reducing the energy dependence mainly to the development of new renewable capacities.

¹² https://ec.europa.eu/commission/presscorner/detail/en/fs_21_5213.

¹³ <https://www.acer.europa.eu/events-and-engagement/news/press-release-acer-publishes-its-final-assessment-eu-wholesale>.

¹⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0138>.

¹⁵ https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjNxK78wuj9AhVASPEDHfbRD3kQFnoECCQQAQ&url=https%3A%2F%2Fwww.lamoncloa.gob.es%2FInag%2Fen%2Fgobierno%2Fcouncilministers%2FPaginas%2F2022%2F20220513_council-extr.aspx&usq=AOvVaw2gQP_j_w9O05S938Ez64C.

¹⁶ <https://www.euractiv.com/section/energy/news/the-final-details-of-germanys-e99-billion-energy-support-scheme/>.

¹⁷ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131.

¹⁸ https://ec.europa.eu/commission/presscorner/detail/en/IP_23_1591.

Despite a decrease in the perception of an energy crisis, some conclusions can be drawn from the past period:

- The response to crises in energy supply continues to depend mainly on the national energy model, and common decisions at the EU level are of limited importance.
- Measures, introduced by national governments in times of crisis, actually limit the free market and increase the importance of budget spending. Including the proposed measures for the development of the market model by the EC have the effect of increased regulations and state involvement.
- Access to the resources of the state-owned companies is direct, which is important when the ability to react quickly is key in case of abrupt market deviations.

In the long run, the European Energy Union will continue to have a significant impact on the development of the national market in Bulgaria through the common policies and market model, channelling of financial instruments and through the rules for permissible state aid. The analysis of the proposed measures by the Commission to change the market model shows rather a commitment to policies for the development of a low-carbon economy than to revise the basic policies.

In conditions of short-term market changes, reflecting the influence of significant external factors, the developed market model does not allow rapid adaptation. In such cases, the available national instruments are of key importance. Providing such opportunities in Bulgaria requires the maintenance and development of power infrastructure and generation capacities with a long horizon of operation.

6. Results and Recommendations

In Bulgaria, a large-scale program for compensation of high energy prices was implemented, which went through several stages and was financed mainly by the companies from the Power Generation Group within BEH EAD. Despite the increased revenues in the period, the analysis of the financial statements does not show an increase in investment and improved operational costs, which leads to the conclusion that companies fail to increase their competitiveness.

Although it was widely supported, this program lacks the necessary level of publicity for the significant resources spent, including what results have been achieved and who are the largest recipients of support. It seems that a quarter of the financial resources are directed to about 30 largest industrial consumers of electricity, but there is no analysis of the impact of this measure in the formation of their final prices. Nevertheless, it is recommended¹⁹ that it is this model of compensation for all free-market users to continue.

Taking into account that the resources redirected by state-owned energy companies under state programs are comparable to the total final consumption expenditures of the Government, which in 2021 amounted to BGN 26,335 million, it is important to assess

¹⁹ <https://www.mediapool.bg/nakade-v-energetikata-sled-izborite-news346373.html>.

whether this support has led to growth in 2022. At this early stage, in terms of accountancy reporting, we can indicate the data from the annual review of the Ministry of Finance "Economy of Bulgaria" from 2022, according to which in 2021 there is a decrease in fixed capital investments by 11%. According to the published key economic indicators of the NSI, the relative share of gross fixed capital formation in GDP in the third quarter of 2022 decreased by 6.1% in real terms compared to the same period of the previous year, according to seasonally adjusted data. On the other hand, according to data²⁰ from the Ministry of Finance, the average growth of companies' profits in Bulgaria for 2021 is about BGN 1.5 billion, while in 2022 it is already BGN 10 billion. The inflation figures also show a negative trend with a growth of 16.9%.

It can be concluded that the compensations have not contributed to reducing consumers' costs or increasing assets in Bulgaria, as it was used as initial justification. At the same time, state-owned companies failed to take advantage of the increased revenues for the deployment of modernization programs or new capacities, unlike their competitors in the private sector in Bulgaria or those on the regional market, which in the medium term will put the companies within BEH in a difficult situation.

The discussion on the effectiveness of the implemented state program is important in view of the expected new price increase of energy resources next winter season when the issue of applying compensation measures will arise again.

In addition to the mechanism for equal compensation of all consumers on the free market, we recommend that the following targeted compensation approaches be considered for application:

1. Compensation is a function of the share of electricity expenses in the cost of the production of the respective enterprise. This approach would mainly target aid to industrial production and would limit aid to the financial sector and services.
2. Application of the compensation model that was used in the conditions of the COVID-19 pandemic – supporting enterprises with reduced sales revenues due to high electricity prices. This model helps to preserve jobs, but there is a risk of losing foreign markets.
3. A model of compensation for all consumers on the free market, but with the stimulation of good commercial practices. Under such a model, full compensation is received by those consumers who have concluded contracts for the supply at prices which are close to the best ones, and consumers with high-priced contracts receive partial compensation. The determination of the competitive market price reference level should be based on the average price achieved by at least 80% of supply contracts. This threshold in determining the reference price is derived in order to avoid the dominance of large consumers, mainly connected to the high voltage grid and who account for about 35% of consumption on the free market.

²⁰ <https://www.mediapool.bg/mf-33-danak-varhu-svrahpechalbite-na-vsichki-firmi-ili-zaem-ot-mvf-news345812.html>.

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STUDY OF THE CURRENT STATE AND DEVELOPMENT OF SHARING ECONOMY IN BULGARIA: SEASIDE TOURISM APPLICATION PERSPECTIVES²

The sharing economy is a modern digitalized alternative to traditional economic relationships and is developing and growing dynamically. The most positive evidence suggests that the sharing economy could match the traditional market economy in terms of the volume of transactions. Globally, the main sharing economy markets are China, the USA and Europe, and within the EU consumer interest in sharing services is high as 52% are aware of sharing options and 17% have used them at least once. According to data, the most developed sharing subsectors in the EU are shared accommodation and shared mobility. As these are the main sub-sectors also in the tourism industry, it is obvious that the sharing economy has entered the tourism industry and is rearranging the traditional tourist business. Therefore, the main purpose of the current study is to investigate the tourism application perspectives of the sharing economy on the Bulgarian Black Sea coast as the latter is the highest developed tourist area in Bulgaria.

Keywords: Sharing economy; tourism; application; perspectives; Bulgarian Black Sea coast

JEL: L81; L83; Z31

1. Introduction

The modern economy is experiencing a process of significant transformation – the kind of transformation that happens once every 100 years (Helbing, 2015). The invention of the computer, the internet and social media are changing the way in which many activities are introduced and performed – redefining institutions, organizations and structures on which society and economy are based. Helbing calls this process a digital revolution, and according to Barnes and Mattson (2016), if the internet contributed in the 1990s to the emergence of a qualitatively new distribution channel for products and services commercialization, as well as the development of e-commerce, a new digitally mediated platform-based society has emerged since 2000. Social interaction through social networks has transformed not only communication but also the exchange of goods and services, which has remodelled business

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² This paper should be cited as: Ilieva, E. (2024). Study of the Current State and Development of Sharing Economy in Bulgaria: Seaside Tourism Application Perspectives. – *Economic Studies (Ikonomicheski Izsledvania)*, 33(5), pp. 114-147.

activities and methods for resource acquisition (Botsman, Rogers, 2011). The current study is dedicated to an extremely current topic covering the sharing economy. Its purpose is to investigate the user's perception of the state and development prospects of the sharing economy in the tourism industry.

2. Defining Sharing Economy

Sharing economy is also commonly called collaborative economy, P2P-economy, collaborative consumption and access-based economy, which are also the most widespread and used in socio-economic aspect terms. Botsman and Rogers contribute notably to the wide adoption of the existing term 'sharing economy' and argue that it focuses on the consumer-led rather than producer-led shift in consumption. The researchers believe that this modern economic system is geared towards more sustainable resource consumption and is based on four key principles – *the critical mass, the idle capacity unlocking, the faith in community and the trust between strangers' principles*.

There are a variety of definitions for sharing economy due to the different aspects of the used term or author's perspective. In the earliest studies, the authors concentrate mostly on human ecology and the behaviour within collaborative consumption and lifestyle (Botsman, Rogers, 2011; Felson, Spaeth, 1978; Hawley, 1950). In the early years of the new millennium, studies emphasize cooperation, non-reciprocal sharing and community-based relationships between people (Rifkin, 2000; Bauman, 2003; Benkler, 2004; Gibson-Graham, 2006; Belk, 2007). From 2010 on most of the researchers have taken a look at the hybrid plethora of the sharing economy as a mixture between economic and social relationships and discuss in their scientific papers the trade alternative-based nature of sharing economy; social platforms and modern technologies as an engine of the system development; the economically more effective access based instead of ownership based consumption of resources and the ecological aspect of this modern phenomenon (Cameron et.al., 2013; Botsman, Rogers, 2010; Rifkin, 2000; Gansky, 2010; Bardhi, Eckhardt, 2012; Schor, Fitzmaurice, 2015; Sigala, 2015; Benyucef, Huang, 2013; Rifkin, 2015)

In terms of sharing economy definitions, most approaches are based on highlighting its substantive aspects, mainly aiming to clarify the process of sharing and its *distinctive characteristics from a trade-based economy*. The existing definitions, although few in number, can be grouped according to the entity producing the definition.

- Institutional – a critically small proportion of the existing definitions are produced by institutions, whether the latter are governmental or non-governmental.

Table 1. Institutional sharing economy definitions

Institution	Definition
World Bank Group (World Bank Group, 2018)	The sharing economy refers to individuals offering their <i>underutilized assets</i> to others using <i>digital platforms</i> .
US National Association of Insurance Commissioners (NAIC, 2020)	The sharing economy involves sharing goods and services with strangers, often through a <i>third-party digital network</i> . The term also describes companies that allow anyone to profit from their own goods and services.
US Corporate Finance Institute (CFI, 2022)	The sharing economy is an <i>economic model</i> in which goods and resources are <i>shared by individuals</i> and groups in a collaborative manner so that physical assets are converted into <i>services</i> .
Australian Government (Australian Government, 2022)	The sharing economy connects individuals who offer/demand products or services for rent or lease through an <i>online platform</i> or mobile app.

Source: Created by the author.

- Scientific – the authors' approaches differ in the sharing economy emphasis. Due to the fact that the sharing economy has a broad content of products and services, variable forms of relationships and effects for stakeholders can be observed.

Table 2. Scientific sharing economy definitions with highlighted aspects

Author	Definition/emphasis
Bardhi & Eckhardt, 2012	A <i>type of access-based consumption</i> in which temporary access to goods and services is obtained in return for transactions in which the right to temporary access is transferred rather than ownership.
Guttentag, 2015	A type of modern service representative of so-called " <i>disruptive innovation</i> " that can transform the market to the point of wiping out the previously dominant leaders, with the new service offering a cheaper, more convenient and simpler solution than the old status quo.
Laura Piscicelli et al., 2015	An emerging <i>socio-economic model based on sharing</i> , bartering, gifting, swapping, renting, and borrowing based on new technologies and peer communities. Providing access to underutilized assets and promoting efficient use of resources, reduced environmental impact, and a focus on sustainable consumption.
Dredge & Gomothy, 2015	A <i>hybrid, technology-based, alternative economic model</i> that reinvents deeply held cultural, moral and environmental beliefs. It is inherently an economic system characterized by a complex scheme of relationships between entities, a specific network of individuals and transactions for the transfer of a good of an intangible nature – the right of access and/or use.
Belk, 2007	The <i>process of distributing and receiving a resource</i> from an individual(s) to others for use by the latter. Unlike sharing, where a resource is provided for use free of charge, SI represents people coordinating the acquisition and distribution of a resource in exchange for payment or other compensation.

Source: Created by the author.

After conducting research about sharing economy definitions we can admit that sharing economy is a very complex term, which deters us from elaborating a single definition. However, we would like to highlight that we accept that the sharing economy is an economic system and follow the approach adopted by the authors to specify its distinctive characteristics that make it unique.

Table 3. Main characteristics of the sharing economy

Characteristic	Description
Economic system	It is complex in structure and includes stakeholders, relationships and objects that are different in nature, which is why it is diversified into separate sharing branches.
Basic principles	Critical mass principle, idle capacity unlocking principle, faith in community principle and trust between strangers principle.
Exchange relationship	Diverse nature of relationships: sharing, bartering, exchanging, trading (in the sense of sharing with monetary return), giving, renting, and borrowing – in essence, the process is 'pseudo-sharing'.
Main participants	The provider of the shared product/service, the consumer of the shared product/service, the mediator of the sharing process.
Object of sharing	No ownership is transferred, but the right of temporary access to an underused resource. The resource can be a tangible good (shared machine etc.), a financial good (shared credit etc.), or an intangible good (knowledge/skills etc.).
Communication type	Communication between supplier and consumer with equivalent positions from all relationship types: C2C, C2B, B2C and B2B.
Open system	Free entry and exit or with negligible barriers based on voluntary participation.
Community-based	The participants not only share assets, but also experience belonging and share cultural, moral and environmental beliefs.
Main goal	Efficient use of underutilized resources, but there are also non-monetary benefits in the alternative sense of user value creation.
Technological dependence	Platforms mediate provider-consumer interaction and facilitate outreach to a large volume of participants, without which sharing would remain critically small.

Source: Created by the author.

The most common reason for sharing economy users to prefer shared than ownership-based assets is economically based. (Bardhi, Eckhardt, 2012; Guttentag, 2015; Walsh, 2011; Zekanović-Korona, Grzunov, 2014) A shared service is considered to be more cost-effective than a traditional purchase of a good or service. In the case of shared consumption, the cost of temporary access for use is generally lower than the cost of ownership. In support, according to a survey of users of shared services, 83% use them as an alternative to ownership because of the lower cost, and another 62% emphasize the speed and convenience of the sharing process versus a traditional purchase (Gitnux, 2022).

Table 4. Comparison of acquisition and access prices at an average frequency of use of resources

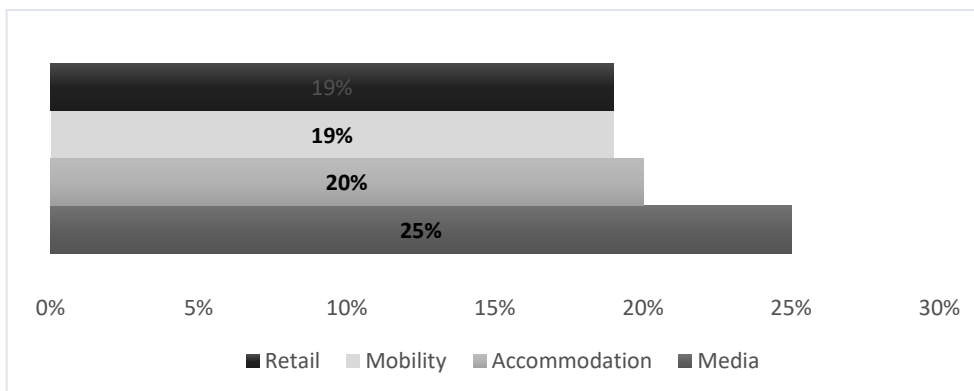
Resource	Average annual frequency of use	Acquisition price	Access based price
Lawn mower	1-2 times weekly	3000 USD	6 USD/day
Boat	1 times monthly	120 000 USD	300 USD/day
Surf	1-2 times monthly	1000 USD	60 USD/week
Bicycle	3-4 times monthly	800 USD	18 USD/day
Car	1-2 times daily	45 000 USD	9 USD/hour
Boutique handbag	1 times monthly	15 000 USD	100 USD/day

Source: *The Economist* (2022). Retrieved from <https://www.economist.com/leaders/2013/03/09/the-rise-of-the-sharing-economy> (Accessed on 19.03.2023).

According to another survey, people are most willing to share electronics (28%), services/education (26%), technology (23%), a bicycle (22%), their home (15%), and

furniture (17%). (Nielsen, 2014). According to the most recent 2021 survey, attitudes have refocused with the most shared being: media (music, photos, movies, etc.) (25%); accommodation (20%); mobility (19%); and retail (19%).

Figure 1. Top shared resources by readiness providing temporary access for use



Source: Šestáková, A., Plichtová, J. (2019). *Contemporary commons: Sharing and managing common-pool resources in the 21st century. Human Affairs 29(1), 74-86.*

3. Sharing Economy State and Participation Within the Tourism Industry

In terms of shared products and services consumption, statistics show that more than 500 MN people in the US, China, Germany, France, the UK, and the UAE have shared resources in the past 3 years to earn a profit. Remarkably, more than 680 MN people have consumed these shared assets in the same period.

Table 5. Sharing economy statistics worldwide

Region	Sharing services widespread
North America	72% have used a shared service app and 50% have fulfilled a shared service transaction.
Asia-Pacific	78% would like to share their owned resources and 81% are willing to use shared assets.
Latin America	70% have a positive attitude to share and another 73% would like to use shared services instead of ownership.
Middle East and Africa	68% of people are willing to share or rent, while 71% are willing to rent from others.
Europe	54% would like to share their own resources, while 44% are willing to use shared-based consumption.
China	73% of the online population are consumers in the sharing economy, from these more than 55% share their owned assets.
UAE	54% are willing to share their owned resources and 61% would like to use shared assets.

Source: Created by the author on Proficient Market Insights, 2023.

As the world economy suffered one of the worst crises in history by the impacts of COVID-19 in 2020, the pandemic also had a significant influence on the sharing economy. However, the effects were different in trade-based and sharing economies. In the sharing economy,

some of the most negatively affected sub-sectors were tourism-related mobility and accommodation. The demand for shared accommodation has declined in all major markets except South America (+30%) and North America (+10%) by between -8 and -39%. (AirDnA, 2022). Shared mobility platforms, such as Lyft and Uber, also reported drops in summer 2020 ranging from -54% to -75% compared to 2019. (MovMi, 2021) On the other hand, the COVID-19 pandemic has created some new opportunities for part of the sharing economy. Due to the lockdowns and social distancing measures, services within **Food & Entertainment sharing** have registered a rise in demand and sales and increased by 51% from March to May 2020.

From a statistical point of view, there has been a dynamic development of shared economic relations over the last few years. The following statistics can be cited in support of this statement (Proficient Market Insights, 2023):

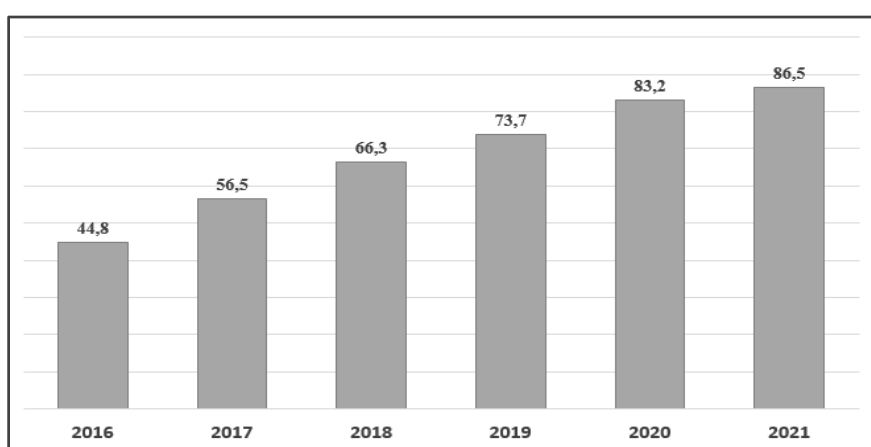
- There are 9,829 companies in the sharing economy worldwide, operating in 133 countries on all continents, indicating the high and efficient productivity of these companies.
- Of the 500 million individuals listed as providers of shared services, 96% made a profit from sharing resources, indicating the opportunity to stimulate entrepreneurship and small business.
- The global sharing economy is expected to grow to \$600 billion by 2027, from \$113 billion in 2021, with a remarkable annual growth rate of approximately 32% (Statista, 2022). Cumulative growth in the sharing economy for the next 12 years is forecast to be 2.133%, with traditional trade-based companies seeing a 39.6% increase in revenue.
- According to PwC, the turnover in the EU sharing economy is expected to rise from €15bn in 2013 to over €300bn by 2025. The total economic impact of the sharing economy amounts to €572m per year within the EU, accounting for nearly 85% growth on an annual basis (Statista, 2022).
- The global leader in the sharing economy, Airbnb, reports an average of 425 million nights spent per year as of 2019, which compares to over 90% more than the Hilton hotel chain worldwide.
- Uber's market capitalization for 2019 is \$75.5 billion, which is more than the capitalization of airline giants such as Delta Airlines, American Airlines and United Airlines combined.
- French ride-sharing pioneer BlaBlaCar had over 60 million users worldwide in 2018. In response to competition, the national rail operator SNCF in France composed new products such as low-cost trains, showing the stimulating innovation impact of the sharing economy (Lewkowicz, 2021).

Within the EU, sharing economy revenue is concentrated in five main sectors, which recorded over 100% year-on-year growth and are expected to continue their trend of steady expansion. In 2020, nearly 70% of sharing economy users in the EU were aged between 25 and 49 (European Commission, 2016). More specifically, the sharing economy is best developed in France and Ireland, where around 35% of users use sharing platforms, and the

least developed in Malta and Cyprus, where the share is below 5% (World Bank Group, 2018). As a perspective, the sharing economy in Europe is expected to grow at an annual rate of over 25%.

In terms of the **US sharing economy**, according to a survey 39% of consumers have used shared services, most commonly in the areas of **mobility** and **accommodation**. These users are mainly in the age range between 21 and 30, and they also have the widest range of shared services used – **mobility, accommodation**, retail and finance. Only 14% of respondents said they had not participated in any resource-sharing initiatives.

Figure 2. Number of users in the U.S. sharing economy system, 2016-2021 (million)



Source: Statista (2022). Number of sharing economy users in the United States from 2016 to 2021, Retrieved from <http://www.statista.com/statistics/289856/number-sharing-economy-users-us/> (Accessed on 22.04.2023).

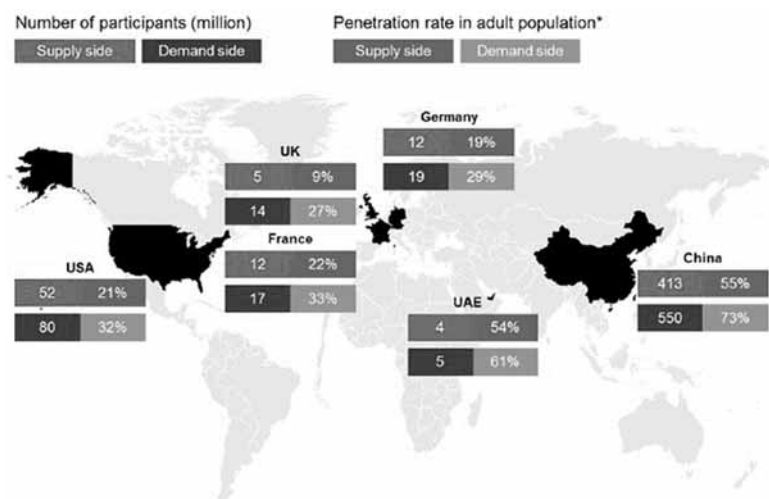
The total number of users of shared services in the US has reached 86.5 million, registering a growth of almost 94% compared to 2016, with an average annual growth rate of around 13%. Of U.S. sharing economy users, 58% agree that shared services save them money and 78% agree that the sharing economy builds a stronger community.

As the chart makes it visible, the largest market for shared economic relationships is China. Interestingly, due to the COVID-19 pandemic, **China's sharing economy** is recorded to increase by 2.9% in 2020. While the sharing of accommodation, work and travel is declining due to the restrictions, the sharing of skills, education and medical care is increasing by 30.9% and 27.8% respectively. China's sharing economy transactions for 2021 amount to US\$582.5 billion. Regarding the sharing economy development prospects, the system is expected to maintain an annual growth rate of 10% over the next five years (Xinhua, 2019).

As a perspective, according to another global study, the top five sharing sectors would be co-financing, co-working, **shared accommodation, shared mobility** and music/video sharing (Hawksworth et. al., 2014). As it can be highlighted from the previous statistical information, the sharing economy is well developed in the tourism industry, most commonly in mobility

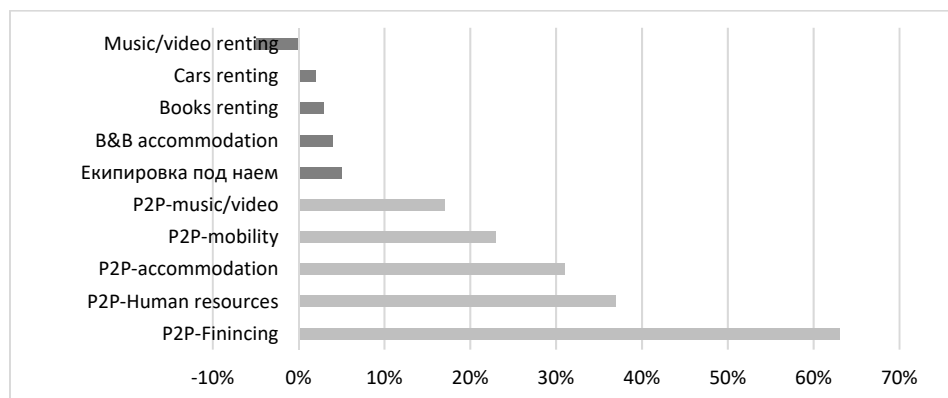
and accommodation sub-industries, but after the pandemic Food & Entertainment is gaining popularity.

Figure 3. Number of participants in the sharing economy and penetration rates by selected countries (million)



Source: Luisetto, M. (2016) Thesis – Alfredo Mantovani. Masaryk University: Faculty of Economics and Administration, Retrieved from https://www.researchgate.net/publication/342548866_CITATION_LUISETTO_M_Thesis_-_Alfredo_Mantovani (Accessed on 17.06.2022).

Figure 4. Projected growth rate of the sharing economy compared to traditional renting, 2013-2025



Source: Hawkworth, Vaughan, Vaughan, 2014.

As a conclusion from the statistics review we can point out the three main sharing economy sub-sectors that represent the sharing economy in the tourism industry and the shared goods and services within tourism – shared accommodation, shared mobility and shared food &

entertainment, which are the modern shared alternatives of the trade based hospitality, transport, food & beverage and entertainment.

One of the few definitions developed specifically for the 'sharing economy in tourism' defines it as a form of (Gretzel, 2015): 1) Sharing **knowledge**, which includes ideas, experiences, etc.; 2) Sharing **experiences** and time in the context of a tourism service; 3) Sharing **objects and spaces** that are dedicated to tourism activities such as accommodation, transport, equipment etc.

It is remarkable that the sharing economy has already developed and even established itself in almost all major areas of tourism worldwide. Acts of sharing are registered in transport, food and beverage, accommodation and travel agencies.

Table 6. Statistics about major shared service companies in tourism

Platform	Users	Value	Scope
<i>Accommodation</i>			
AirBnB	2.5 MN offers, 100 MN guests (2017)	US \$30 BN (2016)	191 countries as of January 2017
HomeAway	1.2 million offers (2017)	US \$3.9 BN (2015)	190 countries as of January 2017
<i>Transport</i>			
Uber	40 MN monthly active trips (2016)	US \$68 BN (2016)	22 countries as of January 2017
BlaBlaCar	35 MN users (2017)	US \$1.6 BN (2015)	---
<i>Food and Beverage</i>			
VizEat	120,000 members (2017)	€3.8 M (2016)	110 countries as of January 2017
EatWith	650 hosts; 80,000 seats (2017)	<i>Unofficially US \$8 MN</i>	50 countries as of January 2017
<i>Tourism services</i>			
Vayable	---	<i>Unofficially US \$2.1 MN</i>	---
ToursByLocals	1 905 guides (2017)	---	155 countries as of January 2017

Source: Created by the author.

4. Sharing Economy Impact on the Bulgarian Economic

It is difficult to determine when the first shared economic relationships emerged in Bulgaria. The earliest significant study about the country's sharing economy was in 2018 in relation to the development of the first global sharing economy index by the Swedish Timbro Trust (Timbro, 2018). In terms of how the index is formed, monthly data is collected from 213 countries regarding traffic to 286 different shared services.

In relation to Timbro's rank list, Bulgaria ranks 63rd in the world out of 213 countries and territories. The country's overall score places it in the middle among EU member states. However, it is also clear from the rankings that Bulgaria's score of 6.1 represents a rather poor performance and positions it in a radically different dimension from the top 30 representatives with scores above 20.0. The latest 2022 statistics also confirm Bulgaria's poor performance. According to the ranking of 60 major cities around the world, Tallinn, Tbilisi, Sao Paulo, Mexico City, Kyiv and Warsaw are the best for sharing economy development. In contrast, the worst performers are **Sofia**, Tokyo, Taipei, Athens and Luxembourg, where restrictive policies that disadvantage conditions for sharing services are registered.

Table 7. Global ranking of countries according to Timbro Sharing Economy Index, 2018

№	Country	Index
1.	Iceland	100.0
2.	Malta	58.2
3.	Montenegro	58.0
4.	New Zealand	52.8
...
29	Cayman Islands	20.3
30	Bahamas	18.9
31	Cyprus	18.8
...
63	Bulgaria	6.1
64	Bosnia & Herzegovina	5.7
65	Singapore	5.6

Source: Created by the author on Timbro (2018) Timbro Sharing Economy Index, Retrieved from <https://timbro.se/ekonomi/timbro-sharing-economy-index/> (Accessed on 13.05.2023).

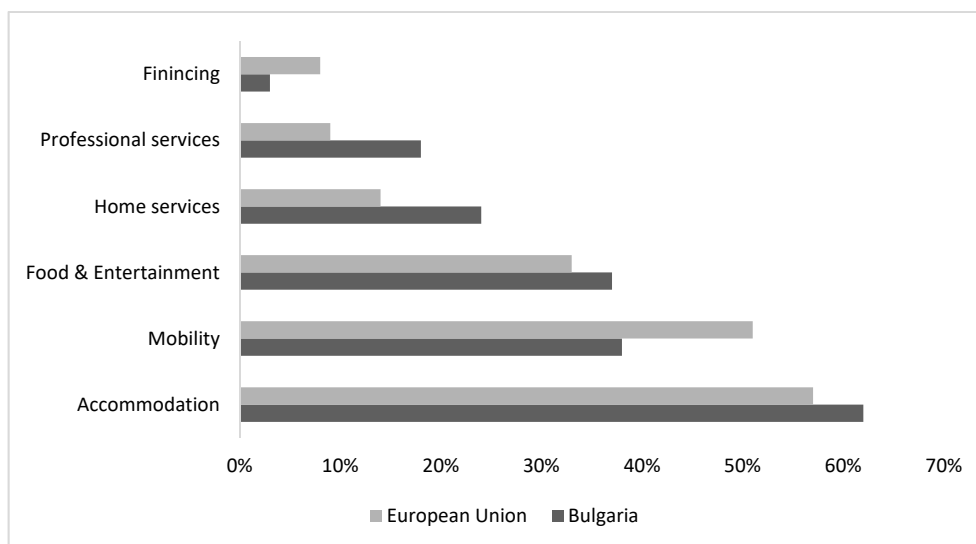
Table 8. Rankings of the most and least favourable cities for the sharing economy

City	Points	Index ranking	City	Points	Index ranking
<i>Sharing economy most friendly cities</i>			<i>Sharing economy least friendly cities</i>		
Tallinn	110	1.	Sofia	60	56.
Tbilisi	110	1.	Athens	60	56.
Sao Paulo	110	1.	Tokyo	55	58.
Buenos Aires	110	1.	Taipei	55	58.
Warsaw	105	5.	Luxembourg City	40	60.
Kyiv	105	5.			
Mexico City	105	5.			
Munich	100	8.			
Lisbon	100	8.			
Hamburg	96	10.			

Source: Created by the author on Consumer Choice Center (2022) Sharing Economy Cities worldwide, Retrieved from <https://consumerchoicecenter.org/sharing-economy-index-2022/> (Accessed on 04.05.2023).

Another significant survey is the Eurobarometer research on Bulgarian users' willingness to participate in the sharing economy (Flash Eurobarometer, 2018). The data show that 83% of Bulgarian consumers surveyed have not used this type of service before. Of the rest, 9% have used a shared service once to several times, another 5% say they use such a service occasionally, and the remaining 3% – regularly. The results are below the EU average but close to it (24% EU). Of those who used shared services, the most frequently used sectors of shared services are indicated as: **accommodation** (62%), **mobility** (38%), **food and drink** (37%), home services (childcare, gardening, repairs, etc.) (24%), professional services (accounting, software technology, etc.) (18%) and financing (3%). It is notable that Bulgaria's performance in 4 out of 6 areas is above the EU average in: **accommodation** (57% EU); **food and drink** (33% EU); home services (14% EU) and professional services (9% EU).

Figure 5. Levels of use of shared services by main sectors in Bulgaria and the EU



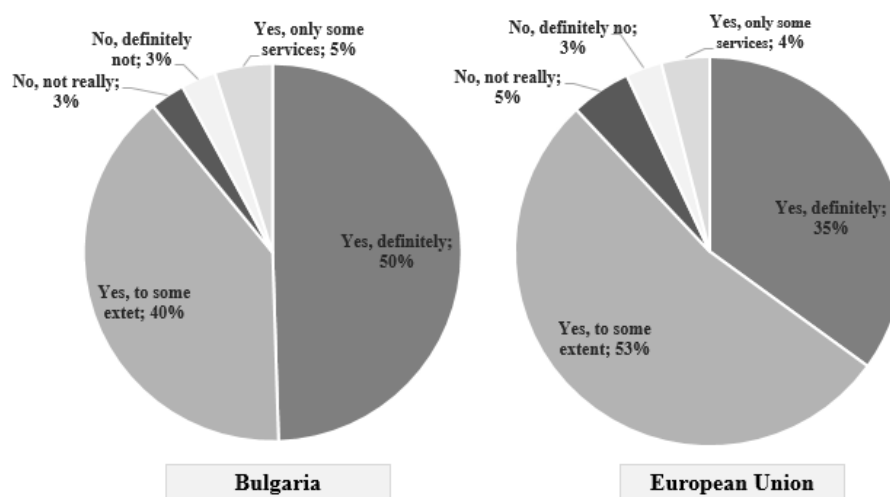
Source: Created by the author on Flash Eurobarometer (2018) *The use of services offered via collaborative platforms*, Retrieved from <https://op.europa.eu/en/publication-detail/-/publication/65f6b2d7-2d3d-11e6-b497-01aa75ed71a1/language-en> (Accessed on 25.05.2023).

The most frequently mentioned advantages of shared services over traditional economic relationships among Bulgarian consumers are:

- Greater convenience of accessing the service via a platform – 74% vs. an EU average of 73%.
- Lower cost of access vs. ownership – 62% vs. 59% average for EU users.
- Greater variety and authenticity versus traditional trade-based distribution – 62% vs. 56% EU average.
- Opportunity to meet and communicate with new people – 40% vs. EU average of 34%.
- Overcoming consumer behaviour – 38% vs. 31% EU average.

Respondents' cumulative attitude towards shared services is reflected in their willingness to recommend these to other users. Among Bulgarian users the willingness can be assessed as positive – a total of 90% of shared services users would recommend them to other people.

Figure 6. Willingness to recommend shared services to other users – Bulgaria and EU



Source: Created by the author on Flash Eurobarometer (2018) The use of services offered via collaborative platforms, Retrieved from <https://op.europa.eu/en/publication-detail/-/publication/65f6b2d7-2d3d-11e6-b497-01aa75ed71a1/language-en> (Accessed on 25.05.2023).

In terms of supply, 94% did not offer a shared service at the time of the survey. Of the rest, 3% have offered several times and another 2% offer shared services regularly. The reasons given by respondents for their lack of willingness to offer shared services are:

- Lack of time and/or interest – 52% vs. 64% EU average.
- Lack of confidence in online payments – 26% vs. 25% average among EU consumers.
- Lack of trust in users of shared services – 29% vs. 24% average among EU consumers.
- Lack of clarity on regulations – 21% vs. 22% average among EU consumers.

Another study within the EU shows that the cumulative use of shared services by the two main sectors in the system, shared accommodation and mobility, is growing dynamically after 2018 in Bulgaria. The levels increased from 4.05% in 2017 to 6.05% in 2019, showing a nearly 50% growth. Subsequently, the methodology of statistical data collection (after 2019) in the EU is changed and data is collected from sharing platforms such as Airbnb and Uber only. According to them, by 2022 the cumulative use of shared services in Bulgaria amounts to 5.3% of users, with the highest share of shared accommodation, followed by shared mobility.

Table 9. Use of shared services in Bulgaria and the EU, 2017-2019 (% of individuals)

Year		Bulgaria	European Union
2017		4.05	20.23
2018		4.11	20.92
2019		6.05	22.56
2020	Cumulative	3.45	18.12
	Home services	0.23	0.55
	Transport	0.57	0.77
	Accommodation	0.64	3.30
2021	Cumulative	3.76	18.46
	Home services	0.17	0.67
	Transport	0.30	0.75
	Accommodation	0.30	3.44
2022	Cumulative	5.30	18.85
	Home services	0.12	0.73
	Transport	0.69	1.20
	Accommodation	1.14	5.63

Source: Created by the author on Eurostat (2023) *Individuals – use of collaborative economy*. Retrieved from https://ec.europa.eu/eurostat/databrowser/view/isoc_ci_ce_i/default/table?lang=en (Accessed on 24.04.2023).

Regarding sharing economy platforms on the Bulgarian market, earlier tourism-related research (Ivanova, 2015) highlights that as early as 2008, shared mobility was well accepted by Bulgarian consumers. According to the study, the leading platforms are AhaCar.com, VEdnaPosoka.com, ZaednoNaPat.com, Ka4i.me and others, which are more or less local platforms and are not presented as P2P-related. On the topic of specific shared service platforms, according to Baltova, there are not many of them in the Bulgarian market. The author's research points to only six main representatives of Bulgarian companies that develop shared services platforms (Baltova, Albena, 2021):

- Spark (www.spark.bg) – Bulgarian company providing a platform for sharing mainly electric cars as well as scooters. The platform expanded into Lithuania and Romania, with 70,000 users on the platform by 2020.
- TAXIME (taxime.to) – the company owns a shared mobility platform, launched in 2015 and by 2020 has offers from over 3,500 individual taxi drivers in Sofia and more than 350,000 users.
- Zaednonapat (www.zaednonapat.com) – the company offers ride-sharing services.
- Co-Working Bansko (www.coworkingbansko.com) – the company provides platforms for shared working spaces.
- Myeducationclub (www.myeducationclub.com) – the company provides the first shared education platform in Bulgaria for sharing knowledge and skills.
- Dressmania (www.dressmania.bg) – the company provides a platform for temporary access for sharing clothes, shoes and accessories.

As a conclusion to the presented statistical data in the current section, we can point out that in general, Bulgaria has a poor performance in the sharing economy compared to the average

of the EU, including the most developed tourism-related branches – accommodation and mobility. Though, the few studies in the field show high levels of satisfaction and willingness to use and recommend shared services among Bulgarian users. In general, we can also admit that sharing economy development is at the initial stage in Bulgaria due to the last presented data in the current section – low quantity and visibility of P2P platforms in the country.

As a working hypothesis, we can suggest that there are three main reasons for this situation:

- There is a low understanding of the sharing economy concept among the Bulgarian audience;
- Shared services, inclusive tourism P2P-services, are mainly offered through P2P-not related platforms and websites, which makes the collection of sharing economy credible statistical data for Bulgaria at the EU level impossible;
- The readiness and satisfaction levels among Bulgarian users in terms of tourism-related P2P services are relatively high, but due to the low familiarity of the P2P economy there is no diversity of the motivators, most of them economically based.

5. Research methodology for analysis of P2P accommodation hosts evaluation of the current state and development perspectives of shared accommodation on the Bulgarian Black Sea coast

5.1. General patterns of the study – subject, object and purpose of the study

After making a literature review of the topic we can conclude that the sharing economy in tourism is one of the fastest growing industries in the sharing economy worldwide. In order to conduct our research we have to construct a methodology that would help to reveal the topic. For that purpose, at the first place, we would like to specify the following:

The subject of this study is to examine the current state and future development perspectives of the sharing economy in the tourism industry on the Bulgarian Black Sea coast.

The purpose of the research is based on an empirical study to investigate the user's evaluation of the state and development prospects of the shared economy in tourism.

The set purpose of the study is realized through the implementation of the following **scientific research tasks**:

- *Development of a questionnaire* for investigation.
- *Creation of a database* for quantitative processing of information in SPSS.
- *Processing and analysis of results* in order to describe the respondents' group and to determine their evaluation of the current state and development perspectives of sharing economy services in tourism.
- *Summarizing the results* to highlight key conclusions from the study.

The realization of the purpose of the research and research tasks is achieved through the use of a set of **scientific methods**: *observation, analysis and synthesis, questionnaire survey, comparative analysis, discriminative statistical methods and descriptive statistical methods.*

The **questionnaire survey** is conducted on the basis of an online survey among potential and current sharing economy users. The study is conducted in the period from 01.06.2023 – 30.06.2023 and it is constructed using the tools of Google Forms Questionnaire. The sources of information are separated into two main groups. **The primary sources** include field research, in-depth interviews and surveys. **The secondary sources** cover mainly scientific works by foreign authors and specialized publications of business, tourism and sharing economy organizations.

Like any scientific publication, this paper has some **limitations**:

The object of study is **geographically limited** only to the opinion of current and potential sharing economy users, who are demanding tourism services in the region of the Bulgarian Black Sea coast.

The object of study is also **nationally limited** to the opinion of Bulgarian users of tourism services in the two mentioned regions. Therefore, the sections of the survey are distributed in Bulgarian language only.

There are also **time limits** for the period of empirical research. They take into account some factors of the external (political, social, and demographic) and internal environment of the tourism industry, as well as the beginning of the active tourist season in 2023.

The leading **research problem** in conducting empirical research is related to the lack of Bulgarian scientific literature on the investigated topic and local statistical information on the subject.

5.2. Survey questionnaire design and distribution

In order to collect empirical data in the first phase of the research, questionnaires were distributed to Bulgarian current and potential participants in the sharing economy in tourism through variable channels, such as: social media (Facebook); related social groups for offering and searching tourism services in Varna and Burgas regions by individuals; non-government organizations in the tourism industry, who were invited to spread the questionnaire among its members; specialized tourism related platforms offering also shared tourism services by individuals (Booking.com, Pochivka.bg), not tourism related platforms offering also shared tourism services by individuals (Olx.bg).

The survey is anonymous and consists of 3 separate sections. *Section 1* is specifically designed to describe the respondents and to form their demographic profile. The identification data consists of gender, age, monthly income, marital status, education and employment status. *Section 2* consists of 13 questions. Ten of them are the type choice of given options with two of them multiple choices possible and three questions are interval scale questions with evaluation from 1 (absolutely not correct) to 5 (absolutely correct). The questions in the current sections are grouped in three main directions:

- Actual use of shared services (respondents that have had used P2P-service in tourism at least once): Investigation of respondents' experience with shared services in general and with shared services in tourism during a holiday in Bulgaria; the reasons for preferring the shared instead of trade based services; satisfaction levels; assessment of sharing economy development perspectives in tourism.
- Potential use of shared services (respondents that have never used P2P-service in tourism before): Investigation about the possible motivators that would lead the users to switch from a trade-based service to a shared one in the tourism industry; assessment of sharing economy development perspectives in tourism.
- Actual and potential supply of shared services: Investigation of actual P2P-supply and potential readiness to share underutilized services in general and in the tourism industry; motivators for participating in the sharing economy in tourism; assessment of sharing economy development perspectives in tourism.

After the survey was conducted, it was found that for the purposes of the analysis, the questionnaires of **293 respondents** could be used. A sample approach to the study of aggregates was used to study the respondents' evaluation towards the current state and development perspective of the sharing economy in tourism. The measurement and evaluation of the parameters of the population are mediated due to the fact that only a limited number of representatives of the population are studied. The expediency of the sampling approach is associated with its speed, relatively low cost and lower error rate compared to comprehensive studies. The sample model is a non-target random sampling type, which is widely used in the study of users' opinions on new products. This sample is associated with several circumstances: first, when conducting formulation research; second, when studying sufficiently homogeneous aggregates of units; third, in preliminary tests of field documents (questionnaires, diaries, etc.). In the current research, we work with accuracy: *Significance level = 0,05*. In processing the data from the survey for analysis and evaluation specialized software for data processing and statistical analysis was used (SPSS standard package).

6. Analysis and assessment of the P2P-accommodation host evaluation towards the current state and development perspective of shared accommodation on the Bulgarian Black Sea coast

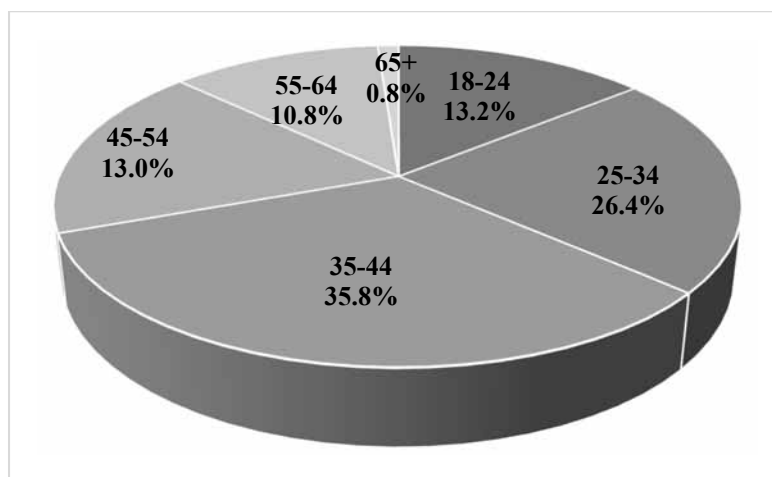
The demographic profile of the respondents who participated in the survey can be presented as follows:

The majority of respondents are female – 61.2% (99 respondents) compared to 38.8% (63 respondents) male. This is not surprising, as studies have shown that women are more likely to participate in surveys than men (Williams, 2008).

A major proportion falls into Generation Y – a total of 62.2% of responding persons (ages 25-44), with a significant proportion also of Generation X – 23.8% (ages 45-64). Generation Baby Boomers form the negligible 0.8% (65+) and Generation Z – 13.2% (ages 18-24). This is logical, as Gen Y is the largest consumer population on the global market, and according

to statistics, by 2025 this generation will form 75% of the working population worldwide and nearly 67% of consumers globally (Team Stage, 2023).

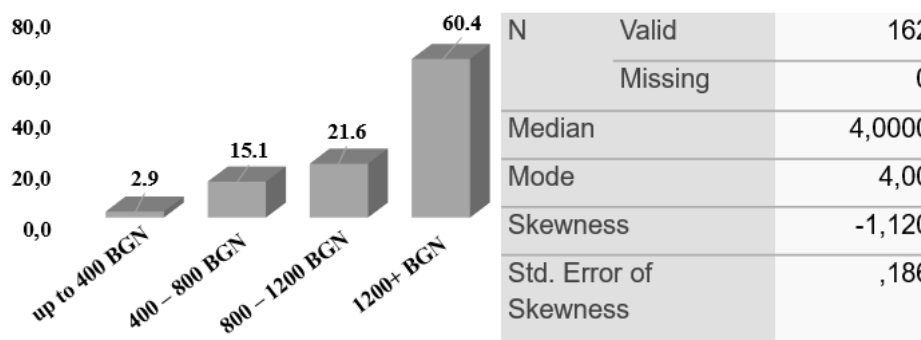
Figure 7. Age structure of survey respondents



Source: Created by the author.

In terms of income, the main share has more than 1200 BGN household monthly income per person (60.4%). Of the rest, nearly one-fifth (21.6%) indicates household monthly income per person in the range of 801-1200 BGN. The mode and the median are presented by 1,200 BGN household monthly income per person and the asymmetry has a coefficient of -1.120, which means that the left tail is longer. Given that official statistics suggest a net income of BGN 1268 for a working person and just over BGN 800 for a member of a family of three, we can argue that for the latter group, the economic benefits of sharing rather than trade-based services would be a significant motivator (Mediapool, 2022).

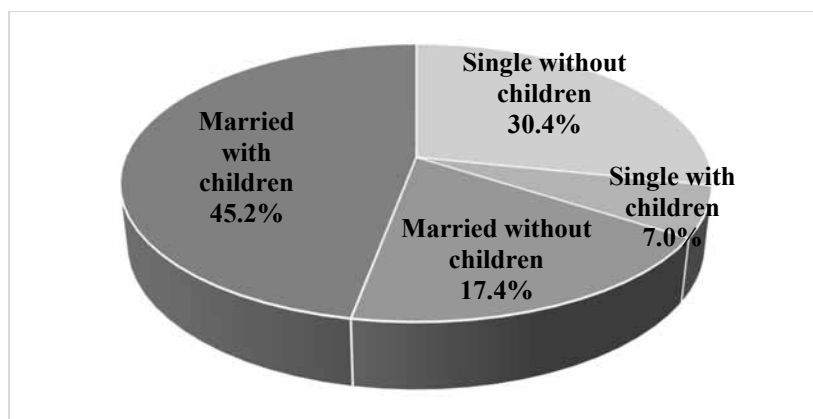
Figure 8. Distribution and statistical indicators of respondents by income



Source: Created by the author.

In relation to marital status, the main share is of those who are married with children (45.2%), but a major share consists of those who are single without children (30.4%).

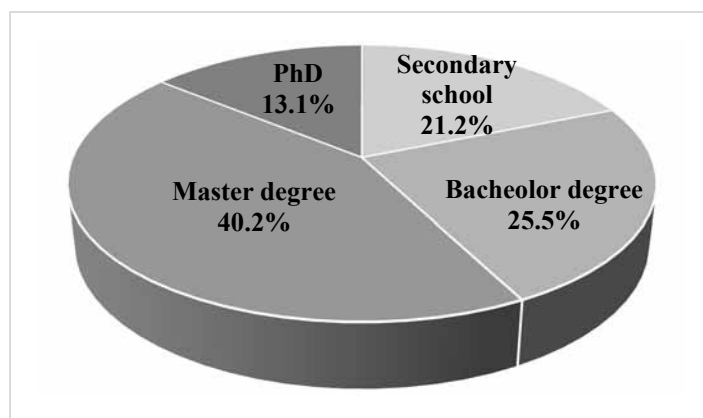
Figure 9. Demographic profile of respondents by marital status



Source: Created by the author.

In terms of education, the biggest share is represented by highly educated persons (78.8% combined PhD, master's and bachelor's degree) and a little above a fifth have secondary education.

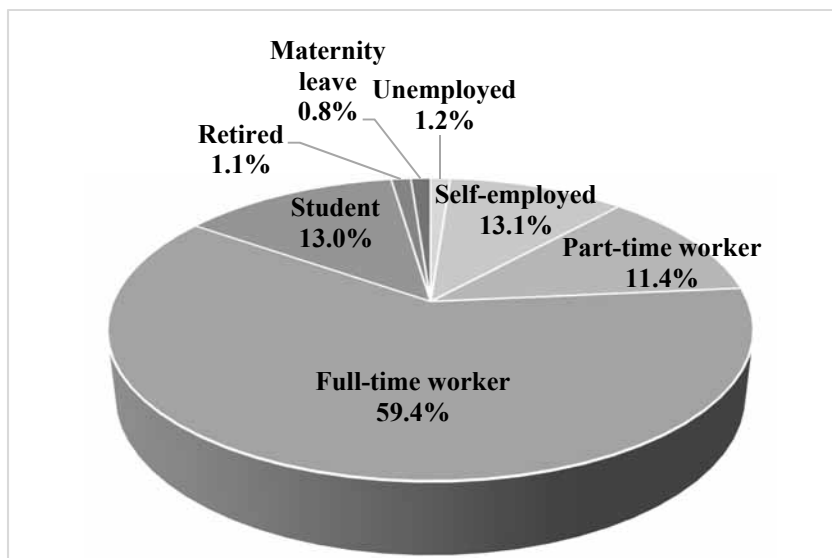
Figure 10. Demographic profile of respondents by level of education



Source: Created by the author.

Notably, a major share of the respondents are full-time workers (59.4%). The remaining groups ranged as follows: 1.2% are unemployed; 1.1% are retired; 11.4% are part-time workers; 13.0% are students and 13.1% are self-employed.

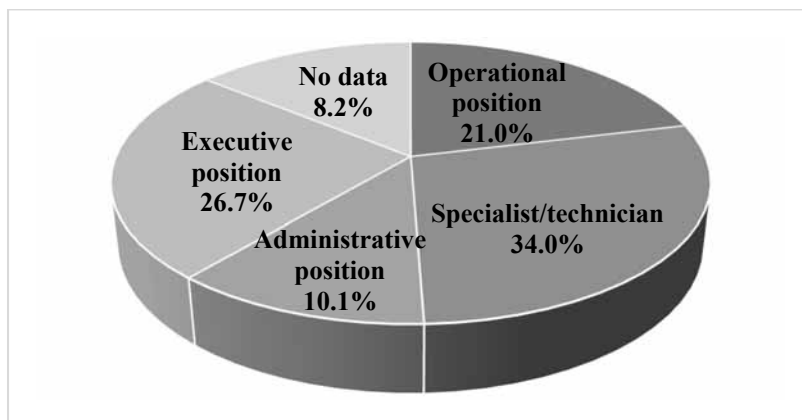
Figure 11. Demographic profile of respondents by employment status



Source: Created by the author.

Of those in employment, the profile of respondents is more diverse, with a predominance of executive positions (26.7%) and specialist/technician (34.0%). It is interesting to note that a total of 26% of the respondents work part-time or are self-employed, which deviates from the statistics about the very low share of these two forms of employment in Bulgaria – below 2% of the employees according to NSI (NSI, 2022).

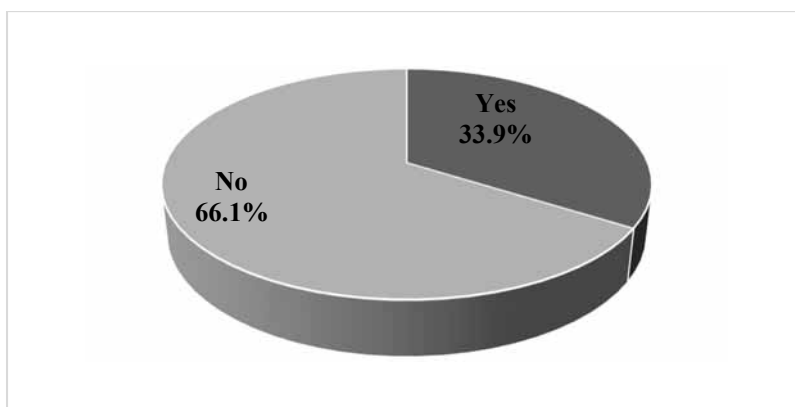
Figure 12. Demographic profile of respondents by job position



Source: Created by the author.

In relation to the survey respondent's familiarity with the sharing economy concept, a major proportion of the participants state that they are not aware of the essence of the concept (66.1%). Only about one-third claim that they know the sharing economy concept, which accounts for 33.9% of survey respondents.

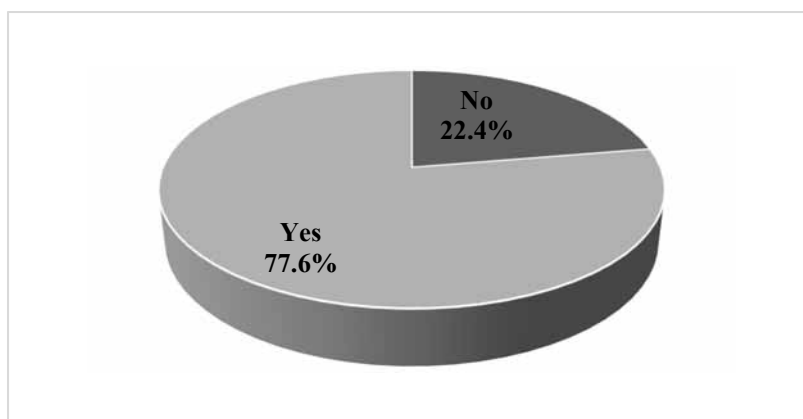
Figure 13. Structure of survey responses of the question “Are you familiar with the concept of sharing economy?”



Source: Created by the author.

At the start of the second survey section, we introduced a short definition to explain the sharing economy nature, giving also examples for four shared assets according to the literature and statistical review in the previous paragraph. After making this clarification, the structure of the responses presents a great part of the respondents having used at least once in the past a shared service.

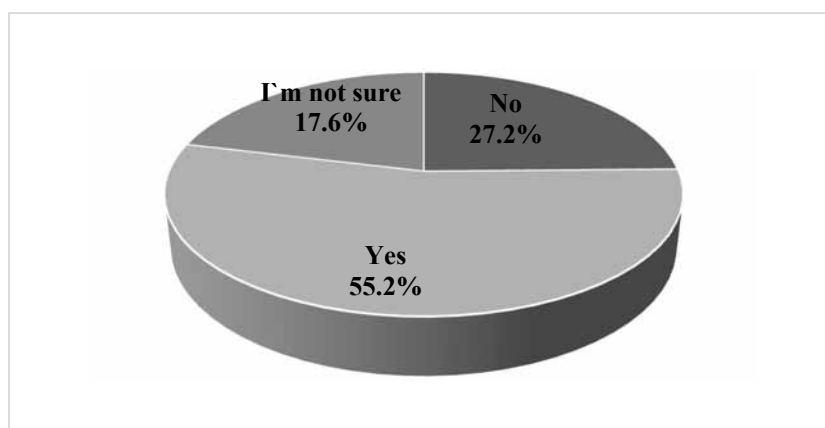
Figure 14. Structure of survey responses of question “Have you used shared services such as accommodation, mobility, house services, music and video, other?”



Source: Created by the author.

In terms of usage of sharing services in tourism during a holiday in Bulgaria, it is noticeable that a smaller proportion of the respondents gave a positive answer – slightly more than half (55.2%). Less than a third stated they have never used shared services in tourism during a trip in the country (27.2%) and less than a fifth could not specify.

Figure 15. Structure of survey responses of the question “Have you used shared services in tourism during a holiday in Bulgaria such as accommodation, mobility, food & beverage, equipment/tours, others?”



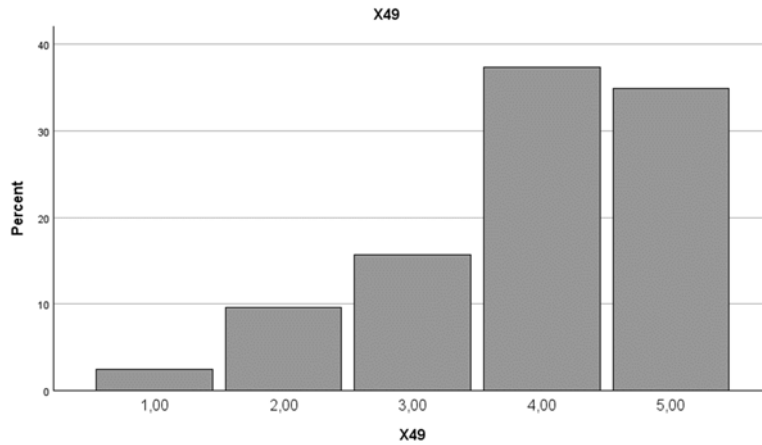
Source: Created by the author.

Regarding those, who have used shared services in tourism during their holiday in Bulgaria (162 respondents), important for the survey purpose is the reason to prefer shared instead of trade-based tourist services. We gave four main options for answers with an interval scale type choosing evaluation from 1 (absolutely not correct) to 5 (absolutely correct).

In terms of shared service usage instead of trade-based tourist service, because it reduces the holiday cost as sharing assets is economically effective, the mean is 3.93, the median is equal to 4, i.e. 50% of the respondents give a score less than or equal to 4, and the mode is 4. The skewness is equal to -0.862, indicating that the left tail is longer and the mass of the distribution is concentrated on the right of the figure.

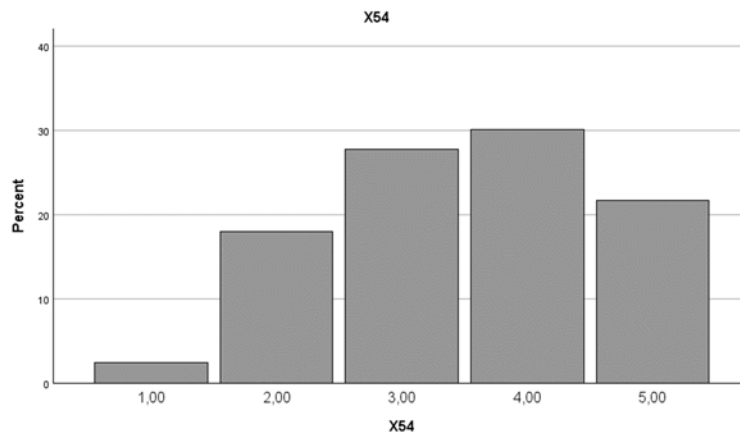
Giving the suggestion for shared service usage instead of trade-based tourist service because it helps to build social new contacts with the local community, the survey responses distribution is noticeably different with a greater proportion of the neutral responses 'neither agree nor disagree' (3.00). The mean is 3.50, the median is equal to 4, i.e. 50% of the respondents give a score less than or equal to 4, and the mode is 4. The skewness is equal to -0.212, indicating that the left tail is slightly longer and a bigger proportion of the distribution is concentrated on the right of the figure.

Figure 16. Survey responses in terms of the statement “holiday cost reduction”



Source: Created by the author.

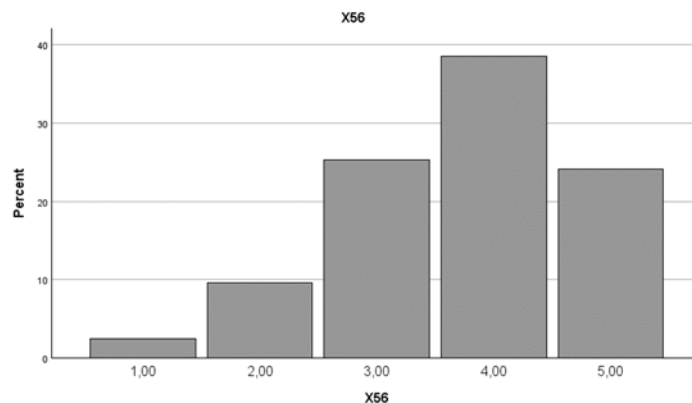
Figure 17. Survey responses in terms of the statement “social contacts improvement”



Source: Created by the author.

Regarding the statement that shared tourist services instead of trade based are preferred because they are more environmentally friendly, it is interesting that more answers are distributed on the positive side of the scale compared to the previous statement – “I agree” (4,00) and “I absolutely agree” (5,00). In terms of response distribution, the mean is 3.73, the median is equal to 4, i.e. 50% of the respondents give a score less than or equal to 4, and the mode is 4. The skewness is equal to -0.554, indicating that the left tail is longer and a greater proportion of the distribution is concentrated on the right of the figure.

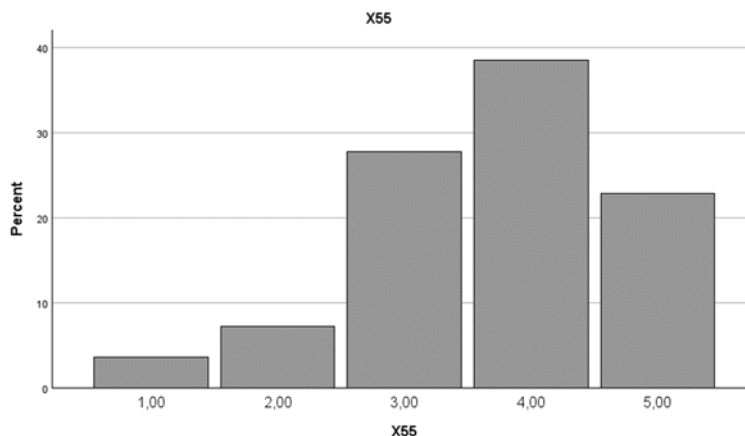
Figure 18. Survey responses in terms of the statement “more environmentally friendly”



Source: Created by the author.

Similar seems to be the distribution of the respondent’s answers making a suggestion that shared tourist services during a holiday in Bulgaria make the holiday experience more authentic compared to the trade-based tourist services. In terms of shared service usage instead of trade-based tourist service, because it reduces the holiday cost as sharing assets is economically effective, the mean is 3.70, the median is equal to 4, i.e. 50% of the respondents give a score less than or equal to 4, and the mode is 4. The skewness is equal to -0.622, indicating that the left tail is longer and the mass of the distribution is concentrated on the right of the figure.

Figure 19. Survey responses in terms of the statement “authentic experience”



Source: Created by the author.

One of the central questions for sharing economy appliances in the tourism industry is the cost reduction compared to the trade-based alternative tourist service, taking into consideration the conclusion from the previous paragraph. Of those, who have used such shared service during a holiday in Bulgaria, the main part stated that the cost reduction is less than 10% (63.5%). About one-fourth of the respondents claimed a cost reduction between 21% and 40% compared to trade-based tourist services and a negligible proportion falls to those who pointed a cost reduction between 11% and 20% and more than 40% – respectively 5.9% and 4.7% of this section survey respondents (162 participants).

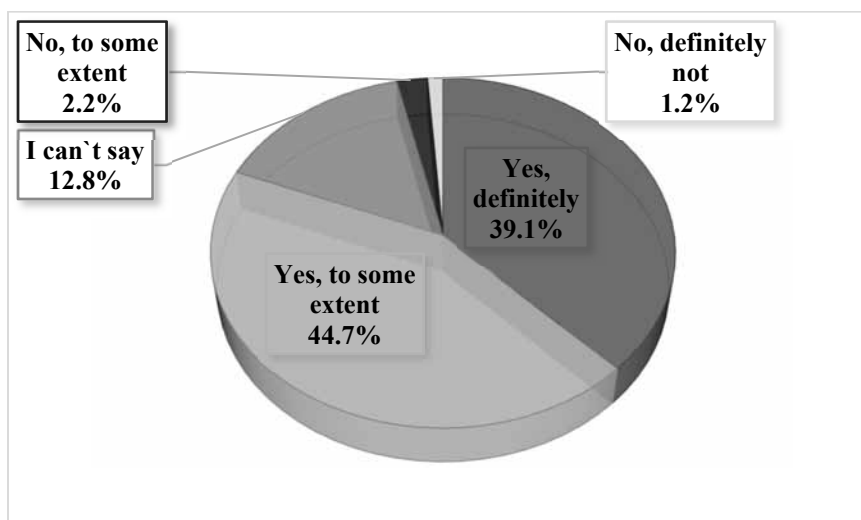
Table 10. Survey responses in terms of cost reduction compared to trade-based alternatives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Up to 10%	106	63,5	64,3	64,3
	11% – 20%	8	5,9	6,0	70,2
	21% – 40%	40	24,7	25,0	95,2
	More than 40%	6	4,7	4,8	100,0
	Total	160	98,8	100,0	
Missing	System	2	1,2		
Total		162	100,0		

Source: Created by the author.

Arising from the previous question, we aimed to assess additionally to what extent the shared service is effectively replacing the trade-based tourist services even if they are or they are not reducing the holiday costs. The main part among respondents states that shared tourist service replaces trade-based effectively with more than 39% absolutely agree and an additional 44.7% agree.

Figure 20. Survey responses in terms of effective alternative to trade-based service



Source: Created by the author.

In connection to those, who have never used shared tourist service during a holiday in Bulgaria (80 respondents), for the survey, it is important to reveal the potential motivators that would push them to consider replacing a trade-based with shared tourist service. We positioned the same possible answers as to the respondents who have used shared tourist service during a holiday in Bulgaria – holiday cost reduction, social contact improvement, environmentally friendly behaviour and authentic holiday experience, with an interval type scale evaluation from 1 (absolutely not correct) to 5 (absolutely correct).

Table 11. Survey responses in terms of motivator “holiday cost reduction”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	4,4	4,7	4,7
	2	10	13,3	14,1	18,8
	3	31	39,9	42,3	61,1
	4	21	25,9	27,5	88,6
	5	9	10,8	11,4	100,0
	Total	75	94,3	100,0	
Missing	System	5	5,7		
Total		80	100,0		

Source: Created by the author.

In terms of response distribution, the mean is 3.26, the median is equal to 3, i.e. 50% of the respondents give a score less than or equal to 3, and the mode is 3. The skewness is equal to -0.147, indicating that the left tail is slightly notably longer and a bigger proportion of the distribution is concentrated on the right of the figure.

Table 12. Survey responses in terms of motivator “improved social contact with the local community”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	5,1	5,5	5,5
	2	7	9,5	10,3	15,9
	3	24	30,4	33,1	49,0
	4	25	31,0	33,8	82,8
	5	13	15,8	17,2	100,0
	Total	73	91,8	100,0	
Missing	System	7	8,2		
Total		80	100,0		

Source: Created by the author.

Regarding this statement, the mean is 3.47, the median is equal to 4, i.e. 50% of the respondents give a score less than or equal to 4, and the mode is 4. The skewness is equal to -0.147, indicating that the left tail is longer and a greater proportion of the distribution is concentrated on the right of the figure.

Table 13. Survey responses in terms of motivator “holiday experience more authentic”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	4,4	4,9	4,9
	2	7	9,5	10,5	15,4
	3	32	39,9	44,1	59,4
	4	21	24,7	27,3	86,7
	5	9	12,0	13,3	100,0
	Total	73	90,5	100,0	
Missing	System	7	9,5		
Total		80	100,0		

Source: Created by the author.

In conjunction with the motivator that sharing tourist service is more authentic than trade-based, the mean is 3.34, the median is equal to 3, i.e. 50% of the respondents give a score less than or equal to 3, and the mode is 3. The skewness is equal to -0.201, indicating that the left tail is slightly longer and a bigger proportion of the distribution is concentrated on the right of the figure.

Table 14. Survey responses in terms of motivator “environmentally friendly behavior”

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	8,9	9,8	9,8
	2	12	15,2	16,8	26,6
	3	31	39,2	43,4	69,9
	4	13	17,1	18,9	88,8
	5	9	10,1	11,2	100,0
	Total	72	90,5	100,0	
Missing	System	8	9,5		
Total		80	100,0		

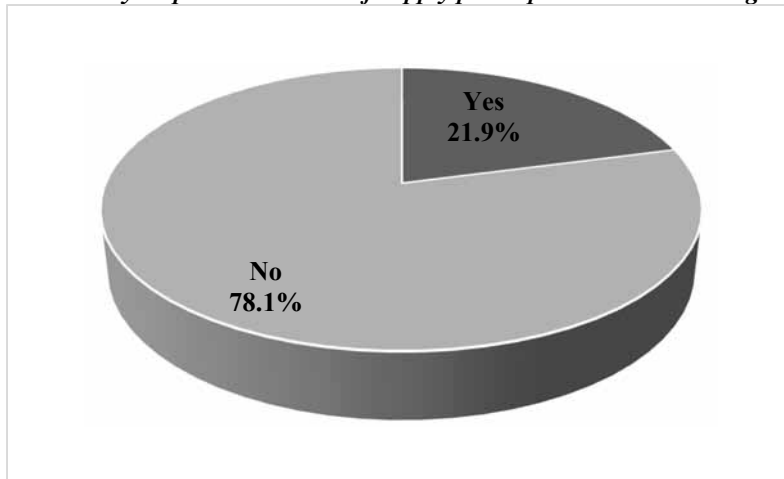
Source: Created by the author.

Given the environmentally friendly behaviour as a motivator to prefer shared rather than trade-based tourist service during a trip in Bulgaria, the mean is 3.05, the median is equal to 3, i.e. 50% of the respondents give a score less than or equal to 3, and the mode is 3. The skewness is equal to -0.033, indicating that the left tail is nearly negligibly longer and a slightly bigger proportion of the distribution is concentrated on the right of the figure.

In the last section, we pointed out questions about the readiness of the respondents to participate in the sharing economy as a supply. As we indicated in the previous paragraph, the readiness of the people to share assets in the sharing economy on a European level is below the demand level.

From the current survey respondents (293 participants) more than 1/5 (21.9% or 64 participants) have shared underutilized assets, but the greater majority (78.1% or 229 participants) states that have never participated as a supplier in the sharing economy.

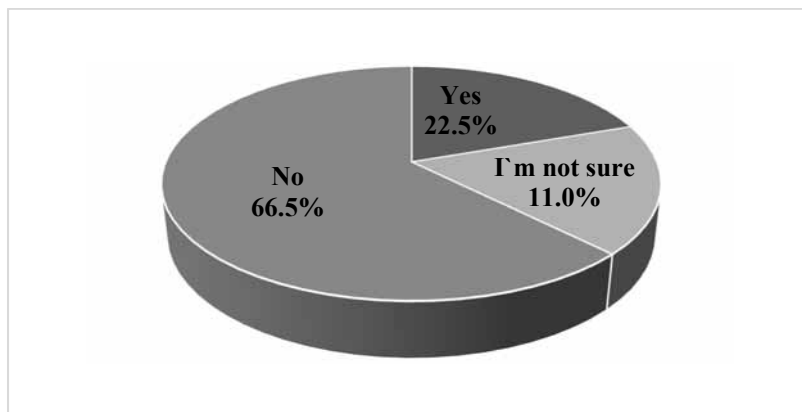
Figure 21. Survey responses in terms of supply participation in the sharing economy



Source: Created by the author.

For those, who have never shared underutilized assets before, it is important to assess the readiness to share in perspective. It is positive that more than a fifth state that they would participate in the sharing economy as a supplier (22.5%).

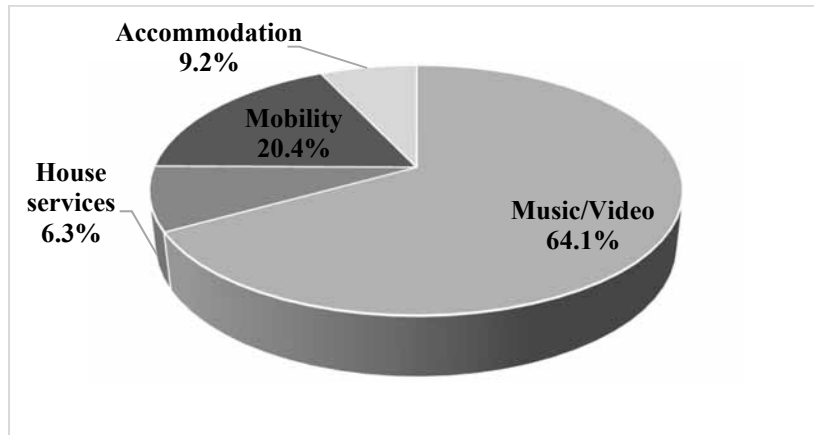
Figure 22. Structure of responses in terms of readiness to share underutilized assets



Source: Created by the author.

Giving the respondents the opportunity to choose from the main four subsectors of the sharing economy according to our study in the previous paragraph, the majority suggest that they would share music and/or video (64.1%). Another 20.4% would rather share mobility in its diverse forms – car sharing, ride sharing etc., an additional 9.2% would share accommodation and the rest 6.3% would share house services. None of the respondents have chosen the ‘food & beverage’ option.

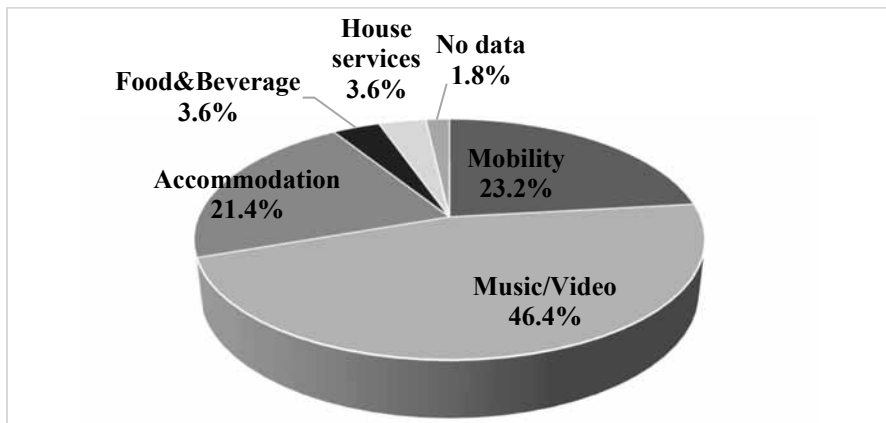
Figure 23. Structure of responses in terms of type of potential shared asset



Source: Created by the author.

Giving the same opportunity to specify the shared assets to the respondents who have shared underutilized assets, the range list keeps the same order with more responses of the accommodation and mobility services. Less than half of the respondents have shared music and/or video in the past. More than a fifth have shared mobility and accommodation – respectively 23.2% and 21.4% of the survey participants. Negligibly small proportion have shared house services and food and beverage.

Figure 24. Structure of responses in terms of type of actual shared asset



Source: Created by the author.

Important for our survey are the actual motives for sharing economy participation as suppliers. This question gives options for statements of the participant agree or disagree, but with the conditions pointing only to two of the four given options as leading motivators.

Table 15. Survey responses in terms of actual leading motives for suppliers' participation

		Frequency	Percent	Valid Percent	Cumulative Percent
Generates additional income					
Valid	No	30	46,4	46,4	46,4
	Yes	34	53,6	53,6	100,0
	Total	64	100,0	100,0	
Reduces the cost of ownership by sharing when resource is not used					
Valid	No	23	35,7	35,7	35,7
	Yes	41	64,3	64,3	100,0
	Total	64	100,0	100,0	
Diversify my social contacts with interesting people					
Valid	No	35	55,4	55,4	55,4
	Yes	29	44,6	44,6	100,0
	Total	64	100,0	100,0	
Helps to overcome consumer behaviour and be more environmentally friendly					
Valid	No	51	80,4	80,4	80,4
	Yes	13	19,6	19,6	100,0
	Total	64	100,0	100,0	

Source: Created by the author.

Most of the respondents think that the leading motivator for sharing economy supply participation is the opportunity to reduce the cost of ownership by sharing when the asset is not used by the owner – 41 respondents have chosen this option (64.3%). A great proportion of the participants pointed out the opportunity to generate additional income by sharing an underutilized asset as a leading motivator – 34 respondents or 53.6%. Less than half (44.6% or 29 respondents) chose as a leading motivator the opportunity to diversify their social contacts by meeting new people. Less than a fifth (19.6% or 13 respondents) pointed out overcoming consumer behaviour and performing more environmentally friendly behaviour as one of the leading motivators for the sharing economy suppliers.

The sharing economy development perspectives in tourism from the respondents' point of view can be assessed as follows:

Table 16. Sharing economy development perspectives

		Mean	Median	Mode	Skewness
<i>Positive</i>					
Development perspectives	Compete hotels successfully	4.173	5.0	5.0	-1.347
	Grow as a cheap type of accommodation	4.06	4.0	5.0	-1.101
	Develop as an eco-friendly form of accommodation	3.98	4.0	5.0	-0.959
	Grow with a focus on social aspects/authentic experience	3.86	4.0	4.0	-0.856
<i>Negative</i>					
Development perspectives	Not develop successfully with lack of time and/or interest	2.32	2.0	1.0	0.637
	Not develop successfully with lack of trust in quality/payment	2.28	2.0	2.0	0.673
	Not develop successfully with lack of clarity on regulations	2.31	2.0	1.0	0.588

6. Conclusions

After the conducted study among former employees in the tourism industry the following conclusions can be highlighted as most important:

- In relation to the survey respondent's familiarity with the sharing economy concept, most of the respondents state that they are not aware (more than 66%). However, after giving clarification about the sharing economy nature and examples of sharing services more than 77% of respondents confirmed that they have used shared instead of trade-based services at least once in the past. We can conclude that sharing economy use is widespread but its concept is not so familiar.
- More than 55% of survey respondents have used tourist-shared services during a holiday in Bulgaria, which confirms the great acceptance of shared services in tourism among Bulgarian users. Interestingly, more than 17% claimed that they were not sure if the tourist service they used was shared or trade-based. This alarms us about the low visibility of information about the service provider.
- Among the respondents, more than 70% of tourist shared services users in total agreed or absolutely agreed that sharing services reduce their holiday cost, which contributes to our statement that the main advantage of sharing instead of trade-based services is economic efficiency.
- Interestingly, the environmental reasons for using shared instead of trade-based tourist services have greater support among respondents with 50% that agreed or absolutely agreed. This indicates that the ecological aspect of the sharing economy could be a co-influencer of its future development.
- Controversy to the previous statements, the cost reduction of using shared instead of trade-based tourist service is most likely less than 10% – more than 63% from respondents.
- In terms of efficiency, more than 80% confirmed that shared tourist services replace trade-based effectively, which overlaps with the sharing economy study on the European level from section three.
- Among shared tourist services non-users, the leading motivator for sharing economy participation would not be a cost reduction – mainly the respondents are neutral to this statement. Similarly is the situation with authentic holiday experience and environmentally friendly behaviour. More voluntarily, the non-users would try shared tourist services influenced by the chance to broaden their social contacts (47% in total), which makes it another potential co-influencer along with economic benefits.
- In terms of readiness to participate in the sharing economy as a provider, more than one-fifth (21.6%) have shared underutilized assets in the past. That is more than in 2016 introduced statistical data from the Eurobarometer (5.6%), which leads us to the conclusion that there is a definitive positive tendency for sharing economy development in Bulgaria.

- Positively, from those who have never shared underutilized assets 22.5% confirm readiness to participate in the sharing economy as a supplier in the future. Moreover, another 11% could not specify, which makes them potential suppliers of shared assets if the right motivator is addressed to them. In total 30% of respondents would share the tourism-related mobility and/or accommodation.
- Giving the respondents who have shared underutilized assets in the past the same options, a greater part confirms readiness to share mobility (23.2%) and accommodation (21.4%), giving the shared services in tourism a more significant influence on the sharing economy in the studied area – 44.6% in total.
- Importantly, the leading motivators for those who have shared underutilized assets are economically based. More than half of this respondents group agreed that the leading motivator is generating additional income and reducing ownership costs. Additionally, the possibility of diversifying their social contacts is also well accepted (45%).
- The sharing economy development perspectives can be generally assessed as positive. The positive statements for successful development are assessed predominantly with value ‘4’ (‘I agree’) and the negative statements that the sharing economy will not grow are predominantly assessed with value ‘1’ (‘I absolutely agree’).
- In terms of positive development perspectives, the highest share of positive values among respondents is reported with the statements that the sharing economy will expand competitively with trade trade-based economy and with a focus on the sharing economy as a cheap alternative of trade-based services. This explicitly highlights the economic aspects of the sharing economy as the greatest value for the users.
- With the negative perspectives statements, it is clear that from the respondent’s point of view, there are no threats to the successful development of the sharing economy in perspective. The negative statements are valued predominantly with ‘1’ (‘I absolutely don’t agree’). As a conclusion, generally, respondents disagree that there is a lack of interest or regulation clarity as well as mistrust in payment or quality of sharing services.

As we can conclude, the sharing economy development perspectives in tourism on the Bulgarian seaside are positive from the actual and potential participant’s point of view. However, we can argue about this highly positive attitude due to some other results from our study. In the first place, we outlined that the sharing economy concept is not familiar to most of the respondents, but after giving clarification with examples of P2P-services we discovered that sharing economy use is relatively widespread. These results *confirm* partly our working hypothesis – *there is a low understanding about the sharing economy concept among the Bulgarian audience*. A very important result is the confirmed low visibility of the shared service provider, which makes the respondents unsure if they are using shared or trade-based services. We can assume that as a result shared services in tourism are offered and demanded mostly in non-P2P-related platforms and/or websites. Moreover, in the tourism industry, there are also a lot of non-tourism-related websites and social network groups that offer shared accommodation and mobility. This makes it impossible to gain a real insight about the tourism sharing economy's current state due to the official statistical leakage in Bulgaria compared to the European statistical data collection methodology. This *confirms*

partly our working hypothesis – *the collection of sharing economy credible statistical data for Bulgaria at the EU level is at the current stage impossible.*

The main reasons for using and offering shared services in tourism are definitely economically based. In terms of users, this is the cost reduction, but it is admitted that the reduction is low – mostly up to 10%, which makes this motivator not strongly influencing. Though, most of users agree that shared service replaces trade based effectively, which leads us to the conclusion that the authenticity of the experience should be the supportive motivator to the economical one – this gives us a wide open area for further investigations on which would be the cluster of stimulating motivators for the further development of sharing economy in tourism.

Additionally, in terms of the supply side – more people have offered underutilized services to others as in the past due to the comparative statistical data from the 2016 Eurobarometer's research and our study. A significant part of them have shared services in the tourism industry, mostly mobility and accommodation. Moreover, a great number from the other are willing to give it a try as more than 30% are ready to offer shared services in tourism – again mobility and accommodation. Once again the economical-based motivators are leading – generating additional income and/or reducing the ownership costs by sharing, but the possibility to diversify their social contacts is also well accepted. The presented conclusions confirm the third part of our working hypothesis – *the readiness and satisfaction levels among Bulgarian users in terms of shared services in tourism are high, but there is no diversity of the leading motivators, most of them economical*, which limits the positive prospects for further development.

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BITCOIN – HEDGE OR SPECULATIVE ASSET: ANALYSIS OF ITS ROLE AND NATURE²

Bitcoin is regarded as a remarkable achievement of the Fourth Industrial Revolution and ranks among the most intricate technological and financial creations. It has long been the focus of attention of investors who are looking for a safe-haven asset. The purpose of this study is to check whether Bitcoin plays the role of a safe-haven asset (hedge). To achieve this, the impact of economic and political uncertainty (EPU) on the return and variation of Bitcoin is investigated. It is being analyzed whether, in comparison with the development of EPU, the returns and variations of Bitcoin show characteristics typical of safe-haven assets or those of ordinary speculative assets. As EPU levels elevate, it is anticipated that safe-haven assets like gold will see a rise in both their returns and variation, whereas typical speculative assets will experience heightened variation and diminished returns. The study uses ordinary linear regression and quantile regression models that cover data for the period between February 2013 and July 2023. These models play a crucial role in ascertaining if Bitcoin functions as a safe-haven asset during turbulent times and if it holds the capacity to serve as a hedge against economic uncertainty. The results of the study are of paramount importance for investors, as they help them decide whether to include Bitcoin in their portfolios for diversification and protection of their capital during unstable economic conditions.

Keywords: Bitcoin; economic and political uncertainty – EPU; safe-haven asset; speculative asset

JEL: C52; C58; G15; G17; O33

1. Introduction

In the wake of the global financial crisis and the weakening trust in the existing financial structure, there emerged an increasing level of uncertainty regarding the economic strategies governments and central banks would implement. In this particular situation, Nakamoto (2008) introduced an alternative to traditional trust-based currencies in the form of a "digital currency" called Bitcoin (Nakamoto, 2008). Bitcoin stands as a decentralized digital currency, formulated as an alternative to conventional fiat currencies. It is marked by its autonomy from governments, central banks, and other entities, and has been suggested as a substitute for the ineffective economic and financial norms of the worldwide currency

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markets. Since its creation, the value of Bitcoin has significantly increased from \$0.09 on July 18, 2010, to an all-time high of \$68,789 on November 10, 2021 (Bankrate.com, 2023). Bitcoin attracts significant interest from investors and practitioners, especially in periods of financial uncertainty and low trust, which is one of the reasons for its popularity. This rapid growth has encouraged interest in the literature that explains the economic and financial factors that can affect its price (Demir et al., 2018). Nonetheless, the interest in Bitcoin from the financial press and the academic community is accompanied by the perception of it as an extremely volatile commodity. Given its value and potential as an investment tool, modelling the price volatility of Bitcoin is an important factor in decision-making and the application of risk management practices.

Regardless of appearing to be unaffected by economic and financial changes (Kristoufek, 2013), various research studies have demonstrated that Bitcoin becomes more appealing during times of economic uncertainty and when trust in traditional economic and financial institutions is low (Bouri, Gupta, et al., 2017; Demir et al., 2018; Fang et al., 2019). These studies suggest that Bitcoin can be utilized as a hedge against the stock market, potentially addressing the inefficiency of these systems (Dyhrberg, 2016; Selmi et al., 2018; Guesmi et al., 2019).

Despite this, Bitcoin was proposed as a hedge against economic uncertainty, it has faced criticism and is not exempt from it. The speculative nature of cryptocurrency, as indicated by various studies (Cheah, Fry, 2015; Baur et al., 2018; Eom et al., 2019), its tendency to form speculative bubbles (Corbet et al., 2018; Bouri, Shahzad, et al., 2019), high price volatility (Brandvold et al., 2015; Aalborg et al., 2019), and the existence of scandals and fraudulent activities have sparked debates about its appropriateness and function within the financial system (Selmi et al., 2018). The underlying inquiry emerges: Does Bitcoin primarily serve as a medium of exchange and a repository of value?

Therefore, the scientific purpose of this study is to investigate the role of Bitcoin in the context of global economic policy uncertainty (GEPU). The subject of the study is Bitcoin, while the object is the impact of economic and political uncertainty on Bitcoin. The primary focus of the investigation is to determine if Bitcoin can serve as a safe-haven asset or hedge against economic and political instability. This is because Bitcoin operates independently from the current economic and financial system. In addition, it is important to recognize that it can also be viewed as a speculative asset due to its significant level of volatility. The objective is to investigate how Economic Policy Uncertainty (EPU) influences the return and variation of Bitcoin and gold, with EPU defined as "the likelihood of modifications in prevailing economic policies" (Baker et al., 2016). This research assesses the role that Bitcoin plays, by considering the behaviour of the returns and volatility of this cryptocurrency under variations in EPU. This approach is appropriate because it has two key objectives:

The primary aim is to explore the potential of utilizing Bitcoin as a safe-haven asset in mitigating the impact of economic and political uncertainty.

Secondly, the objective is to assess whether Bitcoin can be classified as a speculative asset based on its notable volatility characteristics.

When investors encounter uncertainty regarding upcoming fiscal, regulatory, and monetary policies, it is anticipated that they will seek to increase both their returns and volatility by turning to hedging or safe-haven assets. As volatility increases, speculative assets typically decrease their returns. Furthermore, a significant aspect of this research is the differentiation made regarding the influence of EPU on the returns and variation of Bitcoin across quantiles. The goal is to investigate the behaviour of the returns and variation of Bitcoin in periods of high and low EPU levels.

2. Gold and Bitcoin as Strategic Tools for Portfolio Optimization: Analysis of the Benefits of Diversification and Risk Reduction

Gold has been used as a natural currency and store of value for centuries. During times of market uncertainty, it serves a crucial function as a portfolio balancer and source of liquidity. Gold serves as a safeguard against inflation (Hoang et al., 2016) and illustrates opposing patterns in response to economic indicators (Elder et al., 2012), setting it apart from other assets, notably stocks. When capital markets collapse, gold preserves or further enhances its value. Research has shown that gold functions as a hedge against stocks in regular times and performs as a safe-haven asset during times of stress (Baur, Lucey, 2010) (Beckmann et al., 2015). Based on the findings of Baur and Glover (2012), the behaviour of investors has the potential to diminish the protective characteristics of gold. This phenomenon can occur when there is a notable increase in the allocation of funds towards gold for speculation or hedging. This means that gold can be used not only as a protective asset but also for speculative purposes. On the other hand, Klein (2017) employs a dynamic correlation model and proves that gold plays the role of a hedge for stock markets in the United States and Europe (Klein, 2017). However, this hedging role seems to have declined since 2013.

Currently, public attention is shifting from gold to a new emerging asset called Bitcoin. This asset is portrayed as possessing comparable characteristics to gold, particularly when it comes to its ability to hedge against risks and its role as a secure investment. On January 3, 2009, Bitcoin was introduced as the initial decentralized and entirely digital currency system. It operates on the principles of blockchain technology and verifies transactions through a proof of work mechanism³. It quickly gained popularity as an investment option, thanks to its ability to function as a medium of exchange, independence from government authorities, and the ability to trade on specialized exchanges.

Investments in Bitcoin have become easier to access due to the introduction of various Bitcoin funds by major global investment banks like Falcon Private Bank and ARK Investment Management. The Chicago Mercantile Exchange (CME) Group and the Chicago Board Options Exchange (CBOE) introduced a futures contract based on Bitcoin as the underlying asset in December 2017. This move transformed Bitcoin from a peripheral asset

³ Blockchain is a decentralized and publicly distributed database that stores all Bitcoin transactions. It ensures transparency and immutability of records through the utilization of cryptography and a consensus mechanism known as "proof of work." This mechanism addresses the double-spending problem by confirming and validating each transaction within the network. For a more detailed explanation of how Bitcoin functions, you may refer to the research conducted by Selgin (2015).

in the financial world to a mainstream one. This provides Bitcoin with credibility and renders it progressively challenging to disregard as an investment possibility⁴. The minimal correlation of Bitcoin with traditional assets makes it a highly useful tool for diversification (Corbet et al., 2018; Baur et al., 2018; Guesmi et al., 2019) and an important means of hedging against stocks (Balcilar et al., 2017) or the broader stock index (Bouri, Gupta, et al., 2017). Interestingly, during the European debt crisis of 2010-2015 and the Cyprus banking crisis of 2012-2013, Bitcoin was not affected but rather developed successfully (Kristoufek, 2013; Luther, Salter, 2017). This happened when some investors were abandoning sovereign currencies in favour of assets that are not subject to political and sovereign risks. In April 2017, about eight years after its creation, one Bitcoin acquired a greater value than an ounce of gold. As of July 2023, one Bitcoin has a value that is more than 15 times greater than the value of an ounce of gold (Tradingview.com, 2023).

The decentralized nature of Bitcoin, which is not controlled by any government or centralized institutions, including the banking system, implies that it can serve as a significant component in the alternative economy (Fang et al., 2019; Bouri, Gupta, et al., 2017). This opens up the possibility for Bitcoin to function as an instrument for hedging or a safe-haven asset, especially in conditions of loss of trust in the economic system. But does Bitcoin simply act as a medium of exchange or is it rather a mere speculative asset? To gain insight into this role, multiple studies have attempted to elucidate the behaviour of Bitcoin concerning various assets such as stocks (Bouri, Molnár, et al., 2017), bonds (Fang et al., 2019), commodities (Shahzad et al., 2019), gold (Al-Khazali et al., 2018), traditional currencies (Bouri, Molnár, et al., 2017), economic strain (Bouri et al., 2018), and economic policy uncertainty (EPU) (Bouri, Gupta, et al., 2017; Demir et al., 2018; Fang et al., 2019).

The focal point of the debate lies in Bitcoin's ability to represent, or even surpass, the hedging properties of gold compared to the returns of stock markets. Despite specific empirical investigations into both gold and Bitcoin (Bouri, Gupta, et al., 2017; Corbet et al., 2018; Ji et al., 2018), there is still inadequate substantiation about whether Bitcoin and gold jointly assume the roles of safe-haven assets or hedge in the context of equity index shifts during challenging market situations, where hedging assumes particular significance⁵. There is a lack of empirical evidence supporting the advantages of combining gold and Bitcoin in different portfolio compositions and probabilities, particularly in periods when the stock market is experiencing lower returns and both gold and Bitcoin markets are declining.

Although numerous individuals argue that Bitcoin shares certain attributes that render it partially analogous to gold, there exist several underlying distinctions between these two entities. The principal distinctions between gold and Bitcoin encompass their material nature, historical background, intrinsic value, volatility, utility in production, and recognition as a global currency reserve. Unlike gold, Bitcoin is an intangible asset with a relatively short and

⁴ Baur et al. (2018) establish a weak correlation between Bitcoin and stocks. This signifies that Bitcoin can serve as a diversification asset both during normal and stressful periods. *According to the authors, Bitcoin's primary usage lies within the realm of speculative investments, rather than being regarded as an alternative currency or medium of exchange.*

⁵ According to a recent study conducted by Klein et al. (2018) utilizing a combination of methodologies, it is established that the conditional variance properties of Bitcoin significantly differ from those of gold.

contentious history (Bhaskar et al., 2019). The debate surrounding the intrinsic value of Bitcoin continues, as it does not have institutional support. However, recent research indicates that the price of Bitcoin is not solely influenced by speculation (Kristoufek, 2015; Ciaian et al., 2016). As a leading cryptocurrency, Bitcoin exhibits extremely high volatility in financial markets, and despite being on a rather stable downward trend in 2016, it experienced a significant surge starting in early 2017 (Kristoufek, 2018).

These two assets, gold and Bitcoin, share several common characteristics that render them potentially deflationary and uncorrelated with stock markets. While these aspects are well-studied and documented for gold, they are less familiar in the case of Bitcoin. Bitcoin is considered a deflationary asset, as its circulating supply is limited and algorithmically defined to prevent artificial inflation, thereby lacking an inflationary effect. As a result, this leads to a prolonged price rise due to a reasonable level of demand. Both assets are categorized as commodities by the U.S. Commodity Futures Trading Commission and possess production processes – Bitcoin's mining and gold's extraction – although these processes differ physically and technically. Both assets remain beyond the control of sovereign authorities, such as central banks, and have a limited supply⁶. They also exhibit a positive relationship between returns and variation, making them potential hedging tools against inflation and risks associated with capital markets. Moreover, both gold and Bitcoin exhibit asymmetrical responses to positive and negative news, and unlike conventional assets such as equities and bonds, they cannot generate cash flows. Among all these characteristics, the most significant is that both gold and Bitcoin represent effective means of protection against inflation and risks tied to the stock market.

Numerous research works suggest that Bitcoin displays a notably feeble correlation with conventional financial instruments, including stocks and bonds (Dyhrberg, 2016; Bouri, Gupta, et al., 2017; Bouri, Molnár, et al., 2017). This implies that fluctuations in the price of Bitcoin are not closely tied to developments in the stock markets. Intriguingly, studies (Kristoufek, 2015) indicate a mild association between Bitcoin and gold, indicating that these two assets could serve as effective means of diversifying risk, especially when used together.

Bitcoin's capacity to operate as both a hedge and a safe-haven asset is exemplified by its capability to recover and preserve value amidst periods of upheaval (Selmi et al., 2018). This was particularly noticeable after the 2008 crisis when the uncertain economic environment contributed to the rise in Bitcoin's popularity (Weber, 2015). In times of upheaval, Bitcoin was often perceived as a safe-haven asset against the uncertainties linked to traditional financial and economic structures (Bouri, Gupta, et al., 2017). One of the key reasons for the growing interest in Bitcoin was its low transaction fees, further stimulating the demand for this cryptocurrency (Ciaian et al., 2016).

The change in volatility dynamics of Bitcoin in 2017 has a counterproductive effect, as this period is characterized by an influx of new investors and increased liquidity. Nevertheless, trading volumes of Bitcoin and other cryptocurrencies remain relatively low in comparison

⁶ The supply of Bitcoin is strictly limited, as defined by the Bitcoin protocol itself, which establishes an upper limit of 21 million mined coins in its total issuance. This means that the overall number of Bitcoin coins that can be created is pre-determined and cannot be altered. The process of creating Bitcoin is entirely algorithmic and is executed according to strict rules and protocols.

to traditional financial instruments. This simultaneously presents a challenge and an opportunity for further development and growth, as well as a cautionary signal for institutional investors.

Despite geographical limitations and a lack of global acceptance, the potential for Bitcoin's use as a payment medium is growing. For most of these factors, we can consider gold as almost the exact opposite. As an ideal safe-haven asset, the most challenging characteristics of Bitcoin encompass its questionable history (although many investors believe in its reliability) and high volatility (suggesting that in an ideal scenario, Bitcoin should exhibit a negative correlation with the remaining components of the portfolio, such as a stock index, to qualify as an effective hedging instrument).

3. Analysis of the Impact of Economic and Political Uncertainty on the Risk and Return of Bitcoin

Investors are increasingly showing interest in cryptocurrencies as an appealing investment, considering them as a "safe-haven asset" during periods of market instability. Factors influencing the profitability of cryptocurrencies, due to the inefficiencies of the Bitcoin market, have been a subject of recent research. Some of these studies examine the impact of technical indicators of cryptocurrencies, media exposure, the property of "mean reversion," and conditional tail risks that can be predicted promptly. Moreover, numerous studies demonstrate that cryptocurrency returns can be influenced by macroeconomic circumstances.

A new area of scientific literature explores the relationship between Bitcoin behaviour and economic uncertainty to substantiate its potential role as a safe-haven asset. Only a restricted range of research has directed its attention towards the potential consequences of economic and political uncertainty (EPU) on the returns of cryptocurrencies. In this context, Demir et al. (2018) illustrate that the EPU index within the United States holds the capability to accurately forecast Bitcoin returns (Demir et al., 2018). The outcomes demonstrate a predictable effect of EPU on Bitcoin's returns, indicating a negative correlation between the two. Yet, when delving into quantile distinctions, scholars detect a positive and notable influence on the lower and upper quantiles, underscoring Bitcoin's possible function as a hedge against uncertainty. Correspondingly, Baker et al. (2016) investigated the EPU index's capability to foresee cryptocurrency returns across various nations (Baker et al., 2016). Meanwhile, Xia et al. (2020) underscore the significant influence of EPU in the US on the price of Bitcoin (Xia et al., 2020).

Panagiotidis et al. (2020) contribute further support to the notion that the measure of economic and political uncertainty plays a substantial role in forecasting and shaping the valuation of Bitcoin (Panagiotidis et al., 2020). Their approach relies on an unconventional method known as SPCR (sparse principal component regression). In contrast to prior research and discussions on this topic, they analyze the structural changes in the Bitcoin market, allowing them to assess the impact of EPU on the complex conditional relationships between the Bitcoin market and the US stock market. Subsequently, they determine the effects on the portfolio by examining the influence of EPU on the optimal asset allocation.

Bouri, Gupta, et al. (2017) carried out a research study investigating the potential of Bitcoin to operate as a hedge against global uncertainty, assessed through the primary principal element of the Volatility Index (VIX) across 14 developed and emerging capital markets (Bouri, Gupta, et al., 2017). The results indicate that Bitcoin performs as a means of diversification, hedge, or safe-haven asset in the presence of uncertainty. In subsequent work, Bouri and Gupta (2019) reiterate and assess Bitcoin's capacity to function as a hedge in the context of economic uncertainty (Bouri, Gupta, et al., 2019). They also speculate about the possibility of leveraging these uncertainties for more precise predictions of Bitcoin's price movements.

In addition, Selmi et al. (2018) investigate the function of Bitcoin as a safe-haven asset, hedge, and/or diversification tool in response to considerable variations in oil prices, juxtaposing it with the role of gold (Selmi et al., 2018). The research conducted by them underscores that both Bitcoin and gold operate as safe-haven assets and diversifiers about shifts in oil prices. This signifies that investors have the option to allocate these assets during periods characterized by political and economic upheaval. Wang et al. (2018) investigate the impacts of Economic Policy Uncertainty (EPU) on Bitcoin and suggest that as long as Bitcoin maintains its independence from the conventional economic and financial system, EPU will not have a significant impact on it (Wang et al., 2019). Utilizing Baker et al.'s (2016) metric for economic and political uncertainty (EPU) and the stock market uncertainty index – VIX – as a proxy for EPU, they demonstrate that the transmission of risk to Bitcoin is of negligible significance. This highlights the potential for Bitcoin to function as a safe-haven asset or a diversifier in response to EPU.

Moreover, Fang et al. (2019) explore the repercussions of Economic Policy Uncertainty (EPU) on the enduring variation of Bitcoin, worldwide stock markets, commodities, and bonds (Fang et al., 2019). The outcomes demonstrate that EPU affects the variation of Bitcoin, stocks, and commodities, while its impact on bonds is not similarly pronounced. Moreover, the research reveals a substantial adverse influence of EPU on the correlation between Bitcoin and bonds, coupled with a favourable effect on the correlations between Bitcoin and equities, as well as Bitcoin and commodities. This offers substantiation for the potential capacity of Bitcoin to function as a hedge within distinct economic uncertainty scenarios. Nevertheless, the authors underline that the detected impact remains relatively modest.

In addition, Bouoiyour et al. (2019) affirm the multifaceted utility of Bitcoin as a hedge, a safe-haven asset, and a tool for portfolio diversification to navigate the volatility inherent in the oil sector (Bouoiyour et al., 2019). In a separate investigation, Chan et al. (2019) underscore the potent hedge potential of Bitcoin (Chan et al., 2019), especially when integrated into portfolios encompassing the five primary stock market indices. Simultaneously, research initiated by Bermpei et al. (2019) demonstrates a negative correlation between economic uncertainty and market crashes of Bitcoin, thus investors may wish to hold their Bitcoin reserves to avoid this uncertainty (Bermpei et al., 2019).

Despite the extensive literature supporting Bitcoin's ability to act as a hedging asset against uncertainties and risks, this attribute is not universally accepted by other researchers who consider it from a different perspective. In this context, Klein et al. (2018) depict evidence of

a positive relationship between Bitcoin and market downturns, essentially undermining its hedging capabilities (Klein et al., 2018). In the academic research conducted by Kliber et al. (2019), it is shown that Bitcoin's hedging capabilities are contingent upon the exchange's geographical location where trading is conducted (Kliber et al., 2019).

In a separate research endeavour, Al-Khazali et al. (2018) examine the influence of favourable and adverse macroeconomic occurrences on gold and Bitcoin (Al-Khazali et al., 2018). The results suggest that gold consistently reacts to these events, in line with its established function as a safe-haven asset. In contrast, Bitcoin does not react similarly and does not fulfil the same role as gold. In this context, Shahzad et al. (2020) disclose that the effectiveness of hedging, based on gold, is generally higher in comparison to Bitcoin (Shahzad et al., 2019). They note that economic and political uncertainty in the United States and Japan negatively affects the Bitcoin market, while the situation is favourable in China. In a different research investigation, Liu et al. (2019) ascertained that both Bitcoin and gold are not effective in hedging the risk of economic and political uncertainty in the US (Liu et al., 2019).

Matkovskyy and Jalan (2019) posit that risk-averse investors, particularly during crisis periods, tend to abstain from investing in Bitcoin (Matkovskyy & Jalan, 2019). They examine the influence of Economic Policy Uncertainty (EPU) on the connection between Bitcoin and traditional financial markets. The results of their research reveal that the volatility differential between Bitcoin and conventional markets is generally larger than the volatility differential observed solely within the conventional market. Additionally, the volatility model analysis depicts a multifaceted trend spanning a significant period and culminating in December 2017, marked by a price surge post the introduction of Bitcoin futures. The study results demonstrate that EPU exhibits asymmetric effects on the selected conventional assets.

Aysan et al. (2019) note that trade policy uncertainty can have a substantial impact on Bitcoin's returns and could potentially reduce its effectiveness as a hedge (Aysan et al., 2019). Su et al. (2020) further emphasize that Bitcoin might not consistently function as a reliable hedging tool, underscoring its limited hedging characteristics (Su et al., 2020).

Contemporary research is focused on investigating the potential of the cryptocurrency market as a source of a new kind of asset, offering stability and technological advancement (Liu & Tsyvinski, 2018; Su et al., 2020; White et al., 2020). This perspective is grounded in the argument that the returns of traditional asset markets, especially during periods of heightened volatility, have been adversely affected. Hence, it is appropriate to examine the relationship between the returns of traditional assets and cryptocurrencies, particularly the returns of Bitcoin.

Such a study is of utmost importance to comprehend how returns in these market segments fluctuate during turbulent periods when surrounded by uncertainty. In the context of the broad spectrum of uncertainties and instabilities that financial markets may undergo, the existing literature identifies two types of uncertainties that potentially can impact the returns of financial markets, including Bitcoin at large. These two types of uncertainties are of political and economic nature.

Prior studies direct attention towards the possible function of Bitcoin as an investment tool amid economic uncertainty. These studies highlight the diverse characteristics of Bitcoin as an investment asset and its capacity to serve as a hedging instrument, a safe-haven asset, and a portfolio diversifier. Nevertheless, due to contradictions, the need for additional analyses and comprehensive investigations is underscored to determine the clear role of Bitcoin in investment strategies and the stability of financial markets.

4. Issues and Limitations

Cryptocurrencies represent a distinct class of assets with unique characteristics that distinguish them from traditional financial assets and instruments. While many of these characteristics are considered advancements in the financial realm, such as decentralization, lack of regulation, low transaction fees, and anonymity, certain features constrain the adoption and utility of Bitcoin and cryptocurrencies as a whole. The most significant questions and limitations associated with the hedge label include liquidity issues, unclear international tax status, and technical specifics.

In comparison to conventional financial assets, cryptocurrencies still suffer from low liquidity. While some of the largest cryptocurrencies (Bitcoin, Ethereum, Ripple, Bitcoin Cash, and Litecoin) are relatively liquid, the overall trading volume of the entire crypto market remains significantly small when compared to the total trading volume of the currency market. It is estimated that the trading volume of cryptocurrencies represents only about 0.1% of the total currency market. This highlights the growth potential and reflects the limitations of the crypto market in its current stage.

The presence of significant price discrepancies between different cryptocurrency exchanges further emphasizes the liquidity issue. Despite arbitrageurs attempting to exploit these discrepancies, the problem is not easily overcome due to the unstable transfers and withdrawals between exchanges, as well as the high volatility of cryptocurrencies. As a result, arbitrageurs fail to eliminate price differences unless they are substantial enough not to vanish before the transfer between exchanges is completed⁷.

A liquidity-related challenge and a potential hedging concern is the lack of a significant number of currency pairs with Bitcoin. Economists argue that only a few currency pairs involving Bitcoin—US Dollar, Euro, Japanese Yen, and South Korean Won—possess sufficient liquidity with corresponding market depth. Historically, the Chinese Yuan pair held a substantial role, but the Chinese government imposed strict limitations on it⁸. Among these

⁷ In the beginning of 2018, the confirmation time for Bitcoin transactions was affected by significant network congestion, leading to substantial delays. The average transaction confirmation time reached an astonishing 11,000 minutes. Typically, six confirmations from miners are required to complete a Bitcoin transaction, a process that usually takes around 1 to 1.5 hours. However, if the transaction manages to be included in the next block, it is usually confirmed in about 10 minutes. For more information on Bitcoin transfer times between wallets, refer to: (Edge.app, 2022).

⁸ In many countries, services exist that offer the opportunity to purchase Bitcoin with the local currency. However, these services are typically characterized by low liquidity, high transaction fees, and are primarily targeted towards small retail investors with limited experience in the field.

pairs, BTC-USD is the most crucial, implying that while Bitcoin might remain independent of the stock market, the risks associated with the exchange rate of the US Dollar indirectly affect Bitcoin (unless hedged against a portfolio denominated in US Dollars).

An important factor that needs to be considered regarding the potential of Bitcoin as a hedging asset is its ambiguous classification, particularly concerning tax systems and taxation as a whole. In this scenario, anonymity intersects with regulation as governments strive to collect taxes and combat money laundering. The issue of taxing cryptocurrencies remains relevant and of interest to researchers (Gross et al., 2017; Sullivan & Burger, 2017). While the problem of tax classification, especially for conventional assets (such as currencies, stocks, and real estate), remains unsolved or internationally harmonized, it is challenging to assume that major institutional investors would view Bitcoin (or another cryptocurrency) as an investment opportunity⁹.

An intriguing aspect of Bitcoin and cryptocurrencies as a whole, which poses a barrier to entry for major players, is associated with the intricacies of the technical realm of cryptocurrencies. These intricacies are unique to this type of asset and are not observed in other financial assets. In addition to the blockchain's function and the time required for transaction execution and confirmation, the topic of forks (divergences, blockchain updates) in cryptocurrencies has become increasingly significant. All cryptocurrencies require constant updates and upgrades to their code to address evolving challenges and enhance their functionality and security. This demands specialized expertise and meticulous attention to detail, which is not as inherent in other types of financial assets.

Updates to the code in the field of cryptocurrencies often come with community conflicts and lead to divisions, resulting in a phenomenon known as forking. In this process, one version of the code continues as the original cryptocurrency, while another version forms a new cryptocurrency. As a result of the fork, two cryptocurrencies are created, each with its blockchain, with the history before the split being identical for both versions. This process is referred to as a "hard" fork.

Although forks share some similarities with stock dividends or splits, they differ significantly. A fork initiates the creation of an entirely new cryptocurrency, which must prove its utility. The price of the new cryptocurrency is determined by its usefulness and investors' interest in it. Typically, the owners of the cryptocurrency from which the fork was made "receive" the newly created cryptocurrency, following a specific ratio or set of conditions.

Forks carry an additional risk associated with the uncertainty about their impact on the price of the original cryptocurrency and whether this price decrease is compensated by the price of

⁹ By the end of 2017, a significant milestone was achieved in the integration of Bitcoin as a standard financial instrument when both the CME Group and the Chicago Board Options Exchange (CBOE) launched Bitcoin futures contracts. It is noteworthy that both exchanges are regulated and operate in accordance with relevant laws, allowing institutional investors to participate in the market with greater security and confidence. In the same vein, on June 23, 2023, BlackRock, the world's largest asset manager, filed an application to create a US-listed Bitcoin exchange-traded fund (ETF). This news generated substantial interest and excitement within the investment community. See: Reuters.com, (2023).

the newly created cryptocurrency¹⁰. However, the occurrence of forks is an external factor not directly linked to the financial markets and should not play a key role in evaluating Bitcoin as a hedging asset.

In conclusion, Bitcoin possesses several attributes that make it potentially useful as a hedging asset, but it also has certain characteristics that limit its utility. In the evolving crypto landscape, the appealing aspects of Bitcoin are retained while problematic features can be overcome. However, some of the specific characteristics, such as the claimed anonymity, may require reevaluation and concessions¹¹.

5. Methodology, Data, and Empirical Results

5.1. Data

To explore the effects of economic and political uncertainty (EPU) on the returns and variation of both Bitcoin and gold, daily price datasets for Bitcoin and gold are employed for the timeframe spanning from February 2013 to July 2023. Subsequently, these data are recalculated monthly to be compatible with the EPU data.

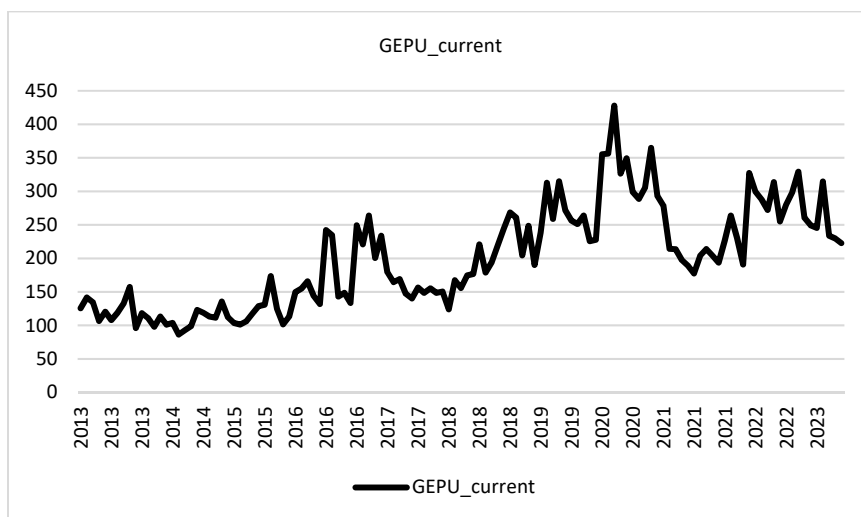
As a measure of EPU, the Global Economic Policy Uncertainty (EPU) index, derived from the research by Baker et al. (2016) (<http://www.policyuncertainty.com>), is utilized. This index is calculated by tallying the occurrences of specific terms within U.S. newspapers, namely: "economy" or "economic"; "uncertainty" or "uncertain," alongside terms like "legislation," "deficit," "regulation," "Congress," "Federal Reserve," or "White House."

Figure 1 illustrates the evolution of GEPU (Global Economic Policy Uncertainty) over the examined period. It is observed that GEPU peaks during occurrences like Brexit, the crisis in the Eurozone, the U.S. debt crisis, the "fiscal cliff" in the U.S., and the COVID-19 pandemic.

¹⁰ Two of the hard forks of Bitcoin are Bitcoin Cash and Bitcoin Gold. While the first one was successful in its development and gained significant popularity, the second one faced challenges and did not achieve the same level of success. Both cryptocurrencies require constant updating and upgrading of their code to remain current and overcome new obstacles that arise in their development and usage.

¹¹ Currently, it is becoming increasingly common for new registrations on cryptocurrency exchanges to require the Know Your Customer (KYC) procedure, in which the registering user must provide an identification number and corresponding identification information. Although this is usually not mandatory for wallets where investments are stored, there already exist services associated with financial institutions or even founded by them that establish a connection between the traditional financial world and the realm of cryptocurrencies. These services apply the standard KYC process and typically conduct a thorough identity verification akin to what a traditional bank would perform.

Figure 1. Global economic and political uncertainty for the period February 2013 – July 2023



Source: Policyuncertainty.com, (2023).

Daily price data for Bitcoin in U.S. dollars, extracted from the website <https://www.investing.com>, is utilized for the analysis of Bitcoin's returns and variation. Figure 2 illustrates the price development of Bitcoin over time. A substantial increase is noticeable in 2017 and 2021, followed by a decline in 2018 and 2022.

Figure 2. The price of Bitcoin for the period February 2013 – July 2023



Source: Investing.com, (2023)

For the analysis of gold, daily price data in U.S. dollars is extracted from the source – <https://www.investing.com>. Figure 3 presents the development of gold prices, focusing on the following periods: 2011-2013, 2020, and 2022. The timeframe from 2011 to 2013 holds significant relevance, notably encompassing the repercussions of the global financial crisis, an event that has left lasting effects on the worldwide economy. In 2020, the price of gold reached high peaks, reflecting the significant level of uncertainty triggered by the COVID-19 pandemic, whereas in 2022, the increase can be attributed to the military conflict in Ukraine.

Figure 3. The price of gold for the period February 2013 – July 2023



Source: Investing.com, (2023).

Bitcoin and gold returns are calculated daily as follows:

$$R_{i,t} = \ln \frac{P_t}{P_{t-1}} \quad (1)$$

Where P_t is the closing price of asset i in period t , while P_{t-1} is the closing price of asset i in period $t-1$.

Next, the return on asset i is recalculated on a 30-day basis as follows:

$$R_{i,30} = (1 + R_{i,1}) * (1 + R_{i,2}) * (1 + R_{i,3}) * \dots * (1 + R_{i,30}) - 1 \quad (2)$$

Variation is mathematically determined by calculating the mean value of the squared differences between each element of the data set and the mean value of the entire set. In the

present case, the calculation of the variation pertains to 30 days and is based on daily return data as follows:

$$\sigma_{i,30}^2 = \frac{\sum (x - \mu)^2}{N} \quad (3)$$

Table 1 presents descriptive statistics for the levels of EPU, returns, and variations of Bitcoin and gold. From the table, it becomes evident that EPU exhibits the highest variation and standard deviation, followed by the values of Bitcoin and gold. The maximum 30-day return value for Bitcoin is 3.79%, and for gold, it is 0.17%.

Regarding asymmetry and kurtosis, the coefficients unveil that most analyzed variables, except EPU, exhibit leptokurtic distribution, which is particularly pronounced in Bitcoin's returns. These observations indicate that the distributions of these variables are non-normal, emphasizing the need for applying a quantile approach to accommodate extreme values.

Table 1. Descriptive statistics of the variables for the period February 2013 – July 2023.

	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
EPU	341,59	86,28	427,87	199,144	75,685	5728,229	0,502	0,217	-0,528	0,43
RitBTC	4,76	-0,97	3,79	0,055	0,353	0,124	3,476	0,04	25,768	0,08
VitBTC	0,02	0,00	0,02	0,0032	0,00443	0,000	2,522	0,04	5,078	0,08
RitGOLD	0,31	-0,14	0,17	0,002	0,048	0,002	0,213	0,048	0,168	0,095
VitGOLD	0,00	0,00	0,00	0,0001	0,00008	0,000	3,569	0,048	15,78	0,095

Source: Author's calculations.

5.2. Methodology

The current study employs a linear regression model to investigate the impact of uncertainty on expected returns and variation of Bitcoin and gold. Additionally, quantile regression is utilized to examine the impact of uncertainty on the extreme quantiles of returns and variation for both assets. It's possible that the distribution of the examined variables may not be normal and could exhibit heavy tails and kurtosis, necessitating the application of a quantile-based approach.

The study aims to analyze whether Bitcoin plays the role of a speculative asset or a safe-haven asset, as often attributed to gold. Therefore, the impact of uncertainty on the returns and variation of both assets in the most extreme quantiles is assessed. The study assumes that a more significant influence of uncertainty can be expected on the returns and variation of Bitcoin and gold at their highest values, where investors' perception of uncertainty is the strongest.

Quantile regression offers an advantage over ordinary linear regression as its estimates are more robust when measuring extreme values. Thus, the ordinary linear regression model is employed to analyze the impact of uncertainty on the returns and variation of Bitcoin and gold, as follows:

$$R_{i,t} = \alpha + \beta EPU_t + \varepsilon_t \quad (4)$$

$$V_{i,t} = \alpha + \beta EPU_t + \varepsilon_t \quad (5)$$

The following notations are used in the study: $R_{i,t}$ signifies the return of asset i on day t , and $V_{i,t}$ denotes the variation of the same asset on the same day. The constant in the model is denoted as α , EPU represents the level of uncertainty in the model for the respective day t , and signifies the intensity of the impact of fluctuations in EPU on $R_{i,t}$ and $V_{i,t}$. The residual error in the model is indicated by ε .

To analyze the impact of EPU in the highest and lowest quantiles of the return and variation of Bitcoin and gold, the proposed quantile regression is utilized. It is defined as follows:

$$R_{i,t} = \alpha_\tau + \beta_\tau EPU_t + \varepsilon_{i,t,\tau} \quad (6)$$

$$V_{i,t} = \alpha_\tau + \beta_\tau EPU_t + \varepsilon_{i,t,\tau} \quad (7)$$

Here, $R_{i,t}$ signifies the return of asset i on day t , $V_{i,t}$ denotes the variation of the same asset on the same day, EPU stands for the uncertainty level in the model on day t , while α and β are parameters of the model reflecting the baseline level of return and the intensity of EPU's impact on $R_{i,t}$ and $V_{i,t}$, respectively. The residual error in the model is represented by ε .

The study employs quantile regression, which represents the quintile with values between 0 and 1. The focal point of the study is on quintiles with the most extreme values, namely: 0.01, 0.05, 0.1, 0.25, 0.75, 0.9, 0.95, and 0.99. These quintiles are selected as they reflect the most extreme values in the data distribution, providing insights into the behaviour of asset returns and variation during moments of exceptionally low and high uncertainty.

5.3. Results

The current study employs a linear regression model to investigate the effect of EPU on Bitcoin returns. The outcomes, as shown in Table 2, highlight a negative and statistically significant β coefficient for the connection between EPU and Bitcoin's returns, while the relationship between EPU and gold is positive. These results imply that the uncertainty emanating from governmental and central bank actions does possess explanatory capability regarding the returns of gold, reinforcing its function as a hedge against instability.

Conversely, the negative correlation between Bitcoin and EPU suggests that heightened uncertainty does not result in increased returns as observed with gold, thus challenging the concept of Bitcoin's role as a hedge. In line with the hypothesis about Bitcoin's role, several other studies reveal that EPU exerts a negative and substantial influence on stock returns, as

observed with Bitcoin (Dzielinski, 2012) (Antonakakis et al., 2013) (Adjei & Adjei, 2017). Therefore, these results support the assertion that Bitcoin assumes the role of a speculative asset. According to Eom et al. (2019), Bitcoin can also be regarded as a speculative asset since it displays the typical characteristics of such assets: responsiveness to investor sentiment and considerable volatility (Eom et al., 2019).

Table 2. Estimates of the impact of EPU on Bitcoin and gold returns with simple linear regression for the period from February 2013 to July 2023

	BTC						GOLD				
	Rbtc						Rgold				
	Unstandardized Coefficients		Standardized Coefficients				Unstandardized Coefficients		Standardized Coefficients		
Coefficients	B	Std. Error	Beta	t	Sig.	Coefficients	B	Std. Error	Beta	t	Sig.
(Constant)	0,179	0,027		6,579	0	(Constant)	0,037	0,012		3,192	0,002
EPU	-0,001	0	-0,385	-4,632	0	EPU	0	0	-0,22	-2,5	0,014

Source: Author's calculations.

When investigating the impact of EPU on the variation of Bitcoin and gold, the results from Table 3 indicate a significant and negative correlation between EPU and the variation of Bitcoin. However, simultaneously, the connection between EPU and the variation of gold is not statistically significant. This negative correlation reinforces the notion that Bitcoin does not function as a hedge against uncertainty.

Table 3. Estimates of the impact of EPU on Bitcoin and gold variations with ordinary linear regression for the period February 2013 to July 2023

	BTC						GOLD				
	Vbtc						Vgold				
	Unstandardized Coefficients		Standardized Coefficients				Unstandardized Coefficients		Standardized Coefficients		
Coefficients	B	Std. Error	Beta	t	Sig.	Coefficients	B	Std. Error	Beta	t	Sig.
(Constant)	0,179	0,001		58,749	0	(Constant)	0,0001	0		9,396	0
EPU	-0,001	0	-0,784	-14,002	0	EPU	0	0	-0,125	-1,395	0,166

Source: Author's calculations

Nevertheless, since the modelling incorporates the influence of sentiment generated by EPU on investors, it appears reasonable to delve further into the impact of EPU on the returns and variation of Bitcoin and gold at their extreme thresholds (quantified through quantiles 0.01, 0.05, 0.1, 0.25, 0.75, 0.9, 0.95, and 0.99). To achieve this, the method of quantile regression is employed.

Table 4 demonstrates the variation in the effect of EPU on the returns of Bitcoin and gold across different quantiles. In the lower quantiles, it is established that EPU has a positive effect on the returns of Bitcoin. Nonetheless, in the higher quantiles (0.9, 0.95, and 0.99), this influence becomes negative. Concerning gold, a positive relationship between EPU and its returns is observed, which is statistically significant except for quantiles 0.05 and 0.25. The negative dependency of EPU on Bitcoin's returns contradicts the findings of Bourri, Molnár, et al., (2017), Selmi et al., (2018), and Demir et al., (2018). The diminishing returns of Bitcoin

during times of increased investor uncertainty, as indicated by EPU values, contradict its status as a safe-haven or hedge asset. In contrast, gold exhibits an increase in its returns during more uncertain periods, when conventional speculative assets like stocks experience a decrease in their returns.

Table 4. Estimates of the impact of EPU on Bitcoin and gold returns with quantile regression for the period from February 2013 to July 2023

Rbtc						Rgold					
τ	Coefficient	Value	Std. Error	t	Sig.	τ	Coefficient	Value	Std. Error	t	Sig.
0,01	(Constant)	-0,160495	0,003	-54,899	0	0,01	(Constant)	-0,074	0,005	-14,019	0
	EPU	0	0	17,542	0		EPU	9,849E-05	0	3,948	0
0,05	(Constant)	-0,137	0,015	-9,057	0	0,05	(Constant)	-0,058	0,011	-5,209	0
	EPU	0	0	2,481	0,014		EPU	0,0000665	0	1,264	0,209
0,1	(Constant)	-0,102	0,021	-4,751	0	0,1	(Constant)	-0,057	0,005	-10,594	0
	EPU	0,0000816	0	0,811	0,419		EPU	7,866E-05	0	3,134	0,002
0,25	(Constant)	0,073	0,031	2,327	0,022	0,25	(Constant)	-0,037	0,009	-4,09	0
	EPU	0	0	-2,888	0,005		EPU	3,773E-05	0	0,884	0,378
0,75	(Constant)	0,228	0,043	5,353	0	0,75	(Constant)	0,116	0,016	7,463	0
	EPU	0	0	-2,04	0,043		EPU	0	0	-4,728	0
0,9	(Constant)	0,311	0,06	5,19	0	0,9	(Constant)	0,142	0,018	8,047	0
	EPU	-0,001	0	-2,07	0,041		EPU	0	0	-4,471	0
0,95	(Constant)	0,419	0,047	8,879	0	0,95	(Constant)	0,162	0,018	8,887	0
	EPU	-0,001	0	-3,866	0		EPU	0	0	-4,376	0
0,99	(Constant)	0,423	0,004	101,617	0	0,99	(Constant)	0,181	0,003	53,175	0
	EPU	-0,001	0	-28,943	0		EPU	0	0	-26,402	0

Source: Author's calculations

In the analysis employing quantile regression, a negative and statistically significant connection between EPU and the variation of Bitcoin is established. The results of the gold analysis signify a positive and statistically significant (except for quantiles 0.05 and 0.25) dependency between EPU and its variation.

The positive correlation between EPU and asset variation demonstrates that when governments and central banks generate greater ambiguity regarding economic policies, it results in increased information asymmetry among market participants. This, in turn, results in greater uncertainty in individual investor expectations. The results of this study are consistent with the results of Eom et al. (2019) and Fang et al. (2019), suggesting that gold functions as a safe-haven asset or hedge. However, this study did not establish similar capabilities for Bitcoin. The results of the analysis on the impact of EPU on the variation of Bitcoin demonstrate that Bitcoin can serve as a means of exchange and a speculative asset, but it is not a hedge or safe-haven asset during periods of higher uncertainty.

Table 5. Estimates of the impact of EPU on Bitcoin and gold variations with quantile regression for the period February 2013 to July 2023

Vbtc						Vgold					
τ	Coefficient	Value	Std. Error	t	Sig.	τ	Coefficient	Value	Std. Error	t	Sig.
0,01	(Constant)	0,001	0	58,036	0	0,01	(Constant)	0,000031	0	80,531	0
	EPU	-0,000001	0	-16,053	0		EPU	0	0	7,99	0
0,05	(Constant)	0,001	0	44,279	0	0,05	(Constant)	0,000035	0	12,575	0
	EPU	-0,000001	0	-8,679	0		EPU	0	0	0,258	0,797
0,1	(Constant)	0,001	0	54,118	0	0,1	(Constant)	0,000049	0	11,551	0
	EPU	-0,000001	0	-11,351	0		EPU	0	0	-2,218	0,028
0,25	(Constant)	0,001	0	60,777	0	0,25	(Constant)	0,00005	0	6,569	0
	EPU	-0,000001	0	-10,923	0		EPU	0	0	0,018	0,986
0,75	(Constant)	0,001	0	45,605	0	0,75	(Constant)	0	0	8,794	0
	EPU	-0,000001	0	-11,034	0		EPU	0	0	-3,005	0,003
0,9	(Constant)	0,001	0	49,893	0	0,9	(Constant)	0	0	17,045	0
	EPU	-0,000001	0	-10,567	0		EPU	0	0	-5,71	0
0,95	(Constant)	0,001	0	38,659	0	0,95	(Constant)	0	0	15,813	0
	EPU	-0,000001	0	-8,298	0		EPU	0	0	-4,147	0
0,99	(Constant)	0,001	0	181,84	0	0,99	(Constant)	(An unbounded solution for the value of q being equal to 0.99).			
	EPU	-0,000001	0	-33,969	0		EPU				

Source: Author's calculations.

Conclusion

The swift expansion of Bitcoin, its ability to recover during turbulent periods, and its high volatility, among other characteristics, have sparked increasing interest in the literature on the economic and financial factors that can influence its price. In this particular context, there is an ongoing discussion regarding the function that this cryptocurrency serves. Specifically, there is debate about whether it functions primarily as a means of exchange and store of wealth, a speculative investment, or a safe-haven asset.

This study aims to address the question by examining the impact of economic and political uncertainty on the returns and variations of Bitcoin. The fundamental assumption is that when investors feel uncertain due to ambiguity surrounding fiscal, regulatory, and currency policies that might be implemented, safe-haven (hedging) assets should increase their returns and variation, while usual speculative assets should raise their variation and decrease their returns. To achieve more reliable results, gold is used as a benchmark safe-haven (hedging) asset, and the behaviour of Bitcoin and gold regarding EPU is compared.

To explore the effect of Economic Policy Uncertainty (EPU) on the returns and variation of Bitcoin and gold for the period of February 2013 to July 2023, the EPU measure by Baker et al. (2016) is utilized. To thoroughly examine this influence, two distinct methodologies are employed: ordinary linear regression and quantile regression.

The findings of the research on the impact of Economic Policy Uncertainty (EPU) on the returns of Bitcoin and gold, applied through ordinary linear regression, reveal that EPU harms Bitcoin's returns and has a positive effect on gold's returns throughout the entire sample

period. When examining the effect of EPU on the variation of Bitcoin and gold, it is observed that EPU harms the variation of Bitcoin and has a positive impact on that of gold. These results are corroborated by the quantile regression analysis as well.

An interesting observation is that in the lower quantiles, a positive influence of EPU on Bitcoin's returns is established. However, in the higher quantiles (0.9, 0.95, and 0.99), this influence becomes negative, which contradicts the notion that increasing uncertainty results in higher returns for Bitcoin. As for gold, a positive correlation between EPU and its returns is observed, which is statistically significant except for the 0.05 and 0.25 quantiles.

These results dismiss the significance of Bitcoin as a hedge or safe-haven asset and emphasize its perception as a speculative asset more akin to stocks. Research has shown that Bitcoin is not effective in safeguarding funds during periods of economic instability and is not considered a significant asset for building diversified investment portfolios. The drawn conclusions provide valuable insights for both individual and professional investors, showcasing Bitcoin's behaviour in situations of economic and political uncertainty. The fact that Bitcoin's returns and variation are influenced by EPU suggests that investors can utilize EPU information to enhance their investment choices regarding Bitcoin, considering it as an additional investment tool rather than merely an exchange medium it was created for.

Investors can derive two advantages from this information. Firstly, leveraging the impact of EPU on the returns and variation of Bitcoin, investors can utilize EPU data to enhance their investment decisions regarding Bitcoin. Secondly, the evidence that Bitcoin cannot function as a safe-haven asset, similar to gold, allows investors to dismiss it as a means of protecting their savings during periods of economic uncertainty. These conclusions are also of significance to policymakers in the realm of economic policy, illustrating how uncertainty surrounding the development and implementation of policies tangibly impacts investment assets.

The results of this research hold significance for the literature about Bitcoin's role under conditions of uncertainty. However, it should be noted that this study carries certain limitations. The examination employs monthly data for the global economic policy uncertainty (EPU) index and Bitcoin's prices in US dollars. In the future, it could be explored whether the outcomes remain consistent when using alternative measures of uncertainty and data for Bitcoin denominated in a currency other than the US\$.

Furthermore, this study does not examine the effect of EPU on other cryptocurrencies. Including a wider range of cryptocurrencies in the research could help in comprehending the factors that influence their behaviour concerning EPU. Finally, this study does not aim to construct effective portfolios incorporating Bitcoin, an area of interest for future investigations.

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AN ANALYSIS OF ALBANIA'S BANKING SECTOR: CURRENT TRENDS AND FUTURE PROSPECTS²

The purpose of this research is to explore and summarize aspects of the current state and development trends in Albania's banking sector. The analysis shows that the banking system dominates the country's financial landscape, while the securities market remains nascent. Adverse inflationary dynamics are also observed. The research demonstrates dependencies between key banking indicators like non-performing loans, capital adequacy ratio and money supply on economic factors. The prospects for Albania's banking sector are challenged by the volatile global economy, however promoting lending, improving asset quality and supporting businesses can help establish stability. Expanding the securities market can also assist banking sector growth. The practical significance is that the identified trends and relationships can inform policy decisions to facilitate robust banking sector performance.

*Keywords: banking systems; loan portfolio; securities; assets; stock market
JEL: E5; G1; G21*

1. Introduction

With the design of economic relations, the development of the financial market plays a significant role in the functioning of the country. In the course of exploring the specific features of the Albanian financial market, it is important to establish the essence and origin of the definition of “financial market”, as this term is a multifaceted concept that requires more detailed research and personification. P. A. Petare et al. explain that the financial market is a set of economic relations based on the interaction of various activities, such as investment banking, securities trading, asset management, insurance and financial advisory services (Petare et al., 2023). R. Chami et al. consider the financial market as the main tool for ensuring the conditions necessary for innovation in technological and economic sectors (Chami et al., 2009). The researchers explain that over time, the development of the financial market is a derivative aspect of economic expansion, which establishes wealth and opportunities, which, in turn, provides a foundation for the expansion and further development of the country's financial system. Thus, it is advisable to understand the

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financial market as a set of economic relations based on the purchase and sale of financial instruments for financial and production activities.

As for Albania, the financial market is expanding, accompanied by the transformation of the country from one of the poorest in the world to an upper-middle-income country (Musabelliu, 2023; Proskurnina, Kähler, Cervantes-Martínez, 2020). A. Fullani (2022) examined the current state of the financial market and its prospects in Albania. The researcher explains that establishing a developed financial market is a significant support for monetary policy and other economic policies. Notably, the author emphasises that inflation fluctuations in the country are a significant problem, although there are positive rapid changes in its dynamics. The scientist believes that the measurement of inflation can be improved by clarifying prices and the weight of different groups in the basket of goods and services offered to the consumer. For example, a product has not yet been included in the basket, and fluctuations in its price are difficult to justify. However, the consumer price index was taken for granted and was not subject to the influence of the Albanian central bank. M. Musabelliu (2023) examined the specifics of political influence on the Albanian financial market. The researcher explains that Albanian politics in early 2023 is more unstable than ever. At this time, the political past is meeting the present with a bang and challenging the future with its dramatic changes. Therewith, the ruling party has all the advantages of power in 2023, and the opposition is almost focused on its self-destruction. However, both parties are running with all the political and financial power at their disposal. The researcher explains that dramatic changes in the country's political course are expected, which in turn will have an adverse impact on the financial market. M. Musabelliu (2023), in his next research, found that the Albanian economy will not face major difficulties in the current period on paper and numbers. However, the author added that it is essential to consider the factors that will contribute to the overestimation of indicators (elections, PPP investments, construction, etc.). The researcher explains that for ordinary citizens, 2023 will be a year of financial insecurity and the struggle for a stable financial situation. The researcher predicts that the main adverse trend will be in the inflation rate in Albania. Accordingly, for a developing country, a high level of inflation growth will mean regression and decline in real economic terms for the country's citizens.

According to the results of 2022, Albania has seen positive trends in the development of trade, exports, employment and Gross Domestic Product (GDP) per capita growth. Therewith, the country's inflation rate rose to 8.3%, which was accompanied by an increase in the discount rate to 2.75%. In 2023, against the backdrop of deteriorating global financial conditions, real exports, consumption, and investment are expected to grow at a slower pace than before the pandemic. Further increases in food and energy prices are considered to be a key risk to growth, as they could affect real disposable income, slow poverty reduction, and increase the tax burden. It is clear that such a small open economy of Albania is quite vulnerable to external shocks and may have a significant impact on the state of the country's financial market (The World Bank, 2023).

Accordingly, the main purpose of the research is to summarise the specific features of the current state and development of the Albanian financial market, and to determine further prospects for its development, considering the impact of economic factors.

2. Materials and Methods

The theory and methodology of the research are based on the main expert studies on the financial market. The following methods were used in the research. The method of deduction, which allows moving from a general to a specific concept, was used to establish the specifics of the meaning of the category “financial market”, to determine the essence of the financial market structure, and to establish its main determinants.

The method of analysis, which allows highlighting the specific features of the dynamics of indicators, was used to determine the specifics of the economic situation in Albania during 2018-2022. The systematization method, which helps to separate data, was used to systematize the indicators of GDP in terms of the US dollar as of 01/01/2019, 01/01/2023, GDP per capita, inflation, GDP deflator, consumer price index, imports and exports of goods and services, central government debt, poverty ratio at the national poverty line, and the overall unemployment rate. This method was used to explore the Albanian financial market and consider indicators of money supply, broad money growth, bank capital to assets ratio, non-performing loans of banks to total loans, domestic loans granted by the financial sector and loans granted to the private sector, deposit interest rate, lending interest rate, number of commercial bank branches (per 100,000 adults), market capitalization of listed domestic companies, and the total number of traded shares.

Econometric modelling was used to establish the relationship between financial market indicators (dependent variables) and economic factors (independent variables). Specifically, multivariate linear regression was utilized. This enabled quantification of the correlation and determination coefficients to assess the strength of associations. Fifteen single factor models were developed with non-performing loans, capital adequacy ratio, and money supply as the outcome variables. The economic determinants were GDP per capita, exports, consumer prices, government debt and poverty rate. Regression analysis provided valuable insights into how changes in the macroeconomic environment influence the banking system and wider financial market. The statistical approach also facilitated evidence-based forecasting of future trends.

Using the method of mathematical modeling, which allows establishing the specifics of the relationship between indicators or phenomena, the regression equations of the dependence of financial market indicators on the economic status of Albania have been developed. In addition, the correlation coefficients were determined, based on which the density of the connection between the resultant indicators and the factor indicators was established. In this case, the indicators of non-performing loans of banks to total loans, the ratio of bank capital to assets, and money supply were the outcome indicators, and the determinants of the economic state of the country were identified as factor indicators. Accordingly, a total of fifteen one-factor models were developed in the research, divided into three sections according to the outcome variable. The factors of influence in these regression models were GDP per capita, exports of goods and services, the consumer price index, central government debt, and the poverty ratio at the national poverty line. This method was used to determine the coefficient of determination, which allows for establishing the percentage dependence of the dynamics of the resultant indicator on the change in the factor indicator.

Using the method of induction, which allows proceeding from a specific concept to a general one, based on a preliminary analysis of the state of the financial market of Albania and determining the specific features of its dependence on the economic situation of the country, the prospects for the development of the financial market of Albania through the expansion of the stock market were determined. This method helped to identify the main benefits of stock market expansion in the Albanian financial market. The research on the prospects for the development of the Albanian financial market was based on the World Bank's data on the indicators of economic development, the banking system, the country's loan portfolio, bank capital sufficiency, and the monetary and securities markets.

3. Results

After gaining independence in the early 20th century, Albania was one of the most backward countries in Europe and did not change until the beginning of the 21st century (Fullani, 2022). At that time, the country's population was considered the poorest. Nevertheless, Albania managed to withstand the adverse effects of the global economic crisis of 2008 and subsequently transformed from one of the poorest countries in the world to an upper-middle-income country. Nowadays, according to the expert G. Sejko (2022), Albania will face difficulties in 2023, and the only indicators that will have a significant increase in the poverty rate are external developments such as the war in Ukraine, sanctions, environmental transition, protectionist policies, and inflationary pressures will have a significant impact on Albania. After all, the Albanian economy has been constantly experiencing a significant number of shocks, and if the factors of existing fundamental economic problems are added to this, an economic catastrophe in the country can be foreseen. Since the entire world is currently experiencing an unstable period of economic, geopolitical, and environmental changes, it is generally expected that inflation in the country will increase to a maximum. Thus, in general, unfavourable conditions for the functioning of the financial market in Albania are expected. It is advisable to consider the latest trends in the economic situation in Albania (Table 1).

Table 1. Dynamics of indicators of the economic situation in Albania during 2018-2022

Indicator	2018	2019	2020	2021	2022	Growth rate, %
GDP (billion, current US dollars)	15.16	15.40	15.16	17.93	18.88	24.58
GDP per capita (current US dollars)	5287.66	5396.21	5343.04	6377.20	6802.80	28.65
Inflation, GDP deflator (annual %)	1.47	1.26	0.70	3.45	9.68	557.16
Inflation, consumer prices (annual %)	2.03	1.41	1.62	2.04	6.73	231.61
Import of goods and services (% of GDP)	23.25	25.54	17.04	17.34	16.62	-28.52
Export of goods and services (% of GDP)	31.57	31.30	22.66	31.31	37.46	18.66
Central government debt, total (% of GDP)	75.89	64.57	75.70	83.89	82.38	8.56
Poverty rate at the national poverty line (% of population)	23.70	23.40	23.00	21.80	22.60	-4.64
Total unemployment rate (% of total labour force) (ILO modelled estimate)	12.30	11.47	13.07	12.68	11.81	-4.00

Source: Central government debt; Exports of goods; GDP (current US\$), 2022; GDP per capita (current US\$), 2022; Imports of goods; Inflation, consumer prices; Inflation, GDP deflator; Poverty headcount ratio; Unemployment, total.

Table 1 demonstrates that the GDP level in Albania tended to increase, and accordingly, GDP per capita increased, which indicates a decrease in the poverty level of the country's citizens. Therewith, there are adverse changes in pricing, as the GDP deflator and the consumer price index had intensive growth rates during 2018-2022. Albania's trade balance had a positive trend during the analyzed period, as exports of goods and services increased while imports of goods and services decreased. The central government's debt tended to increase in 2018-2022, reflecting the adverse trend in the country's economic development. Therewith, the poverty level of the population is decreasing as the poverty rate has decreased, which is accompanied by a similar decrease in the overall unemployment rate in Albania. Thus, in general, the country's economic environment is unstable. In terms of recent financial market developments, Albania is characterized by a moderate degree of financial services preparedness.

Intensive progress has been made in terms of improving legislation on retail payments, bankruptcy, insurance, and collective investment. In addition, banking regulation has been aligned with Basel III, specifically concerning the capital adequacy ratio, and laws have been passed on the internal liquidity assessment process, the capital adequacy ratio, and the net stable funding ratio of banks. In terms of financial market infrastructure, the Albanian Stock Exchange, a private entity, trades only in government bonds. In addition, the country has a central securities depository. Therewith, the Albanian capital market is structured into two segments, namely government securities and bonds issued through private placement. As of the end of 2022, 13 entities operate in the capital market of Albania, including one central securities market, a depository, one securities exchange, and the rest of the banking institutions (Communication from the Commission, 2022). Thus, in general, the financial market of Albania is based on the monetary and public securities markets. Consider the specifics of Albania's monetary market over the past 5 years (Table 2).

Table 2. Dynamics of indicators of the financial market development in Albania during 2018-2022

Indicator	2018	2019	2020	2021	2022	Growth rate, %
Money supply (% of GDP)	77.24	77.94	88.44	85.25	77.74	0.65
Broad money supply growth (annual %)	-0.22	4.31	10.49	8.60	4.87	2313
Banking capital to assets ratio (%)	9.15	9.08	9.07	8.85	8.60	-6.07
Non-performing loans of banks to total loans (%)	10.43	7.97	7.65	5.39	4.79	-54.07
Domestic credit provided by the financial sector (% of GDP)	58.50	61.42	69.08	63.97	60.17	2.86
Domestic credit to private sector (% of GDP)	32.99	34.13	37.92	36.64	34.04	3.20
Depositors of commercial banks (per 1000 adults)	1122.23	1051.96	1094.85	1133.08	1153.53	2.79
Deposit interest rate (%)	0.75	0.49	0.42	0.48	0.73	-2.77
Loan interest rate (%)	5.93	6.28	6.12	6.02	6.51	9.68
Commercial bank branches (per 100,000 adults)	20.72	19.54	18.71	18.61	18.57	-10.38

Source: Bank capital to assets ratio; Bank nonperforming loans; Broad money (% of GDP); Broad money growth; Deposit interest rate; Depositors with commercial banks; Domestic credit provided; Domestic credit to private sector; Lending interest rate (%).

Table 2 demonstrates that, in general, the money supply in Albania tended to grow, which indicates an improvement in the functioning of the country's financial market. Therewith, there was a positive trend in broad money growth in 2018-2022. During the analyzed period, the ratio of bank capital to assets in Albania tended to decrease, which is an adverse trend. In addition, during the period under review, the value of the indicator did not correspond to the regulatory requirements according to the Harmonized Banking Regulation with Basel III. Therewith, there was a positive trend in the loan portfolio of the Albanian banking system, as the ratio of non-performing loans to total loans almost halved between 2018 and 2022. In other words, the Albanian banking system has resolved the issue of non-performing loans in its loan portfolio. In addition, the loan portfolio of the country's banking system is expanding, as evidenced by the increase in domestic loans granted by the financial sector and domestic loans to the private sector. A positive trend for the Albanian financial market is that the number of depositors has increased, which indicates an increase in confidence in the country's banking system. Therewith, the deposit interest rate has decreased, which indicates a reduction in interest costs in the banking sector. The lending rate has increased significantly, which in turn is accompanied by an increase in interest income for the Albanian banking system. Such trends in the country's credit and deposit markets indicate an increase in the level of profitability and a decrease in the degree of risk in the financial market of the country examined.

Therewith, the number of bank branches has decreased, which indicates the automation of financial services and a reduction in the level of costs for banking institutions. Thus, the Albanian monetary market at the end of 2022 will be characterized by positive trends and have great prospects. The research established that there are no indicators of the functioning of the Albanian securities market, according to the World Bank. The indicator of the market capitalization of domestic listed companies was considered, which includes shares of registered national companies; shares of foreign companies listed exclusively on the stock exchange; ordinary and preferred shares of domestic companies (2022); and non-voting shares, the dynamics of which are not traced in Albania at all. In addition, the financial market analysis drew attention to the indicator of the total number of traded shares, both domestic and foreign, multiplied by their respective prices (stocks traded, total value, 2022), and the dynamics of this determinant are absent. Such trends indicate the absence of a stock market in the country in general. Since the banking system is the main sector of the Albanian financial market, it is advisable to determine the specifics of changes in banking performance indicators, considering the impact of economic factors in the country, to establish further prospects for its development. Currently, due to economic shifts in the world and adverse forecasts, non-performing loans in the banking system of Albania are expected to grow. Thus, in the course of the research, when constructing a one-factor regression, the indicator of non-performing loans of banks to the total amount of loans in Albania was taken as the first effective indicator (Table 3).

Table 3. The results of establishing one-factor regression models of non-performing loans in Albania as one of the main indicators of the financial market to the economic development of the country

X	a	b	Correlation coefficient	Determination coefficient	Connection density
GDP per capita (current US dollars)	24.02	-0.003	0.89	0.80	High
Inflation, consumer prices (annual %)	8.94	-0.61	0.61	0.37	Average
Export of goods and services (% of GDP)	12.16	-0.16	0.37	0.14	Low
Central government debt, total (% of GDP)	20.10	0.14	0.57	0.32	Average
Poverty rate at the national poverty line (% of population)	-52.32	0.90	0.86	0.73	High

Source: created by the author.

Table 3 demonstrates that there is a rather high dependence on non-performing loans in the Albanian financial market on the dynamics of the level of GDP per capita and the poverty ratio. The regression equation for the dependence of non-performing loans on the level of GDP per capita demonstrates that with a one-unit increase in the level of GDP per capita, there will be a decrease in non-performing loans in the banking system. It is explained by the fact that as the financial situation of the population improves, their solvency increases and the level of non-performing loans decreases. In addition, as the poverty ratio increases by one unit, non-performing loans in Albania increase, as the poorer the population, the lower their solvency and the more loan obligations are subject to default. The consumer price index and central government debt have a medium impact on the indicator. Thus, as inflation rises by one unit, the level of non-performing loans decreases, as rising prices generally reduce the significance of non-performing loans in the banking system. Therewith, as the country's debt grows, the amount of overdue debt increases. Foreign economic activity has a weak impact on the Albanian financial market, as the regression equation for the dependence of NPLs on exports has a low coefficient of determination. In addition, the regression equation demonstrates that as exports decline, the number of non-performing loans increases. A review of the features of the loan portfolio as an indicator of the financial market is not enough. Thus, the following is a regression of the ratio of bank capital to assets in Albania as one of the main indicators of the financial market's contribution to the country's economic development (Table 4).

Table 4 demonstrates that the dynamics of Albania's bank capital-to-assets ratio are highly correlated with GDP per capita and the consumer price index. The regression equation demonstrates that as GDP per capita increases by one unit, the bank capital-to-assets ratio in Albania decreases. It is explained by the fact that with the growth of household income, the demand for banking services decreases, which generally decreases the level of bank capital sufficiency. The single-factor model of how the indicator depends on the consumer price index shows that the bank capital-to-assets ratio goes down every time the inflation rate in Albania goes up by one unit. Such trends can be explained by the fact that inflationary processes are mostly accompanied by crisis phenomena that negatively affect the capitalization of the banking system. The average impact on the capital adequacy ratio of the Albanian banking system is caused by the export of goods and services and the debt of the

central government. In addition, with the growth of exports of goods and services, there is an outflow of capital from the country, which generally decreases the level of capital sufficiency of the banking system of Albania. A model of the dependence of the performance indicator on the central government debt is established, which demonstrates that with an increase in the debt per unit in Albania, the ratio of bank capital to assets decreases. However, the poverty rate has a weak impact on capital sufficiency, and, accordingly, with the growth of the poor population, the demand for credit products increases, which further contributes to the capitalization of the country's banking market. Next, to fully explore the impact of the economic environment on the financial market and determine its prospects, the money supply in Albania will be considered (Table 5).

Table 4. The results of establishing one-factor regression models of the ratio of bank capital to assets in Albania as one of the main indicators of the financial market to the country's economic development

X	a	b	Correlation coefficient	Determination coefficient	Connection density
GDP per capita (current US dollars)	10.80	-0.0003	0.98	0.96	High
Inflation, consumer prices (annual %)	9.20	-0.0898	0.88	0.77	High
Export of goods and services (% of GDP)	9.82	-0.0283	0.66	0.43	Average
Central government debt, total (% of GDP)	10.46	-0.0198	0.66	0.44	Average
Poverty rate at the national poverty line (% of population)	8.07	0.0718	0.20	0.04	Low

Source: created by the author.

Table 5. The results of establishing one-factor models of regression dependence of the money supply of Albania as one of the main indicators of the financial market to the economic development of the country

X	a	b	Correlation coefficient	Determination coefficient	Connection density
GDP per capita (current US dollars)	84.65	-0.001	0.08	0.01	Low
Inflation, consumer prices (annual %)	83.76	-0.88	0.38	0.15	Low
Export of goods and services (% of GDP)	104.70	-0.76	0.77	0.60	High
Central government debt, total (% of GDP)	66.50	0.19	0.29	0.08	Low
Poverty rate at the national poverty line (% of population)	159.28	-3.40	0.49	0.24	Average

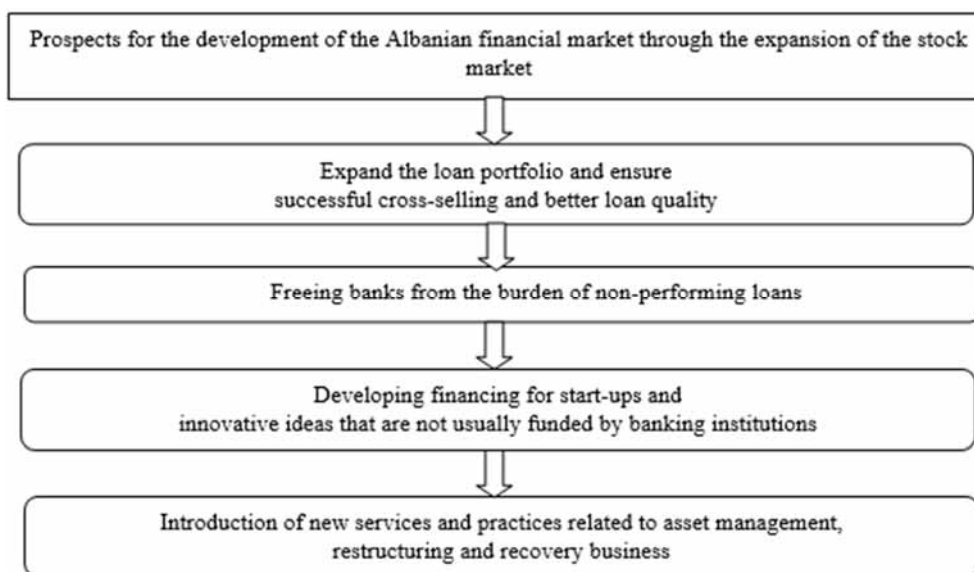
Source: created by the author.

Table 5 demonstrates that exports of goods and services have the most significant impact on the money supply of the Albanian financial market. The regression equation demonstrates that as exports increase, the money supply in the country decreases, as such transactions are accompanied by an outflow of funds from the country's financial market. In addition, the level of poverty in a country has an average impact on the money supply, since, as can be seen from the regression equation, the growth of the poor population causes a decrease in the money supply. Therefore, inflation and central government debt have a weak impact on the money supply. As inflation increases, the money supply decreases, and as the Albanian

government's debt increases, the money supply increases accordingly because the debt increases the amount of cash in circulation. The established regression equation for the dependence of the money supply on the level of GDP per capita presented that the density of the relationship is quite low; thus, further determination of the relationship between these indicators would be inappropriate. In general, the research on the specifics of the dependence of the Albanian financial market on its economic environment has allowed it to be established that this market is diverse and, accordingly, each area of its functioning is subject to a significant impact on the country's economic development.

Thus, the research has demonstrated that due to the unstable foreign economic situation and the significant impact of the country's economic situation on the financial market of Albania, there are practically no prospects for its development. Thus, it can be predicted that the Albanian financial market will either remain at the same level of development or will be exposed to risks due to the crisis. In such a situation, the Albanian government should pay attention to the country's stock market and, to expand the financial market and prevent risks, take measures designed to develop the securities market. Accordingly, the development of the stock market in the Albanian financial market will provide the following prospects (Figure 1).

Figure 1. Prospects for the development of the Albanian financial market



Source: created by the author.

The only promising solution in Albania's current economic environment to stabilize the financial market is to expand the stock market. First and foremost, banks' interaction with the securities market can help turn bad debts into high-quality loan portfolios, and in general, the loan portfolio can be expanded. In addition, private equity funds can support innovative ideas and business development. In general, the presence of a stock market in the Albanian

financial market will improve the asset and business management system, expand asset restructuring and recovery, improve investment banking and securities, expand brokerage activities, introduce the establishment and functioning of a secondary market for distressed assets, and introduce the process of asset securitization.

4. Discussion

The trends and development of the Albanian financial market are currently uncertain. In addition, there is a rather small amount of research on the development of the financial or economic sector in Albania. Sh. Bundo et al. (2022), in their research, only summarized the main provisions and features of the interaction of the financial system of Albania. The work of these researchers determined that the priority sectors of the economy were established in the economic development strategies of Albania. The main strategies are economic development and poverty reduction. In addition to state support for education, healthcare, and social protection, such sectors of the Albanian economy as food, agriculture, industry, and tourism are prominently considered priorities. The authors explain that such priorities are based on many important factors, such as natural resources and geographical location, cultural heritage and traditions, human resources, and strategic position. Most of these strategies have been approved by the Albanian government. This trend suggests that the Albanian economy and its government have determined the main path of the country's development, and accordingly, these sectors will be the main ones to control the development and orientation of the promotion policy.

However, the researchers draw attention to the fact that the country's financial system, in general, and the banking system, in particular, maintain a certain distance from agriculture. The researchers emphasize the lack of interaction between the financial system and agriculture, farming, and livestock and state that the misuse of agricultural land is a rather negative phenomenon (Aghion et al., 2022; Allayarov, 2020; Chaboud et al., 2023; Felix et al., 2015; Guerdjikova, Quiggin, 2021; Jamil et al., 2023; Prymostka, Kysil, 2023; Tajibekova, 2023; What are financial markets, 2022). The authors identify these trends as a shortcoming of Albania's financial system and recommend that investments be made in agriculture. They explain that the more consolidated components the Albanian financial system has, the more stable the country's economy will be. In other words, the authors only consider the priority areas of the Albanian financial system, and, therefore, the issue of the financial market development of the country examined in this research was not raised.

E. Meka (2016) researched to establish some key opinions on the role and importance of the existence and establishment of private equity funds in the Albanian financial market as a means of alternative financing for companies and to determine their significant role in supporting and promoting innovation in the economy. In addition, the researcher examined the legal and institutional framework for the development of the financial sector in Albania. The author identified the main principles and areas of development of the stock market and recommended that banking institutions expand their loan portfolio beyond the meagre credit, which, in turn, will be transformed into positive investments and add value to the economy. Such changes will be accompanied by an increase in the volume of stocks and securities on

the Albanian market. In addition, the researcher proposed several appropriate measures for the Albanian government to ensure the functioning of the country's financial market. The researcher recommends improving the legislative framework to ensure better regulation and monitoring of private enterprises. It is important to pay attention to tax legislation in terms of introducing tax exemptions or holidays for specific sectors of the country's financial system. The author believes that banking institutions should consider and explore the possibility of opening and starting to provide private equity and venture capital services to their existing or new clients, which would be a new way to expand their loan portfolio, allow for successful cross-selling, and improve loan quality. Such measures will help to avoid bad loans or otherwise contribute to the reduction of the bad loan portfolio. The researcher considered only the essence of private equity funds in the financial market but did not define the main principles of financial market development in Albania.

Meka and Tosku (2023) studied the decision-making processes in economics, with a specific focus on the real estate market in Albania. Some researches highlighted how financial decision-making is often influenced by psychological and emotional factors rather than purely rational considerations. The study observes that individuals frequently make irrational decisions, particularly in the context of perceiving losses or overestimating the value of their assets. These tendencies are further influenced by herd instinct, where individuals mimic the investment choices of their social group. The study also finds a correlation between age and bias level, with all biases appearing similarly in both men and women. It points out a general overestimation of financial literacy among individuals, leading to common decision-making errors. The anchoring bias, in particular, is noted to significantly impact asset valuation and loss aversion in the Albanian context.

G. Sejko (2021) conducted research on the economic and financial development of Albania in 2020. The researcher determined that the COVID-19 pandemic and the implementation of the necessary measures to control it had a significant impact on the economic situation of the Albanian economy, as economic activity narrowed, employment problems emerged, and the financial situation of households and businesses worsened. Along with fiscal measures, the Bank of Albania introduced an entire package of measures to preserve liquidity in the financial markets, continue lending and customer service, reduce the cost of borrowing, and create an uninterrupted flow of financial services. These measures helped to reduce the financial costs of the crisis for households and businesses, avoid its transmission to the financial sector, and maintain a stable monetary and financial environment. The researcher determined that, in general, the Albanian economy demonstrated resilience to the shock during 2019 and has a positive result and favourable conditions for development in the near and distant future. However, it was determined that there are a significant number of adverse risks, according to which the economic and financial environment in Albania remains challenging. The author recommends continuing proactive macroeconomic policies until employment expansion and economic growth become stable. Furthermore, the researcher recommends focusing on reducing public debt and establishing the preconditions for risk prevention. Although the author provided the main advantages and disadvantages of the country's financial system, the research indirectly concerned the development of the Albanian financial market.

Hoti et al (2022) critically analyzed the IS-LM model's applicability to the Albanian economy, questioning the effectiveness of current theoretical models in this context. The study reveals weak connections between the Bank of Albania's monetary policies, specifically REPO rates, and key macroeconomic indicators. It also notes that these policies have had a limited impact on the economy, as indicated by the weak transmission effect. Additionally, the study finds an insignificant correlation between inflation rates and REPO rates, suggesting the central bank's limited control over inflation.

The literature review was conducted based on the work of A. Naqellari et al. (2015), which is based on the consideration of one of the areas of the financial market of Albania: the banking market. The purpose of this research is to analyze the development of the banking sector in Albania. The authors found that during the research period, the banking system was concentrated in two parts, with six leading banks and 10 satellite banks. The main effect of monetary policy transmission is a low exchange rate for inflation, the allocation of credit, and economic growth. The distribution of loans, in general, demonstrates that the Albanian economy is not characterized by an appropriate level of lending by commercial banks, establishing developmental disparities between different countries. Consequently, rural areas are not developing financially, as financing is mainly provided by immigrants there and less by government subsidies. The researchers concluded that Albania's banking system is deformed (Allayarov et al., 2020; Anvarov, Allayarov, 2022; Lamara, Nino, 2019; Kravchuk, Lutsyshyn, 2022). In addition, recommendations were made to establish a bank with state capital, gradually liquidate foreign currency deposits and loans, and open a second-tier agricultural bank with full state ownership, which would provide lending to agriculture, agricultural processing, tourism, etc. This research is quite useful in terms of establishing a general idea of the development of the financial market, as it reflects aspects of the functioning of one of the main areas of the country's financial market. In addition, it is important to add that, like some of the previous studies, it recommends paying attention to agriculture in the country's financial market.

Gjoni et al. (2022) in their study provided a comprehensive examination of financial performance measurement in Albania's construction sector, a critical component of the country's economic growth. The authors underscored the importance of financial performance analysis as a tool for stakeholders to make informed decisions. It highlights the utility of financial performance indicators in evaluating the economic health of businesses within the same industry or across different time periods. Their research also reflects on the impact of external factors, such as the COVID-19 pandemic and post-earthquake reconstruction efforts, on the construction sector's financial performance in Albania. The authors concluded with a high determinability coefficient ($R^2 = 99.24\%$), indicating that the considered factors significantly explain ROA variability.

E. Musta (2016) researched the impact of financial development on economic growth in Albania. The author defined the volume of lending as an indicator of financial development since its decrease is always accompanied by crises. In other words, a better-developed financial system helps to maintain the sustainable growth of the country's economy. The purpose of this research is to identify the correlation between lending and growth in the Albanian economy. Accordingly, the research results obtained by the researcher demonstrated that in Albania, the growth of the financial sector has an adverse effect on

economic growth, which the author explains by focusing on the allocation of capital to the most efficient opportunities. Although the research has preliminarily considered the main aspects of financial markets, there is no general description of the system.

Thus, the research conducted on scholars' works on the financial market of Albania has demonstrated that there are indirect, outdated studies, and the structure and prospects for the development of the financial market of the country examined have not been determined.

5. Conclusions

Thus, the research on the financial market allowed for the establishment that it is a set of economic relations based on the purchase and sale of financial instruments for financial and production activities. The analysis of the economic situation has established that Albania is characterized by unstable trends, as there is an intensive increase in inflation, although the level of GDP per capita is increasing, poverty and unemployment are decreasing, and foreign economic activity is positive. It is expected that in the current period, due to external developments such as the conflict in Ukraine, sanctions, environmental transition, protectionist policies, and inflationary pressures, unfavourable conditions for the functioning of the financial market in Albania will be in place.

After reviewing the main current trends in the financial market of Albania, it was found that it is represented by the monetary market, and the securities market is almost absent. The banking system of Albania has positive trends in terms of lending and deposit activities, but the capital sufficiency of the banking services market is declining and does not correspond to international standards. In addition, the money market is characterized by positive trends. In general, the current financial market can be described as stable. However, considering the economic situation of the country in general, the Albanian financial market is beyond risk. The regression analysis of the dependence of the Albanian financial market on its economic environment has demonstrated that this market is diverse and, accordingly, each area of its functioning is subject to a significant impact on the country's economic development. Thus, the prospects for successful development of the financial market in Albania are only possible if the stock market is established.

The development of the stock market in the financial market of Albania will allow to establish a high-quality loan portfolio and expand it, help support innovations, improve the asset and business management system, expand asset restructuring and recovery, expand brokerage activities, improve investment banking and securities, and introduce the process of asset securitization. Further research on the prospects for the development of the Albanian financial market should be based on the development of measures to improve the efficiency of the stock market and the development of the securities market at the international level.

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ACADEMIC BACKGROUND OF NOBEL LAUREATES AND THEIR MAIN CONTRIBUTION TO ECONOMIC SCIENCE³

This paper examines how Nobel laureates' academic backgrounds relate to their economic contributions. The study covers laureates in Economics from 1969 to 2023 and reveals that 49% of laureates studied Economics at the undergraduate level, while the remaining 51% pursued other sciences. Moreover, 79% of laureates obtained their doctoral degrees in Economics and 21% in other sciences. The data also includes a breakdown of laureates' primary contributions in various fields of Economics, with the majority contributing to Macroeconomics (29%), followed by Microeconomics (15%) and Finance (14%), New Methods of Economic Analysis (19%), and General Equilibrium Theory (6%). The results further demonstrate that 17% of laureates have contributed to interdisciplinary research, establishing links between Economics and other sciences such as Psychology, History, Sociology, Philosophy, Politics, Law, and Organizational Sciences. This approach is a result of the diverse educational backgrounds of Nobel laureates.

Keywords: Nobel Laureates; Economics; Background Education; Contributions

JEL: A1; A2; B3

1. Introduction

The Nobel Prize has been awarded for contributions that benefit humanity since 1901. Nobel Prizes have been awarded in sciences such as Medicine, Chemistry, Physics, Physiology, Literature, and Peace. Economics started in 1969 and follows the same nomination and selection process as other sciences (The Sveriges Riksbank Prize in Economic Science, 2023).

From 1901 to 2023, there have been 621 Nobel Prize awards for all sciences, including Economics. In total, 970 laureates and 30 organizations were awarded the Prize. Some laureates and organizations have received the Prize more than once, resulting in 965 Nobel laureates and 27 organizations. Between 1969 and 2023, 55 prizes were awarded in Economic Sciences, totalling 93 laureates (The Sveriges Riksbank Prize in Economic Science, 2023).

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Table 1. The Nobel Prizes for all sciences (1901-2023)

Nobel Prize	Number of prizes	Number of laureates	Awarded to one laureate	Shared by two laureates	Shared by three laureates
Physics	117	225	47	32	38
Chemistry	115	194	63	25	27
Medicine	114	227	40	35	39
Literature	116	120	112	4	-
Peace	104	111+30	70	31	3
Economic sciences	55	93	26	20	9
Total:	621	1000	358	147	116

Source: The Sveriges Riksbank Prize, Nobel Prize facts: <https://www.nobelprize.org/prizes/facts/nobel-prize-facts> [Accessed October 22, 2023].

A Nobel Prize can be shared between two or three laureates when their contributions are closely related or result from cooperation between them (Lindbeck, 1999; Boettke et al., 2011). In Economic Sciences, 26 prizes have been given to one laureate, two laureates have shared 20 prizes, and nine prizes have been shared between three laureates (The Sveriges Riksbank Prize in Economic Science, 2023).

The Nobel laureates of Economic Sciences have different viewpoints and contributions from various schools of economic thought. These viewpoints help lighten the global economy's debates and problems at different times. Previous research has given us a good understanding of the career paths that lead to their success (Chan, Torgler, 2015).

Many studies and research suggest that Economics is becoming more interdisciplinary and less distinct than other fields (Angrist et al., 2020). Nobel laureates have conducted interdisciplinary research, connecting Economic Science with other sciences such as Psychology, History, Sociology, Philosophy, Politics, Law, and Organizational Studies. This approach results from the diverse educational backgrounds of Nobel laureates in Economics.

The remainder of this paper analyzes the academic backgrounds and the main contributions of Nobel laureates in Economics. Section 2 below includes the literature review, and Section 3 includes the methodology and data sources. Section 4 is divided into two parts. The first part presents the results of the data analysis related to the academic backgrounds of Nobel laureates in Economics, including their undergraduate and doctoral majors of study. The second part focuses on their main contributions to various economic fields, such as Macroeconomics, Microeconomics, Finance, Theory of General Equilibrium, New Models of Economic Analysis, and Interdisciplinary Research. Finally, the paper concludes with a summary of its findings.

2. Literature Review

Nobel Prize laureates have achieved the highest recognition in academia, representing the limits of human knowledge and understanding (Chan & Torgler, 2015). Researchers have analyzed and categorized Nobel Prize winners' contributions, some of which are presented below.

Weinberg and Galenson (2005) categorized Nobel laureates in Economics based on their creativity life cycle. They classified Nobel laureates as experimental and conceptual: moderate conceptual and extreme conceptual. This method of categorizing Nobel laureates is based on a quantitative approach. Conceptual innovators solve problems using abstract principles and deductive reasoning, while experimental economists gather knowledge through experience and inductive reasoning. According to research, 75% of the most exceptional conceptual laureates published their best work within the first decade of their careers (Weinberg & Galenson, 2005).

Many researchers in the field of Economics have compared the age at which individuals reach their peak performance. Jones, Reedy, and Weinberg (2014) found a correlation between age and the most significant scientific output of Nobel Prize Winners in Economics. Their research suggests that the peak of scientific output for laureates usually occurs in middle age. They also found that laureates tend to achieve a significant creative output in their late 30s or 40s, with a gradual decline in later years (Jones et al., 2014).

Regarding the age at which Nobel economists received their Prize, 48% received it between ages 60-69, 35% at 70 or older, and 17% under 60.

Table 2. Age at Nomination of Economics Nobel Laureates (1969-2023)

	Less than 60	Between 60 and 69	70 and more	Total
Frequency	16	45	32	93
Percent	17	48	35	100

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023)

Boettke, Fink, and Smith (2011) presented a new way of categorizing Nobel laureates in Economics. They differentiate between Mainline and Mainstream economists. Mainline economists view economics as a science of exchange, while Mainstream economists view it as a science of choice. The study found that between 1970 and 2007, Mainline economists had a more significant impact than Mainstream economists (Boettke et al., 2011).

(Karier, 2010) classified Nobel Laureates into different groups, such as behaviourists, free market economists, and Keynesians. Meanwhile, Lindbeck (1999) divided the contributions of economic Nobel laureates into five fields from 1969 to 1998. These include General Equilibrium Theory, Macroeconomics, Microeconomics, Interdisciplinary Studies, and New Methods of Economic Analysis (Lindbeck, 1999).

The intersection of disciplines refers to the learning experience in the education of individuals and teamwork (Li et al., 2021). Molina, Iñiguez, Ruiz, and Tarancón (2020) conducted a network analysis of Nobel laureates. They amassed data from all Web of Science in Economics papers, identifying at least one author who won the Nobel Prize in Economics between 1969 and 2016. Deaton, Tirole, Arrow, and Stiglitz emerged as leaders based on the total output of their respective networks among laureates in Economics (Molina et al., 2020). The knowledge gained during academic studies significantly impacts one's future career (Chan & Torgler, 2015). Nobel Prize laureates often approach problems from unique perspectives or utilize skills and materials from other fields to solve them (Ghosh, 2013).

Therefore, it is crucial to examine the educational backgrounds of Nobel laureates in Economics to understand how their previous education shapes their future success and recognition. The educational backgrounds of Nobel laureates in Economics typically involve training in Mathematics, Physics, Statistics, or other sciences (Root-Bernstein & Root-Bernstein, 2022).

The use of mathematics and statistics has significantly impacted Economics, leading to interdisciplinary research and the integration of Economic Science with other fields (Chan & Torgler, 2012; Chan & Torgler, 2015). However, as Lebaron (2006, p.95) points out, “Statisticians and mathematicians continue to receive the Nobel Prize, and some of them, such as statistician Clive W. Granger 2003, emphasize in the Nobel lecture that they are not economists” (Lebaron, 2006).

To effectively integrate knowledge from different disciplines, it is necessary to develop interdisciplinary skills, practices, and methodologies (Päivi et al., 2012). Recognizing that the economy is an open system, a pluralistic, political economy understanding is necessary rather than relying solely on economists (Neves, 2017).

Truc, Santerre, Gingras, and Claveau (2020) examined the interdisciplinary aspect of Economics since the 1950s. They analyzed economics journals on the Web of Science. They found that Economics is becoming more open and less inward-looking, contrasting with previous citation studies that suggested Economics is more isolated than other social sciences (Fourcade et al., 2015).

According to Angrist et al. (2020), Economics is becoming increasingly interdisciplinary and valuable for other fields. They have analyzed 17 academic disciplines, each represented by approximately 50 journals. They attribute this shift to a greater focus on empirical research and a growing interest in other areas of study within the field of Economics (Angrist & Pischke, 2010). As a result, economics research is becoming more appealing to scholars in other disciplines (Angrist et al., 2020).

Sharma (2021) suggests that the human mind is naturally inclined toward acquiring interdisciplinary knowledge, which is crucial for scientific progress. Integrating various fields of knowledge is vital for our future and provides hope for progress (Sharma, 2013).

3. Materials and methods

3.1. Data

Information regarding the educational backgrounds of Nobel laureates in Economics and their main contributions to Economics was gathered primarily from their biographies on The Nobel Prize's official website. Additionally, encyclopedia resources like Britannica, monographs, and books about Nobel prize winners were consulted. Various scientific journals were also used as sources for research and analysis.

The database contains detailed information about each Nobel laureate, including their name, date of birth, nationality, year of receiving the award, age at the time of winning, notable work by fields, prize motivation, affiliation during the award, undergraduate and doctoral

majors of study, year and country of study, university, prize share, and gender. It is important to note that some awardees did not obtain a master's degree or have no information available, so the master's degree is not included to avoid confusion.

To better analyze their notable work, we have divided it into five categories based on the categorization done by Lindbeck (1999). These categories include Macroeconomics, Microeconomics, General equilibrium, New Methods of Economic Analysis, and Interdisciplinary Research. The contribution of Nobel laureates in Finance has also been added as a separate category, considering its importance for both macroeconomics and microeconomics.

However, it is essential to note that it can be challenging to categorize the contributions of Nobel Laureates in Economics as they may have contributed to multiple scientific fields. Therefore, our classification is based on the main field they contributed.

Our analysis of the economics includes 93 laureates, as the award is given annually. During the data processing related to the laureates' doctorates, we took into consideration that two of them had received honorary doctorates from different universities.

3.2. Methods

This paper analyzes the academic background of Nobel laureates in Economics from 1969 to 2023. Only undergraduate and Ph.D. degrees are considered as part of their educational backgrounds. Additionally, we presented the contributions for which they were awarded the Nobel Prize, classified by economics fields. It will emphasize the crucial role of interdisciplinary connections between economics and other sciences, especially for laureates with interdisciplinary educational backgrounds.

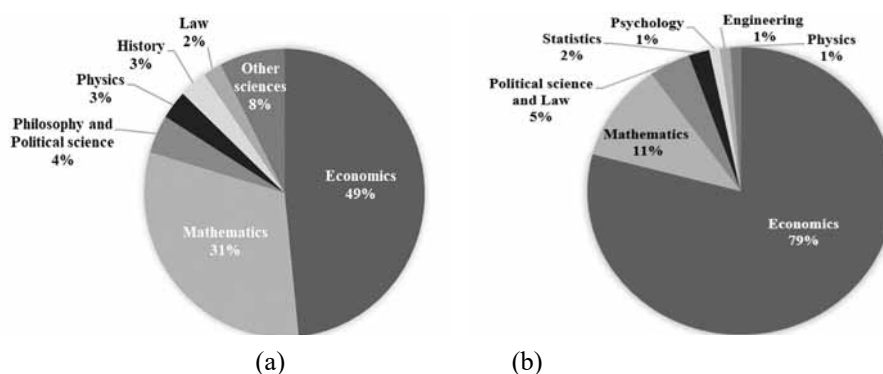
The study will seek to answer several key questions, including What educational paths have economic sciences laureates pursued? How has their educational background reflected their contributions to economics? In which fields of the economy have the Nobel laureates of economics made significant contributions? How has their educational background influenced interdisciplinary connections between economics and other sciences?

4. Results and discussion

4.1. Statistics of educational background

The majority of Nobel laureates who have been awarded the Nobel Prize in Economics did not complete their undergraduate studies in Economics. Figure 1(a) shows that 51% of laureates studied other sciences during their undergraduate education (Philosophy and Political science, Physics, History, and Law). Meanwhile, in other sciences (8%) graduated in Econometrics, Social studies, Psychology, Electrical Engineering, Agriculture, Pharmacology, and Romance languages.

Figure 1. The proportion of different subjects in the educational backgrounds of Nobel prize laureates of economics (a) Undergraduate majors (b) The doctoral majors



Source: Authors' contribution based on Biographical data (*The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023*)

Figure 1(b) shows that 79% of Nobel laureates in economics hold a doctoral degree in Economics, while the remaining 21% have a doctorate in other sciences. Two laureates, Leonid Hurwicz and John Hicks, received honorary doctorates from different universities.

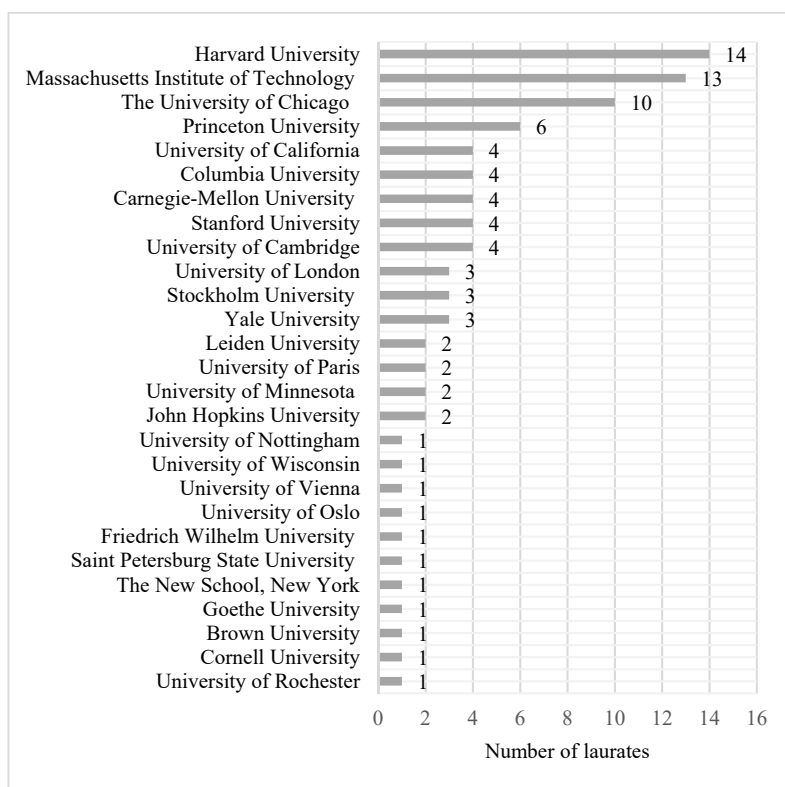
Also, two of the Nobel laureates have a doctorate in political science, and one has a doctorate in law and political science (Hayek obtained his law degree in 1921 and his political science degree in 1923 from the University of Vienna).

Of the 91 Nobel Laureates, 47% completed university studies and obtained a doctorate in Economics. Meanwhile, 33% of the Nobel laureates who completed university studies in other sciences also received a doctorate in Economics. Only 2% of the laureates who studied Economics obtained doctorates in other sciences, while 18% completed university studies and also obtained doctorates in other sciences.

The Nobel laureates of economic sciences have completed their doctorates in the following universities (Figure 2).

For instance, three Nobel Prize winners in economics with interdisciplinary backgrounds are Elinor Ostrom, who earned a bachelor's degree (1954), a master's degree (1962), and a Ph.D. (1965) in Political Science, University of California, Los Angeles; Daniel Kahneman who studied Psychology, Hebrew University, Jerusalem (B.A., 1954) and University of California, Berkeley (Ph.D., 1961) and Herbert A. Simon graduated (1936) and earned a doctorate (1943) from the University of Chicago (Britannica, 2023).

Figure 2. Ranking of universities according to the number of laureates where they received doctorates (1969-2023)



Source: Authors' contribution based on Biographical data (*The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023*)

Names of Laureates and earliest year of doctorate by universities are presented in Table 3.

The other universities in which a Nobel laureate received a doctorate are the University of Rochester (Richard H. Thaler, 1974), Cornell University (Robert F. Engle III, 1969), Brown University (Guido W. Imbens, 1991), Goethe University (Reinhard Selten, 1961), The New School formerly New School for Social Research, New York (Franco Modigliani, 1944), Saint Petersburg State University formerly Leningrad State University (Leonid Vitaliyevich Kantorovich, 1930), Friedrich Wilhelm University (Wassily Leontief, 1928), University of Vienna (Friedrich August von Hayek, 1923), University of Wisconsin (Theodore W. Schultz, 1930), University of Nottingham (Clive W.J. Granger, 1959) and University of Oslo (Ragnar Frisch 1926). Trygve Haavelmo delivered his doctoral dissertation, “The Probability Approach in Econometrics in 1941 at Harvard University. Also, he had two doctorates from the University of Oslo (Britannica, 2023).

Table 3. Names and earliest year of doctorate by universities

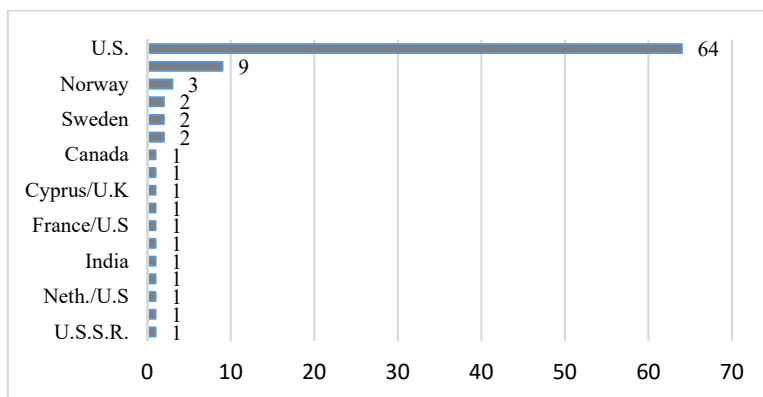
Universities	Laureates (Year of doctorate)
Harvard University	Paul A. Samuelson (1941), Trygve Haavelmo (1941), James Tobin (1947), Thomas C. Schelling (1951), Robert M. Solow (1951), Vernon L. Smith (1955), Robert B. Wilson (1963), Christopher A. Sims (1968), Thomas J. Sargent (1968), A. Michael Spence (1972), Eric S. Maskin (1976), Roger B. Myerson (1976), Abhijit Banerjee (1988), and Michael Kremer (1992).
Massachusetts Institute of Technology (MIT)	Lawrence R. Klein (1944), Robert J. Aumann (1955), Robert A. Mundell (1956), Peter A. Diamond (1963), George A. Akerlof (1966), William D. Nordhaus (1967), Joseph E. Stiglitz (1967), Robert C. Merton (1970), Robert J. Shiller (1972), Paul Krugman (1977), Ben S. Bernanke (1979), Jean Tirole (1981), and Esther Duflo (1999).
University of Chicago	George J. Stigler (1938), Herbert A. Simon (1943), James M. Buchanan Jr. (1948), Harry M. Markowitz (1954), Gary S. Becker (1955), Robert E. Lucas Jr. (1964), Eugene F. Fama (1964), Myron S. Scholes (1970), Claudia Goldin (1972) and Paul M. Romer (1983),
Princeton University	John F. Nash Jr. (1950), Lloyd S. Shapley (1953), James J. Heckman (1971), Oliver Hart (1974), David Card (1983), and Joshua D. Angrist (1989).
University of California	Douglass C. North (1952), Daniel Kahneman (1961), William F. Sharpe (1961), and Elinor Ostrom (1965).
Columbia University	Simon Kuznets (1926), Milton Friedman (1946), William Vickrey (1947), and Kenneth J. Arrow (1951).
Carnegie – Mellon University	Oliver E. Williamson (1963), Edward C. Prescott (1967), Dale T. Mortensen (1967), and Finn E. Kydland (1973).
Stanford University	John C. Harsanyi (1959), Alvin E. Roth (1974), Bengt Holmström (1978), and Paul R. Milgrom (1979).
University of Cambridge	Richard Stone (1957), Amartya Sen (1959), James A. Mirrlees (1963), and Angus Deaton (1974).
University of London	Sir Arthur Lewis (1940), Ronald H. Coase (1951), and Christopher A. Pissarides (1973).
Stockholm University	Bertil Ohlin (1924), James E. Meade (1924), and Gunnar Myrdal (1927).
Yale University	Edmund S. Phelps (1959), Philip Dybvig (1979), and Douglas W. Diamond (1980).
Leiden University	Jan Tinbergen (1929) and Tjalling C. Koopmans (1936).
University of Paris	Gerard Debreu (1956) and Maurice Allais (1949).
University of Minnesota	Daniel L. McFadden (1962) and Lars Peter Hansen (1978).
John Hopkins University	Merton H. Miller (1952) and Robert W. Fogel (1963)

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023)

Figure 3 shows the number of laureates by nationality or citizenship at the time they received the Nobel Prize.

From the data presented, it can be observed that most of the economic science laureates by nationality or citizenship at the time they received the Nobel Prize were from the U.S.

Figure 3. Number of laureates by nationality when they received the Nobel Prize



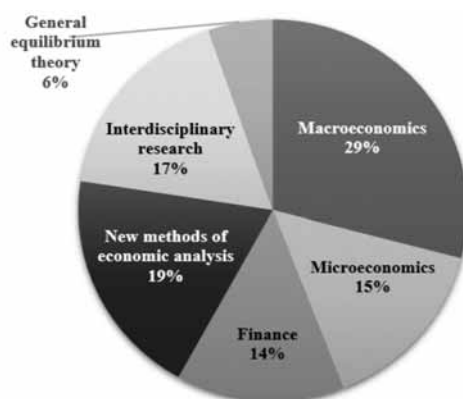
Source: Authors' contribution based on Biographical data ((Britannica, 2023).

4.2. Statistics by fields

Since many have contributed to multiple areas, it is challenging to classify Laureates' contributions in Economic Science by fields (1969-2023). Therefore, the classification is based on their main contributions.

The contribution of economics Nobel laureates according to the main fields of study (%) is presented in Figure 4.

Figure 4. The contribution of Laureates in economics according to the main fields of study (%)



Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023)

Most Nobel laureates have contributed to Macroeconomics (29%), followed by Microeconomics (15%) and Finance (14%), New Methods of Economic Analysis (19%), Interdisciplinary Research (17%), and General Equilibrium Theory (6%).

Below is a presentation of their contributions for which they were awarded the Nobel Prize, classified by fields and year of award.

4.2.1. The main contributions of laureates to Macroeconomics

In macroeconomics, Nobel laureates analyze and explain the state and progress of the national economy, including private consumption, investments, exports, imports, expenditures for goods and services, and others (Pano & Angjeli, 2003).

In this field, Nobel laureates in Economics have made the following contributions.

Table 4. The main contribution of laureates to Macroeconomics (1969-2023)

Year of Nobel Prize	Laureates	Main contributions
1976	Milton Friedman	Analyzing monetary history and theory, consumption analysis, and demonstration of the complexity of stabilization policy.
1977	James E. Meade and Bertil Ohlin	Development of the theory of International trade.
1979	Arthur Lewis and Theodore Schultz	Economic development research of developing countries.
1980	Lawrence Klein	Creation and application of econometric models to the analysis of economic fluctuations and economic policies.
1987	Robert Sollow	Theory of economic growth.
1995	Robert Lucas	Applying and developing the hypothesis of rational expectations.
1999	Robert Mundell	Analysis of the monetary and fiscal policy under different exchange rate regimes and the optimum currency areas.
2004	Finn E. Kydland and Edward C. Prescott	Analysis of the Dynamic Macroeconomics: The time consistency of economic policy and the driving forces behind business cycles.
2006	Edmund S. Phelps	Analysis of intertemporal tradeoffs in macroeconomic policy.
2008	Paul Krugman	Analysis of trade patterns and location of economic activity.
2010	Peter A. Diamond, Dale T. Mortensen and Christopher A. Pissarides	Analysis of markets with search frictions (dynamics of unemployment).
2011	Thomas J.Sargent and Christopher A. Sims	Empirical research on cause and effect in the macroeconomy.
2015	Angus Deaton	Integration of climate change into the long-run macroeconomic analysis;
2018	William D. Nordhaus Paul M. Romer	Integration of technological innovations into long-run macroeconomic analysis.
2019	Abhijit Banerjee, Esther Duflo, and Michael Kremer	Application of the experimental approach to alleviating global poverty.
2021	David Card, Joshua D. Angrist, and Guido W. Imbens	Empirical contribution to Labor economics; Methodological contributions to the analysis of causal relationships.

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023; Lindbeck, 1999; Xhelili, 2012)

4.2.2. The main contributions of laureates to Microeconomics

The contributions of Nobel laureates have enriched Microeconomics, particularly in analyzing firm and individual decision-making, allocation of resources, public sector role, state regulation, market structures, asymmetric information, auctions, contracts, and mechanism design (Pano & Angjeli, 2003).

In this field, Nobel laureates in Economics have made the following contributions:

Table 5. The main contribution of laureates to Microeconomics (1969-2023)

Year of Nobel Prize	Laureates	Main contributions
1982	George Stigler	Industrial structures and functioning of markets, and public regulation (Industrial organization)
1996	James Mirrlees and William Vickrey	The theory of incentives under asymmetric information
2001	Joseph E. Stiglitz, A. Michael Spence, and George A. Akerlof	Analyses of markets with asymmetric information
2007	Leonid Hurwicz, Eric S. Maskin, and Roger B. Myerson	Mechanism design theory
2014	Jean Tirole	Analysis of market power and regulation
2016	Oliver Hart and Bengt Holmström	Contract theory.
2020	Paul R. Milgrom and Robert B. Wilson	Auction theory and inventions of new auction formats

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023; Lindbeck, 1999; Xhelili, 2012)

4.2.3. The main contributions of laureates to Finance

Finance is a crucial aspect of both macroeconomics and microeconomics. Over the years, several Nobel laureates have made significant contributions to the field of Finance through their research in areas such as portfolio selection theory, analysis of household savings and financial markets, financial markets and investment decision-making, methods for determining the value of stock options and other derivatives, empirical analysis of asset prices and research on banks and financial crises.

In this field, Nobel laureates in Economics have made the following contributions:

Table 6. The main contribution of laureates to Finance (1969-2023)

Year of Nobel Prize	Laureates	Main contributions
1981	James Tobin	Analysis of financial markets
1985	Franco Modigliani	Analyses of saving and financial markets
1990	Harry Markowitz, Merton Miller, and William Sharpe	The theory of financial economics (MICRO)
1997	Robert C. Merton and Myron S. Scholes	Method for determining the value of stock options and other derivatives (MICRO)
2013	Eugene F. Fama, Lars Peter Hansen, and Robert J. Shiller	Empirical analysis of asset prices (financial markets)
2022	Ben S. Bernanke, Douglas W. Diamond, and Philip Dybvig	Research on banks and financial crises

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023)

4.2.4. The main contributions of laureates to the General Equilibrium Theory

The Nobel laureates in economics have significantly transformed the Theory of General Equilibrium, making it one of the most important creations for the theoretical and practical analysis of the economy as a whole and the effective allocation of resources.

In this field, Nobel laureates in economics have made the following contributions:

Table 7. The main contribution of laureates to General Equilibrium Theory (1969-2023)

Year of Nobel Prize	Laureates	Main contributions
1970	Paul A. Samuelson	Development of the static and dynamic economic theory (Partial and General Equilibrium Theory).
1972	John R. Hicks and Kenneth J. Arrow	General economic equilibrium theory and welfare theory.
1983	Gerard Debreu	Reformulation of general equilibrium theory and application of new analytical methods into economic theory.
1988	Maurice Allais	Efficient utilization of resources and theory of markets.

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023; Lindbeck, 1999; Xhelili, 2012)

4.2.5. The main contributions of laureates to the New Methods of Economic Analysis

Mathematical and statistical methods, econometrics, linear programming, and new methods for economic analysis characterized the second half of the twentieth century. The importance of mathematical techniques is reflected in awards like Samuelson, Hicks, Arrow, Koopmans, Kantorovich, Debreu, Allais, Phelps, and others. The Nobel Prize has recognized the importance of quantitative methods such as statistical testing and estimation, with laureates including Frisch, Tinbergen, Leontief, Heckman, and McFadden, among others (Ghosh, 2013).

In this field, Nobel laureates in economics have made the following contributions:

Table 8. The main contribution of laureates to the New Methods of Economic Analysis (1969-2023)

Year of Nobel Prize	Laureates	Main contributions
1969	Jan Tinbergen and Ragnar Frisch	Application of the dynamic models to analyzing economic processes (Macroeconometrics).
1973	Wassily Leontief	Development and application of the input-output method to economic problems.
1975	Leonid Vitaliyevich Kantorovich and Tjalling C. Koopmans	Development of the theory of the optimum allocation of resources.
1984	Richard Stone	Development of systems of national accounts and improvement of the basis for empirical economic analysis.
1989	Tyrgve Haavelmo	Clarification of the probability theory foundations of econometrics and analyses of simultaneous economic structures (Econometrics).
1994	John C. Harsanyi, John F. Nash Jr. and Reinhard Selten	Analysis of equilibria in the theory of non-cooperative games.

Xhelili-Krasniqi, F., Mustafa-Topxhiu, R. (2024). *Academic Background of Nobel Laureates and Their Main Contribution to Economic Science*.

Year of Nobel Prize	Laureates	Main contributions
2000	James Heckman and Daniel L. McFadden	Theory and methods for analyzing selective samples (Microeconometrics).
2003	Robert F. Engle Clive W.J. Granger	Methods of analyzing economic time series with time-varying volatility (Econometrics) Methods of analyzing economic time series with common trends-Cointegration (Econometrics).
2005	Robert J. Aumann and Thomas C. Schelling	Conflict and cooperation through game-theory analysis.
2012	Alvin E. Roth and Lloyd S. Shapley	The practice of market design and the theory of stable allocations.

Source: Authors' contribution based on Biographical data (*The Sveriges Riksbank Prize in Economic Science, 2023; Britannica, 2023; Lindbeck, 1999; Xhelili, 2012*)

4.2.6. The main contributions of laureates to Interdisciplinary Research

Laureates contributed to interdisciplinary research, connecting Economics with Psychology, Sociology, History, Organizational Science, Politics, and Philosophy.

Economics with Psychological Science – According to Herbert Simon, decision-makers typically aim for a satisfactory solution rather than the best possible outcome assumed by traditional Microeconomic Theory (The Sveriges Riksbank Prize in Economic Science, 2023). Richard Thaler studies Behavioral Economics, Finance, and the Psychology of decision-making (Walgreen, 2023). According to Thaler, human behavior and perception are as critical to financial trends as the principles of supply and demand (Argys, 2017).

Economics with Sociological Science – Becker is known for his studies and analysis of human capital, family economics, gender, and racial discrimination (Xhelili, 2018). He examined social interactions outside the market system, and his influence extends to the Rational Choice school of Sociology (Lindbeck, 1999; Science, 2023).

Economics with Historical Science – Kuznets aimed to derive empirical generalizations without relying on complex statistical techniques (Lindbeck, 1999). Kuznets has used long-range data to identify economic growth and income distribution patterns in different nations and times (Pano & Angjeli, 2003). Claudia Goldin has contributed to economic history and labour economics. She has studied social and economic factors that have determined the extent of women's participation in the workforce and the wage gap between women and men from the late 18th century to the present (Britannica, 2023).

Economics with Law and Organizational Science – Douglas North, Ronald Coase, Elinor Ostrom, and Oliver Williamson contributed significantly to Institutional Theory (Ménard & Shirley, 2014). Williamson did not choose Economics as his career as an undergraduate but instead discovered his interests as he moved from one field to another, ultimately combining Economics with Organization Theory and Contract Law (Williamson, 2014).

Economics with Political Science – James McGill Buchanan is considered a founding father of the Public Choice Theory. He analyses the driving forces behind political decisions in models of national economies. His research in Public Finance has significantly contributed

to the combination of Economics and Political science (Pano & Angjeli, 2003; Lindbeck, 1999).

Economics with Philosophical Science – Amartya Sen analyzed the philosophical foundations of collective decisions and welfare evaluations, including income and wealth distribution. Additionally, he created influential indicators for measuring poverty and income inequality. (Lindbeck, 1999; Pano & Angjeli, 2003; The Sveriges Riksbank Prize in Economic Science, 2023).

Nobel laureates who have integrated Economic Science with other sciences include:

Table 9. Nobel laureates who bridge Economics with other sciences

Connection with other sciences	Year of Nobel Prize	Laureates	Contributions
Economics with Psychological Science	1978	Herbert A. Simon	Research on the decision-making process within economic organizations.
	2002	Daniel Kahneman	Integrating psychological research into economic science concerning human judgment and decision-making under uncertainty.
		Vernon L. Smith	Application of the laboratory experiments as a tool in empirical economic analysis.
	2017	Richard H. Thaler	Development of behavioural economics.
Economics with Sociological Science	1974	Friedrich August von Hayek and Gunnar Myrdal	Analysis of the money and economic fluctuations theory and the interdependence of economic, social, and institutional phenomena.
	1992	Gary S. Becker	Development of the microeconomics, including nonmarket behaviour.
Economics with Historical Science	1971	Simon Kuznets	Empirically interpretation of economic growth.
	1993	Robert W. Fogel and Douglass C. North	Applying economic theory and quantitative methods to explain economic and institutional change.
	2023	Claudia Goldin	Research on women's labour market outcomes.
Economics with Law and Organizational Science	1991	Ronald H. Coase	Discovery and clarification of the significance of transaction costs and property rights for the institutional structure and functioning of the economy.
	2009	Elinor Ostrom and Oliver E. Williamson	Analysis of economic governance within the boundaries of the firm.
Economics with Political Science	1986	James McGill Buchanan	Development of the contractual and constitutional bases for economic and political decision-making theory.
Economics with Philosophical Science	1998	Amartya Sen	Development of the welfare economics.

Source: Authors' contribution based on Biographical data (The Sveriges Riksbank Prize in Economic Science, 2023; Lindbeck, 1999; Britannica, 2023; Xhelili, 2012)

The Nobel Prize demonstrates how brilliant ideas, science, and hard work can positively impact the world (The Sveriges Riksbank Prize, 2017). Universities play a crucial role in fostering effective academic cultures that enable researchers to pursue knowledge for their sake and shape our worldview (Altbach & DeLaquil, 2022). Teachers are crucial in promoting this (The Sveriges Riksbank Prize, 2017).

5. Conclusion

This paper analyzes the academic background of Nobel laureates in Economics from 1969 to 2023. Additionally, the paper examines laureates' contributions to Economics and classifies them by economics fields, emphasizing their contribution to interdisciplinary connections between economics and other sciences.

In the analysis of the background education of laureates, only undergraduate and PhD degrees are considered part of their educational backgrounds. The analysis results show that most Nobel laureates who have received the Nobel Prize in Economics did not major in Economics during their undergraduate studies. Instead, they studied other sciences, such as Philosophy and Political Science, Physics, History, and Law, and other sciences. Most Nobel laureates in Economics hold a doctorate in Economics, while some have doctorates in other sciences.

The Nobel Prize Winners in Economics belong to various schools of economic thought, so their opinions, views, proposals, and suggestions have contributed not only to the solution of specific problems but also to the development of economic science in general.

Researchers have categorized these contributions in different ways. One of them is the categorization of laureates' main contributions by fields of study, which include General Equilibrium Theory, Macroeconomics, Microeconomics, Interdisciplinary Studies, and New Methods of Economic Analysis. This paper uses the classification above but also consists of the main contributions of Nobel laureates in Finance as a separate category, recognizing their significance for macro and microeconomics.

The results of the analysis of the laureates' main contributions by fields show that most of them have contributed to Macroeconomics, followed by Microeconomics and Finance, New Methods of Economic Analysis, Interdisciplinary research, and General Equilibrium Theory.

The topic that has attracted attention in the last quarter of a century has been behavioural economics, which analyzes both the psychological and social factors that influence individuals' decision-making. Some awards are the Nobel Prize for George Akerlof and Daniel Kahneman, Elinor Ostrom, Robert Shiller, and Richard Thaler. Next are the Nobel laureates who have addressed poverty issues, such as Amartya Sen, Abhijit Banerjee, Esther Duflo, and Michael Kremer. Other laureates have analyzed real-world problems, such as George Akerlof, Paul Milgrom, Robert Wilson, Ben Bernanke, David Card, and this year's Nobel laureate, Claudia Goldin.

Nobel laureates' contributions to Interdisciplinary research have bridged Economics with other sciences, such as Psychology, History, Sociology, Philosophy, Politics, Law, and Organizational Sciences. This approach results from the diverse educational backgrounds of Nobel laureates in Economics.

Economics is becoming more interdisciplinary, and integrating various fields of knowledge is essential for future progress.

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SUMMARIES

Deyan Radev

DYNAMIC MEASURES OF SOVEREIGN SYSTEMIC RISK

This paper introduces a dynamic dependence framework to calculate various indicators of systemic sovereign default risk. Our analysis reveals a notable increase in systemic fragility among euro-area sovereigns since the onset of the Subprime Crisis, particularly during the First Greek Bailout in May 2010. Furthermore, our measures successfully capture key events within the euro area, including Mario Draghi's impactful "whatever-it-takes" speech in mid-2012 and the Cypriot Banking Crisis of 2012-2013. The incorporation of dynamic dependence into our measures provides a more comprehensive depiction of systemic risk within the euro area sovereign system, often demonstrating distinct dynamics when compared to their static counterparts. These findings carry significant policy implications and contribute to enhancing our understanding of systemic risk among euro-area sovereigns.

Keywords: Sovereign Default; Systemic Risk; Financial Stability; Financial Distress; Tail Risk; Contagion

JEL: C16; C61; G01; G21

Putu Yudha Asteria Putri, Iwan Triyuwono, Bambang Hariadi, Lilik Purwanti

DECONSTRUCTION OF MANAGEMENT CONTROL SYSTEMS AND THE ROLE OF CULTURE IN TRADITIONAL BANKING INSTITUTIONS

This study aims to know the existence of culture and its deconstruction in management control systems in traditional banking institutions. This research uses a mixed method with Explanatory Sequential Design by taking a traditional banking institutions in Indonesia and exploring it using interview and observation techniques at one of the traditional banking institutions to form a deconstruction of the new MCS concept. The results of this research reveal a significant influence between culture and MCS. Furthermore, a culture-based MCS deconstruction was discovered and formed, which found a kindness implemented in the Standard Operational Procedure, Assets implemented in the Work Plan, budgeting, and expenditure and a desire for its implementation through performance. Lastly is happiness, implemented in reporting and auditing.

Keywords: Management Accounting; Management Control System; Explanatory Sequential Design

JEL: M40; M41

Aigul Akhmetova, Elmira Otar, Nurlan Baigabylov

EVALUATING THE 'BASTAU BUSINESS' PROGRAM: IMPACTS ON ENTREPRENEURIAL COMPETENCIES AND SME FORMATION

The relevance of the problem is since in the state there was a need to create educational programs aimed at the creation of the proper level of entrepreneurial competencies, required to organise their own small or medium businesses. The aim is to investigate the efficiency of the educational program "Bastau Business" in the formation of entrepreneurial competencies, contextualized by existing theories and the changing demands of Kazakhstan's innovation-driven economy. The leading method to study this problem is the questionnaire method, which allows for monitoring the formation of professional entrepreneurial competencies among the graduates of the educational program and to identify the problems they face at the beginning to improve the content and focus of the educational modules. The study showed a high readiness of the graduates of the programme for further

independent entrepreneurial activities, which unequivocally indicates its effectiveness. The study also helped identify a range of factors that need to be addressed when improving the educational programme for small and medium business support.

Keywords: entrepreneurial competencies; education; entrepreneurship; medium and small business; entrepreneurial activity

JEL: L26; I25; M13

Ahmad S. Al Humssi, Vladimir Z. Chapliuk, Larisa N. Sorokina, Liliya G. Akhmetshina

MODELLING THE IMPACT OF MACROECONOMIC FACTORS ON COUNTRY'S FINANCIAL STABILITY: EVIDENCE FROM THE RUSSIAN FEDERATION

Promoting financial stability is one of the main priorities for the governments of countries seeking to achieve sustainable economic growth. The article aims to assess and model the impact of macroeconomic factors on the financial stability of the Russian Federation in the period 2010-2030 using ADF, OLS, VAR, ARCH, VECM and other techniques. In addition, the linear causal relationship between a group of 6 macroeconomic indicators and the financial stability of the Russian Federation was studied. The results of this research show that Russia's financial stability depends mainly on exports of crude oil and natural gas, price stability, volume of government debt, deficits and surpluses of the state's budget, exchange rate stabilization of national currency, and effectiveness of the banking system. Additionally, events taking place in Eastern Europe, the Middle East and the African continent may negatively affect Russia's financial security if it fails to take the necessary preventive measures.

Keywords: Macroeconomic modelling; financial stability; inflation rate; government budget balance; Balance of Payment; government debt; Russian Federation

JEL: C32; G01; G21; G28

Nataliya Krasnikova, Roman Ivanov, Oleksandr P. Krupskyi, Olena Dzyad

FACTORS FOR REDUCING THE GLOBAL GENDER GAP

Gender inequality generates negative consequences for the economy, social sphere, and often the environment at the level of individual countries and the world. In this way, inequality creates a gender gap. The issue of reducing the gender gap was highlighted in the Sustainable Development Goals and drew scientists' attention from various fields and international organizations to a multifaceted study of the gender gap phenomenon at different levels.

The article analyzes available indicators that measure the gender gap and the conducted earlier research on the factors that influence gender equality. We chose the Global Gender Gap Index. We found a statistically significant impact on the gender gap: the share of women in the total population, the level of achievement of the Sustainable Development Goals, the level of democracy, and GNI per capita. Thus, by accelerating the achievement of sustainable development goals and implementing democratic reforms, countries are reducing the gender gap in society.

Our study did not confirm the statistically significant inverse relationship between fertility rates and the gender gap, which was previously established based on incomplete statistical information. Also, the gender gap is not affected by the country's population growth or by the country's belonging to one of the four groups by per capita income. The impact of migration processes on gender equality requires an in-depth and additional analysis based on data showing the impact of migration movements influenced by the war between Russia and Ukraine.

Keywords: Sustainable Development; Country's Income Level; Migration; Population Growth; Level of Democracy; Fertility; Economic Growth Management; Gender equality

JEL: F63; J11; Q01; O15

Anton Ivanov

ON THE EFFECT OF MEASURES FOR COMPENSATION ON THE END CONSUMERS OF ELECTRICITY ON THE FREE MARKET

This article aims to examine the national mechanism applied in Bulgaria to tackle the high electricity prices in the period 2021-2023 and its impact on state-owned enterprises, which are the main source of the compensation funds. The proposed thesis is that with the collection of the revenues of state-owned companies, they are posted in conditions of restriction in terms of development opportunities, which is why the imposed emergency measures should be reviewed in the future. Although the measures themselves are widely discussed, the mechanisms for providing financial support, the financial magnitude of this support, as well as its effect, are yet to be clarified, and the data collected in the material may be useful for further analyses and evaluations.

Keywords: free market; regulation; state-owned companies; compensation

JEL: E640; G38; L11

Elena Ilieva

STUDY OF THE CURRENT STATE AND DEVELOPMENT OF SHARING ECONOMY IN BULGARIA: SEASIDE TOURISM APPLICATION PERSPECTIVES

The sharing economy is a modern digitalized alternative to traditional economic relationships and is developing and growing dynamically. The most positive evidence suggests that the sharing economy could match the traditional market economy in terms of the volume of transactions. Globally, the main sharing economy markets are China, the USA and Europe, and within the EU consumer interest in sharing services is high as 52% are aware of sharing options and 17% have used them at least once. According to data, the most developed sharing subsectors in the EU are shared accommodation and shared mobility. As these are the main sub-sectors also in the tourism industry, it is obvious that the sharing economy has entered the tourism industry and is rearranging the traditional tourist business. Therefore, the main purpose of the current study is to investigate the tourism application perspectives of the sharing economy on the Bulgarian Black Sea coast as the latter is the highest developed tourist area in Bulgaria.

Keywords: Sharing economy; tourism; application; perspectives; Bulgarian Black Sea coast

JEL: L81; L83; Z31

Svetoslav Borisov

BITCOIN – HEDGE OR SPECULATIVE ASSET: ANALYSIS OF ITS ROLE AND NATURE

Bitcoin is regarded as a remarkable achievement of the Fourth Industrial Revolution and ranks among the most intricate technological and financial creations. It has long been the focus of attention of investors who are looking for a safe-haven asset. The purpose of this study is to check whether Bitcoin plays the role of a safe-haven asset (hedge). To achieve this, the impact of economic and political uncertainty (EPU) on the return and variation of Bitcoin is investigated. It is being analyzed whether, in comparison with the development of EPU, the returns and variations of Bitcoin show characteristics typical of safe-haven assets or those of ordinary speculative assets. As EPU levels elevate, it is anticipated that safe-haven assets like gold will see a rise in both their returns and variation, whereas typical speculative assets will experience heightened variation and diminished returns. The study uses ordinary linear regression and quantile regression models that cover data for the period between February 2013 and July 2023. These models play a crucial role in ascertaining if Bitcoin functions as a safe-haven asset during turbulent times and if it holds the capacity to serve as a

hedge against economic uncertainty. The results of the study are of paramount importance for investors, as they help them decide whether to include Bitcoin in their portfolios for diversification and protection of their capital during unstable economic conditions.

Keywords: Bitcoin; economic and political uncertainty – EPU; safe-haven asset; speculative asset

JEL: C52; C58; G15; G17; O33

Eneida Çifligu

AN ANALYSIS OF ALBANIA'S BANKING SECTOR: CURRENT TRENDS AND FUTURE PROSPECTS

The purpose of this research is to explore and summarize aspects of the current state and development trends in Albania's banking sector. The analysis shows that the banking system dominates the country's financial landscape, while the securities market remains nascent. Adverse inflationary dynamics are also observed. The research demonstrates dependencies between key banking indicators like non-performing loans, capital adequacy ratio and money supply on economic factors. The prospects for Albania's banking sector are challenged by the volatile global economy, however promoting lending, improving asset quality and supporting businesses can help establish stability. Expanding the securities market can also assist banking sector growth. The practical significance is that the identified trends and relationships can inform policy decisions to facilitate robust banking sector performance.

Keywords: banking systems; loan portfolio; securities; assets; stock market

JEL: E5; G1; G21

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ACADEMIC BACKGROUND OF NOBEL LAUREATES AND THEIR MAIN CONTRIBUTION TO ECONOMIC SCIENCE

This paper examines how Nobel laureates' academic backgrounds relate to their economic contributions. The study covers laureates in Economics from 1969 to 2023 and reveals that 49% of laureates studied Economics at the undergraduate level, while the remaining 51% pursued other sciences. Moreover, 79% of laureates obtained their doctoral degrees in Economics and 21% in other sciences. The data also includes a breakdown of laureates' primary contributions in various fields of Economics, with the majority contributing to Macroeconomics (29%), followed by Microeconomics (15%) and Finance (14%), New Methods of Economic Analysis (19%), and General Equilibrium Theory (6%). The results further demonstrate that 17% of laureates have contributed to interdisciplinary research, establishing links between Economics and other sciences such as Psychology, History, Sociology, Philosophy, Politics, Law, and Organizational Sciences. This approach is a result of the diverse educational backgrounds of Nobel laureates.

Keywords: Nobel Laureates; Economics; Background Education; Contributions

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