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# NAŠE GOSPODARSTVO

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# The Impact of Macroprudential Policy on Credit Growth in Nine Euro Area Economies\*

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## Abstract

In this paper, we investigate the impact of macroprudential policy measures (bundled together into a macroprudential policy index, MPI) on the non-financial corporate sector credit and household credit growth using a one-step system GMM empirical research method. The goal of our paper is to test whether contractionary macroprudential policy stymies credit growth rate and whether expansionary macroprudential policy spurs credit growth rate in selected Euro Area economies (Austria, Belgium, Finland, Germany, Ireland, Italy, Netherlands, Slovenia, and Spain) over the period 2008Q4–2018Q4. We test two hypotheses: H1: The tightening of macroprudential policy measures reduces the non-financial corporate sector credit growth rate, and H2: The tightening of macroprudential policy measures reduces the growth rate of household credit. Based on our empirical results, we can confirm the first hypothesis. In contrast, the second hypothesis can be neither confirmed nor rejected since the explanatory variable of interest (MPI) is statistically insignificant in the second model.

## Introduction

Banks' significant losses during the 2007–2008 subprime crisis called into question banks' risk-taking behavior. Lehman Brothers' default pointed out that financial stability has a macroprudential or systemic dimension (Matysek-Jędrych, 2018). If the financial system is treated simply as the sum of its parts, its historical tendency to transition between booms and busts can be overlooked (Beck & Gambacorta, 2020). Before the emergence of the crisis, banks were involved in exuberant risk-taking activities (Luu & Vo, 2021) and excessive lending to borrowers with dubious creditworthiness, which led to credit and asset price booms, a banking crisis, and a surge in non-performing loans (Festič & Romih, 2008). In the fallout of the crisis, policymakers and academics recognized that more effective macroprudential policies and regulatory actions are required to reduce excessive optimism of economic agents, stem moral hazard behavior, and prevent banks from unrestrained risk-taking (Luu & Vo, 2021). The "Greenspan doctrine" (Greenspan, 2002,

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2011), advocating the view that it was preferable to inject liquidity into the financial system after a final crisis had occurred, has ended. The ex-ante policy interventions are no longer seen as too costly, blunt, or unpredictable in their effects (Jeanne & Korinek, 2020). In this paper, we investigate the impact of macroprudential policy measures (bundled together into a macroprudential policy index, MPI) on the growth rate of loans extended by banks to non-financial institutions and households respectively. The objective of our paper is to establish whether contractionary macroprudential policy stymies credit growth rate and whether expansionary macroprudential policy spurs credit growth rate in selected Euro Area economies (Austria, Belgium, Finland, Germany, Ireland, Italy, Netherlands, Slovenia, and Spain) over the period 2008Q4 to 2018Q4.

The first time the term “macroprudential” was used in an official report was in 1986 when the Cross Report was published (BIS, 1986; Bini Smaghi, 2009; Maes, 2010). In the Cross Report, the goal of the macro-prudential policy was defined as “the safety and soundness of broad financial system and payments mechanism”. The seminal papers by BIS economists which defined the concept of macroprudential policy are Borio (2003), Borio and White (2004), and White (2006). That said, while macroprudential tools may not have been actively used since the early 1990s, they were frequently used and were an integral part of the policy toolkit of the Federal Reserve and of the other authorities in the United States between the First World War and the early 1990s (Elliott, Feldberg & Lehnert, 2013; Borio, 2011; ECB, 2020, Galati & Moessner, 2011). They were only not named “macroprudential”. Examples of such macroprudential tools used in the US are underwriting standards, stock margin requirements, selective credit controls on portfolios, reserve requirements, interest rate ceilings, capital requirements, supervisory guidance, and “direct pressure” etc. (Elliott, Feldberg & Lehnert, 2013). Nowadays, macroprudential policy is defined as “the use of primarily prudential tools to limit systemic risk – the risk of disruptions to the provision of financial services that is caused by an impairment of all or parts of the financial system, and can cause serious negative consequences for the real economy” (IMF, 2013).

Ben Bernanke, a former Federal Reserve Chairman, in 2008 acknowledged the need for macroprudential regulation by asserting: “Going forward, a critical question for regulators and supervisors is what their appropriate “field of vision” should be. Under our current system of safety-and-soundness regulation, supervisors often focus on the financial conditions of individual institutions in

isolation. An alternative approach, which has been called systemwide or macroprudential oversight, would broaden the mandate of regulators and supervisors to encompass consideration of potential systemic risks and weaknesses as well” (Bernanke, 2008). Similarly, Andrew Crockett, a former general manager of the BIS, championed the push for macroprudential regulation with the following statement: “Strengthening the macro-prudential orientation of the regulatory and supervisory framework is important because of the costs and nature of financial instability. The main costs take the form of output losses. The nature of the processes generating instability puts a premium on a macro-prudential conception of economic behavior (Crockett, 2012).”

It strives to ensure that the financial system does not magnify a downturn in the real economy – for instance, by financial institutions having to reduce the supply of credit in a stressful situation (Aikman et al., 2019). The ultimate target of macroprudential policy is not to eliminate recessions altogether but rather to prevent the financial system from creating shocks that set off recessions and from magnifying shocks that make recessions worse (Aikman et al., 2019; ECB, 2020; Claessens, 2014). The key is the preventive, ex-ante reaction to the build-up of systemic risk. For instance, Laidroo and Männasoo (2014) demonstrate that regulatory and supervisory authorities should monitor credit lines for timely recognition of periods in which banks overextend credit.

Systemic crises come about as a result of the build-up of financial imbalances (mostly leveraged booms) in the financial sector, which is why the ex-ante prevention of immoderate risk-taking is a key objective of macroprudential policy (Peydró, 2016). The macroprudential policy takes the edge off the credit supply cycles, which positively affects the real economy during a crisis (Peydró, 2016). While financial stability is the first and foremost goal of macroprudential policy, its intermediate target is the correction of externalities (e.g. excessive house price appreciation and credit growth) and the mitigation of market failures and imperfections which generate systemic risk even when microprudential supervision and monetary policy are conducted effectively (Claessens, 2014). First, the causes of systemic risk need to be identified, and, they need to be corrected by specific macroprudential tools and instruments. In our paper, the intermediate target of macroprudential policy measures implemented by individual Euro Area economies (bundled into a macroprudential policy index) is credit growth (the growth rate of loans extended by banks to non-financial institutions and households).

Even in 2014, more than seven years after the crisis, the meaning of the term “macroprudential regulation” was obscure (Barwell, 2013), and its effectiveness was debated (Galati & Moessner, 2014). There has been a spike in empirical and theoretical studies on macroprudential policy and macroprudential regulation in the past few years. Since 2008, the term “macroprudential” in speeches by central bankers has surged along with academic research on this topic (Galati & Moessner, 2011). Nonetheless, there is still insufficient agreement on what constitutes a macroprudential policy framework, which contrasts with a monetary policy framework where there is a clear consensus on the definition of an inflation-targeting regime (Lombardi & Siklos, 2016). Our paper is a contribution to this field.

This paper is structured as follows: The second section provides an overview of the theoretical background of the empirical analysis. The third section lays down data specification, hypotheses, and methodology. The fourth section sets out empirical results and discusses them. The fifth section concludes.

The paper aimed to test whether expansionary macroprudential policy spurs credit growth and vice versa. We selected the sample of countries on the criteria of compatible database and similar timelines of the impulses of macroprudential policy regarding to the economic cycle.

The implications for macroprudential policy conclude that the same approach in different countries has the same impact on credit growth regarding the economic cycle phase. The limitation of the study is the aggregate approach and general conclusion, which could differentiate between small and systemic important banks.

## Theoretical Background

Granular credit registry data to study the impact of macroprudential policies has so far been used in very few cases: Dassatti Camors et al. (2019) investigate the impact of changes in reserve requirements in Uruguay; Jimenez et al. (2017) examine dynamic provisioning in Spain; and Gambacorta and Murcia (2020) use confidential bank-loan data to shed light on the effectiveness of macroprudential policy tools and their interaction with monetary policy (more in Claessens, 2014; Akinci and Olmstead-Rumsey, 2018; Poghosyan, 2020).

Even in the euro area, the effectiveness of various monetary policy and macroprudential policy instruments varies and may or may not be in accordance with country-specific

conditions, as demonstrated by Cocriș and Nucu (2014). In our paper, we use aggregate country-level data (as opposed to granular credit registry data) in line with the majority of the existing body of research on the effects of macroprudential policy.

The literature examining the impact of macroprudential policy instruments is vast and versatile (Morgan, Regis & Salike, 2019). In general, we can identify three strands of literature: The first strand is the empirical research employing cross-country macro data and assessing the impact of various macroprudential policy instruments on the housing market, the credit cycle, or some other indicator of financial stability (ibid., 2019). The second set is the case studies of countries using micro-level data and investigating the effect of one or more macroprudential policy instruments on financial stability (ibid., 2019). The third group of studies, which is the most recent one, employs both macro- and micro-level data to estimate the impact of country-specific macroprudential policy instruments on financial stability (ibid., 2019). This type of literature draws on the data retrieved from many banks headquartered in different countries, which gives an insight into how changes in macroprudential policy affect other countries and groups of banks (ibid., 2019).

Some studies assess the impact of macroprudential policy instruments on financial variables such as asset prices, credit, and economic imbalances in the economy (e.g., Akinci & Olmstead-Rumsey, 2018; Cerutti, Dagher & Dell’Ariccia, 2015; Lim et al., 2011), whereas others focus on the impact of macroprudential policy instruments on macroeconomic variables traditionally targeted by monetary policy – inflation and output (e.g., Richter et al., 2019; Kim & Mehrotra, 2017). Most studies construct dummy indices that are based on the dates of policy actions (Lim et al., 2011; Shim et al., 2013; Cerutti, Claessens & Laeven 2017; Cerutti, Correa, Fiorentino & Segalla, 2017; Akinci & Olmstead-Rumsey, 2018). The dummy indices signal a tightening or a loosening of the macroprudential policy stance but do not reflect the intensity of changes in macroprudential policy instruments (Kim & Oh, 2020). Some relatively recent studies incorporate the power of macroprudential policy actions. For example, Alam et al. (2019) and Richter et al. (2019) created a loan-to-value (LTV) index reflecting the intensity of changes in the LTV cap. Vandebussche et al. (2015) designed dummy indices of policy measures that incorporate the changes’ intensity.

Recent empirical results indicate that debt-to-income and loan-to-value caps are more effective than capital requirements for limiting credit growth (Claessens et al., 2013; Basten & Koch, 2015; Drehmann & Gambacorta, 2012). Another strand of literature (e.g. Jakubik & Hermanek, 2008) investigates the impact of macroprudential policy

instruments on financial stability by constructing stress scenarios and presenting stress test results (more in Altunbas, Binici & Gambacorta, 2017).

Macroprudential policy instruments seem to be effective in mitigating the sensitivity of leverage and credit to the business cycle – i.e. the procyclicality of leverage and credit growth (Lim et al., 2011; Galati & Moessner, 2014; Claessens, 2013). Macroprudential tools appear to be effective also in restraining asset growth, leverage, and credit growth (Vandenbussche et al., 2015; Alper et al., 2014; Cerutti, Claessens & Laeven, 2017; Claessens, Ghosh & Mihet, 2013; Olszak, Roszkowska & Kowalska, 2018).

The empirical evaluation of the effectiveness of macroprudential policies is complicated for several reasons (Poghosyan, 2020): Insufficient number of macroprudential policy measures; intensity of measures; and endogeneity. These possible problems could potentially make our empirical assessment more complex and intricate.

Insufficient number of macroprudential policy measures: Certain macroprudential policy measures (such as liquidity coverage ratio, net stable funding ratio, and leverage ratio) have been enacted only 3-5 years ago (or even more recently or are obligatory only since end-June 2021 onwards) and in a limited number of countries, which may make the number of observations for the empirical assessment insufficient. Furthermore, it is difficult to estimate the dynamic effects of measures which came into force only recently because the number of observations on the target variable after the implementation of the measures is not yet sufficient (Poghosyan, 2020).

Intensity of measures: It is difficult to quantify the intensity of macroprudential policy measures. For example, an increase in the annual amortization requirement by 1% and a decrease in the loan-to-value (LTV) ratio by 5% indicate macroprudential tightening; however, it is difficult to say which of the two instruments is more stringent. Many researchers thus rely on categorical variables to differentiate between tightening and loosening calibration of macroprudential policy instruments (ibid., 2020). Carreras, Davis, and Piggott (2018) findings suggest that macroprudential policy instruments positively impact stalling household credit growth and house prices in both the short and long run.

Endogeneity: The problem of reverse causality exists between macroprudential policy instruments and the target variables since the former are usually calibrated in response to a change in the latter. For example, in periods of rising house prices macroprudential policy will usually be tightened, leading to a positive correlation between

the macroprudential policy variables and the residual (Vandenbussche et al., 2015). This can cause the coefficient of the macroprudential variable to be biased upwards. Hence, the estimated coefficients of macroprudential variables are usually given as lower bounds. If the regression coefficient of the macroprudential variable is insignificant and/or does not have the right sign, this can be a result of the upward bias. As a consequence, the estimation can be uncertain. Conversely, if the regression coefficient of the macroprudential variable has the right sign and is significant, the lower bound of the estimate is substantial, hence macroprudential policy can be characterized as effective. Many researchers resort to using the generalized method of movement (GMM) as the econometric method of choice for estimating parameters in statistical models (Poghosyan, 2020). In our paper, we employ the one-step GMM (dynamic panel-data estimation) empirical research method to avoid the problem of endogeneity.

Similarly, Olszak, Roszkowska and Kowalska (2019) investigate if macroprudential policies dampen the procyclical impact of capital ratios on bank lending in a sample of sixty-five countries. Of the investigated macroprudential instruments, only borrower-based measures such as LTV and DTI caps seem to countercyclically by weakening the positive impact of capital ratio on bank lending, particularly in crisis periods.

Along the same lines, Arregui et al. (2013) develop an analytical framework for estimating macroprudential policies' costs, benefits, and unintended consequences. They propose a measure of net benefits of implementing macroprudential policy, composed of the probability of a crisis, the loss of output in a crisis, the ability of policy to reduce the likelihood and damage during a crisis, and the output costs of a certain policy decision. They also describe the unintended consequences of certain policies and identify instruments that could minimize such leakages. The macroprudential policy measures which authors identify as the most effective for stemming house price appreciation and credit growth are reserve requirements, higher risk weights on capital, and LTV limits. Loan loss provisioning policies do not seem to substantially affect house prices and credit.

Comparably, Ma (2020) analyzes the trade-off between growth and financial stability as a consequence of macroprudential policy implementation. This is done by examining the effect of optimal macroprudential policy in a small open economy on growth and welfare (annual consumption). Macroprudential policy substantially strengthens financial stability (it reduces the frequency and probability of crises) at the cost of a very small negative effect on average growth and welfare.

In the same vein, Akinci and Olmstead-Rumsey (2018) examine the effectiveness of macroprudential policies in limiting credit



growth and house price growth by using a dynamic panel data model for 57 economies from 2000 to 2013. To this end, the authors develop new indices for seven macroprudential tools (LTV limits, DSTI limits, other housing measures, time-varying capital requirements, provision requirements, consumer loan limits, and credit growth ceilings). Counterfactual simulations indicate that, if the countries had not used any macroprudential policy measures in 2011–2013, the bank credit growth, housing credit growth, and house price appreciation would have been substantially higher.

Similarly, Meuleman and Vander Venet (2020) examine the effectiveness of macroprudential policy in mitigating the systemic risk of banks in Europe from 2000–2017. The systemic risk measure is decomposed into individual bank risk and systemic risk. This is crucial for the differentiation between microprudential and macroprudential policy effects. The macroprudential policy instruments seem to reduce individual bank risks and bank systemic risk, as assessed by stock market investors.

Comparably, Altunbas, Binici, and Gambacorta (2017) shed light on the impact of macroprudential policies on bank risk by drawing on data from 61 countries over the time span 1990–2012. Small, weakly capitalized banks and banks having a high share of wholesale funding respond more strongly to changes in macroprudential policy tools. Macroprudential policies are more efficient when employed during a downturn than during a boom.

Along the same lines, Zakaria and Fatine (2017) analyze macroprudential policy instruments and empirically show that these instruments should be deployed only in particular macroeconomic circumstances and with a certain risk profile of financial institutions. The variables to be considered when taking macroprudential policy decisions are the output gap (which depicts economic cycle), the Z-score, liquidity ratios, and changes in bank profitability. The use of macroprudential instruments mitigates the build-up of systemic risk in the financial system and positively affects its resilience. This notwithstanding, the use of financial instruments should be temporary so as not to lead to negative externalities.

Similarly, Cizel, Frost, Houben and Wierds (2019) investigate whether implementing macroprudential policy leads to substituting bank credit with non-bank credit. However, the results vary across methodologies and samples. On the one hand, it could be claimed that the substitution effect leads to the propagation of new systemic risks. On the other hand, it could be asserted that the substitution effect reduces systemic risks since non-bank financial institutions are, by and large, less leveraged and with lower liquidity risks than the banks.

Another comparable study is that of Bambulović and Valdec (2020) who investigate the impact of macroprudential policy measures on foreign and domestic banks' lending in Croatia over a 19-year period split into the period before the 2008 financial crisis and after it. The study concludes that macroprudential policies were relatively successful in containing credit growth and constraining the build-up of risks for banks in foreign ownership. The macroprudential policy measures were more effective during the pre-crisis period than during the crisis period. The direction of the measure implementation (tightening or loosening) does not result in an impact of the same magnitude. This resulted in an increase in lending activity in sectors other than the banking sector. Consequently, the private sector's indebtedness markedly increased. As such, one of the paper's conclusions is that policymakers should consider both the supply and the demand side of the borrowing and lending process. Furthermore, banks anticipated the introduction of macroprudential policy measures and increased their lending activities shortly beforehand, which underscores their procyclical behavior. Tighter macroprudential policy in the home countries of banks under foreign ownership had a negative impact on the lending of those banks in Croatia, which underlines regulatory spillover effects. This finding highlights the relevance of aligning policy stances and reciprocity agreements among the EU member states.

Along the same lines, Gambacorta and Murcia (2020) use confidential granular credit registry (bank-loan) data of five Latin American countries (Argentina, Brazil, Colombia, Mexico, and Peru) to investigate the effectiveness of macroprudential policy tools and their interaction with monetary policy. The panel regressions and meta-analysis technique are employed to compare results across countries. The key takeaways from the study are that macroprudential policies have been effective in stabilizing credit cycles and reining in banking sector risk; the policies aimed at restraining the credit cycle are more effective at curbing credit growth than policies aimed at enhancing financial institutions' resilience; and macroprudential policy tools have a more pronounced impact on credit growth when the monetary policy complements them.

In a similar vein, Ely, Tabak, and Teixeira (2021) use a novel identification approach based on the nearest neighbor matching with propensity scores and a system-GMM model to examine how twelve different macroprudential policy instruments impact the risk-taking behavior of banks by drawing on a sample of 16,255 banks in 45 emerging and developed countries and the time period 2000–2014. Empirical results show that instruments that attempt to mitigate vulnerabilities stemming from interconnectedness and contagion of the financial system (e.g., caps on asset

concentration and interbank exposures) reduce leverage, improve the tradeoff between the risk and return, and facilitate bank stability. Likewise, certain borrower-based instruments (e.g., loan-to-value ratio, debt-to-income ratio, and capital surcharges on systemically important banks) decrease leverage and positively impact bank stability. Concentration limits are more effective for bigger and more leveraged banks, whereas loan-to-value and debt-to-income ratios are more efficient in concentrated markets. All structural and borrower-based policies appear less effective for more stable banks. Capital-based policies (e.g. countercyclical capital requirements, capital surcharges for systemically important banks, leverage ratios and dynamic loan-loss provisions) have mixed effects. Asset-based policies (e.g., caps on domestic and foreign currency loans) lead banks to reduce capital, which negatively affects bank stability. The effects of implementing various instruments are heterogeneous and differ depending on banks' size, leverage, liquidity, risk level, and market concentration. The study results support the usage of macroprudential policy instruments in countries with very different market characteristics and institutional environments.

Similarly, Cerutti, Claessens and Laeven (2017) shed light on the usage of macroprudential policy instruments in 119 countries from 2000 to 2013 by drawing on the IMF data. The study results suggest that emerging market economies use macroprudential policy instruments most often – particularly those which influence the foreign exchange rate. Advanced economies seem to rely more on borrower-based policies. The imposition of a macroprudential policy instrument usually leads to a decline in household credit growth. Macroprudential policy effects are weaker in open, financially more developed countries. The implementation of macroprudential policy instruments tends to result in an increase in cross-border borrowing, which points at regulatory arbitrage if other countries do not reciprocate changes in policy instruments. Another empirical finding is that macroprudential policies are more effective during economic upturns and less effective during economic downturns. Overall, the results of the study suggest that macroprudential policies can substantially impact credit growth in the financial system. Furthermore, the effect on credit growth varies across instruments and countries.

Along the same lines, Olszak, Roszkowska and Kowalska (2018) investigate how effective several macroprudential policy instruments are in dampening the procyclicality of loan-loss provisions (LLPs) by drawing on individual bank information from more than 65 countries and by using the two-step GMM Blundell-Bond approach. The study results are three-fold: First, borrower-based macroprudential policy measures are more effective than other macroprudential

policy instruments in dampening the procyclicality of loan-loss provisions. Second, macroprudential policy instruments which are likewise effective in reducing the procyclicality of loan-loss provisions are dynamic provisions, large exposure concentration limits and taxes on specific assets. Third, debt-to-income and loan-to-value caps are particularly effective in dampening the procyclicality of loan-loss provisions of large banks. For large banks, taxes and concentrations limits are likewise effective in reducing the procyclicality of loan-loss provisions. Dynamic provisions decrease the procyclicality of loan-loss provisions for banks of all sizes.

### Data Specification, Hypotheses, and Methodology

In this paper we use the following data (and variables created based on these data):

- Quarterly growth rate of household credit (source: Statistical Data Warehouse of the European Central Bank, henceforth ECB SDW, 2021);
- Quarterly growth rate of non-financial corporate sector credit (source: ECB SDW, 2021);
- Capital – solvency ratio, calculated as equity capital divided by total assets (source: ECB SDW, 2021);
- GDP growth rate (source: Eurostat, 2021);
- Unemployment rate (source: Eurostat, 2021);
- House price index – quarterly rate of change (source: Eurostat, 2021);
- Size – logarithm of total assets of all banking groups in an economy (source: ECB SDW, 2021);
- $y_{2008}$  – a dummy variable which takes the value 1 if the year is equal to 2008; and value 0 if the year is different from 2008 (source: Own creation of a dummy variable);
- Crisis – a dummy variable which takes the value 1 if the year is equal to 2008 or 2009; and value 0 if the year is different from 2008 or 2009 (source: Own creation of a dummy variable);
- MPI (macroprudential policy index) – takes the value of -1, 0 or 1. If the sum of macroprudential policy action indicators for 17 macroprudential policy instruments is positive, the MPI index takes the value 1; if the sum is negative, the MPI index takes the value -1; if there are no policy actions in a given quarter or if they offset each other, the MPI index takes the value 0. Each tightening event is coded as a +1, each loosening event is coded as a -1, and no or neutral action is coded as a zero (source:

Integrated Macroprudential Policy (iMaPP) of the International Monetary Fund; henceforth IMF iMaPP, 2021).

MPI (macroprudential policy index) is a sum of loosening and tightening measures of the following 17 macroprudential policy instruments in a particular country in a specific quarter (IMF iMaPP, 2021; Zohair et al., 2019):

- *Countercyclical capital buffer*<sup>1</sup>: Banks must maintain a countercyclical capital buffer. Implementations at 0% are not considered as a tightening in dummy-type indicators.
  - *Capital conservation buffer*: Requirements for banks to maintain a capital conservation buffer, including the one established under Basel III.
  - *Capital requirements*: Capital requirements for banks, which include risk weights, systemic risk buffers, and minimum capital requirements. Countercyclical capital buffers and capital conservation buffers are captured in their sheets respectively and thus not included here. Subcategories of capital measures are also provided in separate sheets, classifying them into household sector targeted (Capital\_HH), corporate sector targeted (Capital\_Corp), broad-based (Capital\_Gen), and FX-loan targeted (Capital\_FX) measures.
  - *LVR – leverage limits*: A limit on leverage of banks, calculated by dividing a measure of capital by the bank's non-risk-weighted exposures (e.g., Basel III leverage ratio).
  - *LLP – loan loss provisions*: Loan loss provision requirements for macroprudential purposes include dynamic provisioning and sectoral provisions (e.g., housing loans).
  - *LCG – limits on credit growth*: Limits on growth or the volume of aggregate credit, the household-sector credit, or the corporate-sector credit by banks, and penalties for high credit growth. Subcategories of limits to credit growth are also provided, classifying them into household sector targeted (LCG\_HH), corporate sector targeted (LCG\_Corp), and broad-based (Gen) measures.
  - *Loan restrictions*: Loan restrictions are more tailored than those captured in "LCG". They include loan limits and prohibitions, which may be conditioned on loan characteristics (e.g., the maturity, the size, the LTV ratio and the type of interest rate of loans), bank characteristics (e.g., mortgage banks), and other factors. Subcategories of loan restrictions are also provided, classifying them into household sector targeted (LoanR\_HH), and corporate sector targeted (LoanR\_Corp) measures.
- Restrictions on foreign currency lending are mostly captured in "LFC".
  - *LFC – limits on foreign currency*: Limits on foreign currency (FC) lending, and rules or recommendations on FC loans.
  - *LTV – limits on the loan-to-value ratio*: Limits to the loan-to-value ratios, including those mostly targeted at housing loans, but also includes those targeted at automobile loans, and commercial real estate loans.
  - *DSTI – limits to the debt-service-to-income ratio*: Limits to the debt-service-to-income ratio and the loan-to-income ratio restrict the size of debt services or debt relative to income. They include those targeted at housing loans, consumer loans, and commercial real estate loans.
  - *Tax measures*: Taxes and levies applied to specified transactions, assets, or liabilities, which include stamp duties, and capital gain taxes.
  - *Liquidity requirements*: Measures taken to mitigate systemic liquidity and funding risks, including minimum requirements for liquidity coverage ratios, liquid asset ratios, net stable funding ratios, core funding ratios and external debt restrictions that do not distinguish currencies.
  - *LTD – Limits on the loan-to-deposit ratio*: Limits to the loan-to-deposit (LTD) ratio and penalties for high LTD ratios.
  - *LFX – Limits on foreign exchange positions*: Limits on net or gross open foreign exchange (FX) positions, limits on FX exposures and FX funding, and currency mismatch regulations.
  - *RR – Reserve requirements*: Reserve requirements (domestic or foreign currency) for macroprudential purposes. Please note that this category may currently include those for monetary policy as distinguishing those for macroprudential or monetary policy purposes is often not clear-cut. A subcategory of reserve requirements is provided for those differentiated by currency (RR\_FCD), as they are typically used for macroprudential purposes.
  - *SiFi* – Measures taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs), which include capital and liquidity surcharges.
  - *Other*: Macroprudential measures not captured in the above categories—e.g., stress testing, restrictions on profit distribution, and structural measures (e.g., limits on exposures between financial institutions).

<sup>1</sup> Klinger and Teply (2014) demonstrate that sufficient capital buffers are key for safeguarding the stability of the financial system as a whole.

The data are used for nine Euro Area economies (Austria, Belgium, Finland, Germany, Ireland, Italy, Netherlands,

Slovenia, and Spain) over the time span 2008Q4 to 2018Q4.

We test the following two hypotheses:

$H_1$ : *The tightening of macroprudential policy measures reduces non-financial corporate sector credit growth rate.*

$H_2$ : *The tightening of macroprudential policy measures reduces the growth rate of household credit.*

In the first model (to which the first hypothesis applies), two explanatory variables are used: Capital and MPI. The dependent variable is the growth rate of non-financial corporate sector credit (henceforth NFIGR). We assume that Capital will have a positive impact on NFIGR, since banks which are better capitalized are better able to absorb losses (and hence may be able to extend loans to riskier clients); satisfy regulatory capital requirements (and hence do not face any supervisory restrictions for extension of loans) and are overall in a better position to extend loans and expand their scope of business activities. We expect that MPI<sup>2</sup> will have a negative effect on NFIGR, since the tightening of macroprudential policy measures should impose direct and indirect limits on banks' credit activity.

In the second model (to which the second hypothesis applies), three explanatory variables are used: Size, MPI, and Unemployment. The dependent variable is the growth rate of household credit (henceforth HHGR). We postulate that Size (logarithm of total assets of all banking groups in an economy) will have a positive impact on HHGR, since in a bigger banking sector, there should be more interdependencies among banks, the banking sector should be more important relative to other sectors, and the households may be more dependent on banks to satisfy their credit needs. We expect that MPI will have a negative effect on NFIGR, since the tightening of macroprudential policy measures should impose direct and indirect limits on banks' credit activity. We presume that Unemployment will have a negative impact on NFIGR, since a higher unemployment rate indicates that a greater proportion of the population has a lower (or no) income; there is greater uncertainty in the economy; the employed part of the population might be more concerned about losing their job and might therefore be less willing and/or less able to take out a loan (depending on their job security). Table 1 summarizes our expectations concerning the sign of the regression coefficients.

**Table 1**

*Expected signs of regression coefficients*

Explanatory variable	Expected sign of regression coefficient
Capital	+
MPI	-
Size	+
Unemployment	-

To test our hypotheses, we use the one-step system generalized method of moments (GMM), an empirical research method used for dynamic panel-data estimation. GMM is a dynamic panel data estimator and a generic method for estimating parameters in statistical models. It uses moment conditions which are functions of the data and the model parameters such that their expectation is equal to 0 at the parameters' true value (Roodman, 2009, 2014; Mileva, 2007). GMM controls for correlation between the explanatory variable and the error term in a model (i.e. for the endogeneity of the lagged dependent variable in a dynamic panel model). Furthermore, it controls for omitted variables bias, unobserved panel heterogeneity, and measurement errors (Roodman, 2009, 2014; Mileva, 2007). Hence, GMM is suitable for use in settings characterized by independent variables which are not strictly exogenous (but are correlated with the error term); arbitrarily distributed fixed effects, heteroscedasticity, and autocorrelation within groups or panels.

In GMM models, the number of groups or cross-sections (N) must exceed the time span (T). Instrumental variables (IV) are used in the model. The instruments (Z) must be exogenous ( $E(Z^{\wedge'} u) = 0$ ). The number of instruments (Z) must be lower than or equal to the number of groups (N). There are two sets of GMM estimators: Difference GMM and system GMM. They were developed by Holtz-Eakin, Newey, and Rosen (1988); Arellano and Bond (1991); Arellano and Bover (1995); and Blundell and Bond (1998).

Difference GMM, proposed by Arellano and Bond (1991), corrects endogeneity in the model by transforming all regressors through differencing and removing fixed effects. However, the disadvantage of the first difference GMM is that it subtracts the previous observation from the current one, thereby increasing the gaps in an unbalanced panel. System GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998), corrects endogeneity in

<sup>2</sup> *The more macroprudential policy measures were tightened in a particular quarter, the higher (more positive) value the MPI has.*

the model by introducing more instruments to improve efficiency and by transforming the instruments to make them uncorrelated (exogenous) with fixed effects. It creates a system of two equations: The original and transformed. It uses orthogonal deviations: The average of all future available observations of a variable is subtracted from the current observation. Regardless of the number of gaps in the data, this can be calculated for all observations apart from the last one, which minimizes data loss.

System GMM is an augmented estimator: One equation is expressed in levels form with first differences used as instruments. The second equation is expressed in first differenced form with levels as instruments. One-step system GMM is simply an augmented version of the one-step difference GMM. It uses more moment conditions than the one-step difference GMM. Moreover, it is efficient and robust to autocorrelation and heteroscedasticity (Roodman, 2009, 2014; Mileva, 2007). To implement the system GMM in Stata, we used the “xtabond2” command. We did not use the “small” option in Stata; hence the z-statistics/Wald statistics were reported (instead of t-statistics/F-statistics).

## Empirical Results and Discussion

In this section, we present the results of two models: One with the quarterly growth rate of non-financial corporate sector credit as the dependent variable (“NFI model”) and one with the quarterly growth rate of household credit as the dependent variable (“HH model”). Both models were estimated with one-step system GMM. Both models are applied to nine Euro Area economies (Austria, Belgium, Finland, Germany, Ireland, Italy, Netherlands, Slovenia, and Spain) and to time period 2008Q4–2018Q4.

There are two tests for the validity of instruments: Hansen’s (1982) J test and Sargan’s (1958) test for the validity of over-identifying restrictions. The null hypothesis ( $H_0$ ) is: “The instruments used are valid.” The alternative hypothesis ( $H_1$ ) is: “The instruments used are not valid.” Not rejecting  $H_0$  (i.e. “accepting”  $H_0$ ;  $p > 0.1$ ) supports the choice of the instruments. The most favorable values of the Hansen and Sargan tests are between 0.1 and 0.6. However, values up to 0.9 are still acceptable, whereas values exceeding 0.9 indicate that the model may be misspecified (Roodman, 2009).

Moreover, there is a test for serial correlation and autocorrelation of the error term: The null hypothesis ( $H_0$ ) is: “The differenced error term is not first order (AR(1))

serially correlated.” The alternative hypothesis ( $H_1$ ) is: “The differenced error term is first order (AR(1)) serially correlated.” For the second order serial correlation, the hypotheses are comparable, only AR(1) is replaced by AR(2). Not rejecting  $H_0$  (i.e. “accepting”  $H_0$ ;  $p > 0.1$ ) means that the error term is serially uncorrelated and that the moment conditions are correctly specified.

Three instruments are used in the NFI model: GDP growth rate; unemployment rate; and house price index. The number of instruments (3) is less than the number of groups (9). The NFI model uses two explanatory variables: Capital L1 and MPI L2.

The explicit form of the model is (level equation):

$$y_{i,t} = \delta y_{i,t-1} + X'_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

differenced equation:

$$y_{i,t} - y_{i,t-1} = \alpha_0 + \alpha_1(y_{i,t-1} - y_{i,t-2}) + \alpha_2(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (2)$$

where:

$y_{i,t}$  – endogenous variable

$X_{i,t}$  – strictly exogenous covariates

$\mu_i$  – the panel-level effects

$\varepsilon_{i,t}$  – i.i.d. over the whole sample

$\alpha$  – estimation parameters

**Table 2**

*Results of the one-step system GMM estimation for the NFI model*

Statistics	NFI model
Wald chi2(2)	8.38 (0.015)**
Capital L1	0.012831 (0.006)***
MPI L2	-0.1274296 (0.063)*
Constant	-0.196045 (0.004)***
AR(1)	-2.02 (0.043)**
AR(2)	0.71 (0.479)
Sargan chi2(1)	0.19 (0.666)

*Notes: “L1” denotes one lag, whereas “L2” indicates two lags. The z-/chi2-statistics are given in brackets below the coefficients and the p-values are given in brackets below the z-/chi2-statistics. Significance levels are denoted as: \*\*\*Significant at 1%. \*\*Significant at 5%. \*Significant at 10%.*

In the NFI model, the explanatory variables Capital L1 and MPI L2 are statistically significant at 1% and 10%, respectively. The constant is likewise statistically significant at 1%. The model as a whole is statistically significant at 5%. The p value of the Arellano-Bond test for AR(1) in first differences is equal to 0.043, which indicates that the differenced error term could be first order serially correlated at 5%. However, the p value of the Arellano-Bond test for AR(2) in first differences exceeds 0.1, which indicates that the differenced error term is not second order (AR(2)) serially correlated. Hence, the p value for AR(1) being less than 0.05 is not a problem. The p value of the Sargan test is greater than 0.1 and less than 0.9, implying that we cannot reject  $H_0$ , hence it can be concluded that the instruments used are valid. Both explanatory variables (Capital L1 and MPI L2) have the expected signs of regression coefficients (Capital: a positive sign and MPI a negative sign). Since the regression coefficient of MPI is negative, the first hypothesis (H1: Tightening of macroprudential policy measures reduces the growth rate of non-financial corporate sector credit.) can be confirmed.

Four instruments are used in the HH model: GDP growth rate; house price index; y2008; and Crisis. The number of instruments (4) is less than the number of groups (9). The HH model uses three explanatory variables: Size L1; MPI L1; and Unemployment L1.

**Table 3**

*Results of the one-step system GMM estimation for the HH model*

Statistics	HH model
Wald chi2(3)	17.62 (0.001)***
Size L1	-0.0160128 (0.040)**
MPI L1	0.0173952 (0.565)
Unemployment L1	-0.0031554 (0.093)*
Constant	0.1232222 (0.007)***
AR(1)	-1.43 (0.153)
AR(2)	-0.84 (0.399)
Sargan chi2(1)	0.51 (0.474)
Hansen chi2(1)	0.53 (0.465)

*Notes: "L1" denotes one lag, whereas "L2" indicates two lags. The z-/chi2-statistics are given in brackets below the coefficients and the p-values are given in brackets below the z-/chi2-statistics. Significance levels are denoted as: \*\*\*Significant at 1%. \*\*Significant at 5%. \*Significant at 10%.*

In the HH model, the explanatory variables Size L1 and Unemployment L1 are statistically significant at 5% and 10%, respectively. The constant is likewise statistically significant at 1%. On the other hand, the explanatory variable MPI L1 is not statistically significant, which implies that it is not possible to confirm or reject our second hypothesis (H2:

Tightening of macroprudential policy measures reduces the growth rate of household credit.) based on the available data and results. The model as a whole is statistically significant at 1%. The p value of Arellano-Bond test for AR(1) and for AR(2) in first differences exceeds 0.1, which indicates that the differenced error term is neither first order (AR(1)) nor second order (AR(2)) serially correlated. The p value of the Sargan and Hansen tests is greater than 0.1 and less than 0.5, implying that we cannot reject  $H_0$ , hence it can be concluded that the instruments used are valid. Only one explanatory variable (Unemployment L1) has the expected sign of regression coefficient (a negative sign).

## Conclusion

The aim of macroprudential policy, tools, instruments and measures is to build up (capital and liquidity) buffers in expansionary periods such that they can be drawn down in periods of financial distress. This dampens the pro-cyclicality<sup>3</sup> of the financial system, which in turn improves financial stability (Borio, 2011). The macroprudential policy objective is to prevent systemic risk from taking shape and unfurling in the financial system, and hence to reduce the probability of financial crises with significant output losses for the economy as a whole. By identifying and restraining channels of formation and spread of systemic risk, macroprudential policy acts preventively against any signs of financial instability and mitigates their impacts if preventative measures falter (Frait & Komarkova, 2011). In the post-crisis era, interconnectedness among banks and sovereigns has declined, albeit unevenly across the euro area countries. Moreover, the institutional reforms intending to cut the bank-sovereign nexus are incomplete (Stawasz-Grabowska, 2020). Since the macroprudential policy came to the forefront of the economic profession only recently, evidence on the effectiveness of macroprudential tools is still scarce. Our paper is a contribution to this field.

According to M er o (2017), macroprudential targets are slightly ambiguous (decreasing systemic risk versus increasing macroprudential shock-absorbing capacity of banks); we do not yet know or have evidence if the new macroprudential rules are suitably calibrated; if the usage of new instruments amplifies the possibilities for regulatory arbitrage; what are the interactions between macroprudential and monetary policy; and if the usage of macroprudential tools can create certain risks – for instance, those which arise from economic agents increasingly resorting to the use of unregulated shadow banking that is (currently) outside the purview of macroprudential legislation. Our paper contributes to

<sup>3</sup> Pro-cyclicality is defined as the inclination of the financial system to reinforce the business cycle (Festic, 2006).

investigating the effectiveness of macroprudential policy measures and hence to closing some of the existing gaps in the economic scientific community.

We tested two hypotheses:  $H_1$ : The tightening of macroprudential policy measures reduces non-financial corporate sector credit growth rate.  $H_2$ : The tightening of macroprudential policy measures reduces the growth rate of household credit. Based on our empirical results, we can confirm the first hypothesis. In contrast, the second hypothesis can be neither confirmed nor rejected, since the explanatory variables of interest (MPI) is statistically insignificant. In the NFI model where quarterly growth rate of non-financial corporate sector credit is employed as the dependent variable, the explanatory variable MPI has the expected sign (negative) and is statistically significant. As such, it can be concluded that macroprudential policy measures do play an important role in stymying non-financial corporate sector credit growth, and, by extension, in cooling down the economy, and safeguarding financial stability. On the other hand, in the HH model where quarterly growth rate of household credit is employed as the dependent variable, the

explanatory variable MPI does not have the expected sign and is not statistically significant. Thus, no conclusion can be drawn about the impact of macroprudential policy measures on household credit growth rate.

This paper was taking its final shape in 2021, a year marked by COVID-19 and its economic downturn (Nakatani, 2020). Macroprudential policy measures and capital controls can be used during the coronavirus turmoil to help prevent economic crisis from transitioning into a financial crisis (ibid., 2020). There are concerns that emerging and developing economies could experience substantial capital outflows which may cause liquidity problems in domestic or foreign currencies in the banking and corporate sectors, particularly in economies where currency mismatches and exchange rate depreciations are widespread (ibid., 2020). The coronavirus crisis could also adversely affect the real estate sector and lead to a decline in asset prices (Nakatani, 2020). While we do not examine the use and effectiveness of macroprudential policy measures in 2020 and 2021 (because the data which would be required for an empirical analysis were not available), this period is likely to be extensively studied in the future.

## References

- Aikman, D., Bridges, J., Kashyap, A., & Siegert, C. (2019). Would Macroprudential Regulation Have Prevented the Last Crisis? *Journal of Economic Perspectives*, 33(1), 107–130. DOI: 10.1257/jep.33.1.107
- Akinci, O., & Olmstead-Rumsey, J. (2018). How effective are macroprudential policies? An empirical investigation. *Journal of Financial Intermediation*, 33, 33–57. DOI: 10.1016/j.jfi.2017.04.001
- Alper, K., Binici, M., Demiralp, S., Kara, H., & Ozlu, P. (2014). Reserve Requirements, Liquidity Risk, and Credit Growth. Working Paper No. 14/24. Central Bank of the Republic of Turkey. Retrieved on 28.01.2021 from <https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Publications/Research/Working+Papers/2014/14-24> DOI not available
- Altunbas, Y., Binici, M., & Gambacorta, L. (2017). Macroprudential policy and bank risk. Bank for International Settlements: *BIS Working Papers* No. 646.
- Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, 58(2), 277–297. DOI: 10.2307/2297968
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29–51. DOI: 10.1016/0304-4076(94)01642-D
- Arregui, N., Beneš, J., Krznar, I., Mitra, S., & Oliveira Santos, A. (2013). Evaluating the Net Benefits of Macroprudential Policy: A Cookbook. *IMF Working Paper*, WP/13/167. DOI: 10.5089/9781484335727.001
- Bambulović, M., & Valdec, M. (2020). Testing the characteristics of macroprudential policies' differential impact on foreign and domestic banks' lending in Croatia. *Public Sector Economics*, 44(2), 221–249. DOI: 10.3326/pse.44.2.4
- Barwell, R. (2013). Macroprudential Policy: Taming the wild gyrations of credit flows, debt stocks and asset prices. Basingstoke, Hampshire, UK: Palgrave Macmillan. DOI: 10.1057/9781137274465
- Basten, C., & Koch, C. (2015). Higher bank capital requirements and mortgage pricing: Evidence from the countercyclical capital buffer (CCB). *BIS Working Papers*, no. 511.
- Beck, Thorsten, & Gambacorta, Leonardo. (2020). Editorial: New evidence on the effectiveness of macroprudential policies. *Journal of Financial Intermediation*, 42, 100834.
- Bernanke, B. S. (2008). Reducing Systemic Risk. *Speech at the Federal Reserve Bank of Kansas City's Annual Economic Symposium*, Jackson Hole, Wyoming, August 22, 2008.
- Bini Smaghi, L. (2009). Going Forward: Regulation and Supervision after the Financial Turmoil. *Speech at Bocconi University*, Milan (Italy), 19 June.

- BIS. (1986). Recent Innovations in International Banking. Prepared by a Study Group established by the Central Banks of the Group of Ten Countries (*Cross Report*), Basel: Bank for International Settlements.
- Blundell, R., and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. DOI: 10.1016/S0304-4076(98)00009-8.
- Borio, C. (2003). Towards a macroprudential framework for financial supervision and regulation? *BIS Working Papers*, February, n. 128.
- Borio, C., & White, W. (2004). Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes, *BIS Working Paper No. 147*.
- Borio, C. (2011). Implementing the macroprudential approach to financial regulation and supervision. In: Green, Christopher J., Pentecost, Eric J., & Weyman-Jones, T. (eds.) *The Financial Crisis and the Regulation of Finance*. Cheltenham, UK: Edward Elgar.
- Carreras, O., Davis, P. E., & Piggott, R. (2018). Assessing macroprudential tools in OECD countries within a cointegration framework. *Journal of Financial Stability*, 37(C), 112–130. DOI: 10.1016/j.jfs.2018.04.004
- Cerutti, E., Claessens, S., & Laeven, L. (2017). The use and effectiveness of macroprudential policies: New evidence. *Journal of Financial Stability*, 28, 203–224. DOI: 10.1016/j.jfs.2015.10.004
- Cerutti, E., Correa, R., Fiorentino, E., & Segalla, E. (2017). Changes in prudential policy instruments – a new cross-country database. *International Journal of Central Banking*, 13(1), 477–503.
- Cerutti, E., Dagher, J., & Dell'Ariccia, G. (2015). Housing Finance and Real-estate Boom: A Cross-country Perspective. *IMF Staff Discussion Note 15/12*.
- Cizel, J., Frost, J., Houben, A., & Wierds, P. (2019). Effective Macroprudential Policy: Cross-Sector Substitution from Price and Quantity Measures. *Journal of Money, Credit and Banking*, 51(5), 1209–1235. DOI: <https://doi.org/10.1111/jmcb.12630>
- Claessens, S. (2014). An Overview of Macroprudential Policy Tools. IMF Working Paper WP/14/214.
- Claessens, S., Ghosh, S. R., & Mihet, R. (2013). Macro-Prudential Policies to Mitigate Financial System Vulnerabilities. *Journal of International Money and Finance*, 39(C), 153–185. DOI: <https://doi.org/10.1016/j.jimonfin.2013.06.023>
- Cociş, V., & Nucu, A. E. (2013). Monetary policy and financial stability: Empirical evidence from Central and Eastern European countries. *Baltic Journal of Economics*, 13(1), 75–98. DOI: <https://doi.org/10.1080/1406099X.2013.10840527>
- Crockett, A. D. (2012). Marrying the micro- and macro-prudential dimensions of financial stability. In: *Speech Before the 11th International Conference on Banking Supervision*, Basel, September.
- Dassatti C., Cecilia, P., José L., Rodriguez-Tous, F., & Vicente, S. (2019). Macroprudential and Monetary Policy: Loan-Level Evidence from Reserve Requirements. *Economics Working Papers 1650*, Department of Economics and Business, Universitat Pompeu Fabra, revised Nov 2019.
- Drehmann, M., & Gambacorta, L. (2012). The effects of countercyclical capital buffers on bank lending. *Applied Economics Letters*, 19(7), 603–608. DOI: <https://doi.org/10.1080/13504851.2011.591720>
- ECB SDW. (2021). *European Central Bank: Statistical Data Warehouse*. Retrieved on 10.04.2021 from <https://sdw.ecb.europa.eu>.
- ECB. (2020). *Financial stability and macroprudential policy*. Retrieved on 02.10.2020 from <https://www.ecb.europa.eu/ecb/tasks/stability/html/index.en.html>.
- Elliott, D.J., Feldberg, G., & Lehnert, A. (2013). The History of Cyclical Macroprudential Policy in the United States. *Finance and Economics Discussion Series*, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D. C., 2013–29.
- Ely, R. A., Tabak, B. M., & Teixeira, A. M. (2021). The transmission mechanisms of macroprudential policies on bank risk. *Economic Modelling*, 94, 598–630. DOI: <https://doi.org/10.1016/j.econmod.2020.02.005>
- Eurostat. (2021). Eurostat Database. Retrieved on 11.04.2021 from <https://ec.europa.eu/eurostat/web/main/data/database>.
- Festić, M. (2006). Procyclicality of Financial and Real Sector in Transition Economies. *Prague Economic Papers*, 15(4), 315–349. DOI: 10.18267/j.pep.291
- Festić, M., & Romih, D. (2008). Cyclicity of the Banking Sector Performance and Macro Environment in the Czech Republic, Slovakia and Slovenia. *Prague Economic Papers*, 17(2), 99–117. DOI: 10.18267/j.pep.323
- Frait, J., & Komárková, Z. (2011). Financial Stability, Systemic Risk and Macroprudential Policy. Occasional Publications - Chapters in Edited Volumes, in: *CNB Financial Stability Report 2010/2011*, chapter 0, pages 96-111, Czech National Bank.
- Galati, G., & Moessner, R. (2011). Macroprudential Policy – A Literature Review. *BIS Working Papers*, No. 337. February 2011. DOI: <https://doi.org/10.1111/j.1467-6419.2012.00729.x>
- Galati, G., & Moessner, R. (2014). What Do We Know About the Effects of Macroprudential Policy? *DNB Working Paper 440*. Netherlands Central Bank.



- Gambacorta, L., & Murcia, A. (2020). The impact of macroprudential policies in Latin America: An empirical analysis using credit registry data. *Journal of Financial Intermediation*, 42, 100828. DOI: <https://doi.org/10.1016/j.jfi.2019.04.004>
- Greenspan, A. (2002). Opening Remarks. *Economic Volatility*, Kansas City: Federal Reserve Bank of Kansas City, pp. 1–10.
- Greenspan, A. (2011). Dodd-Frank fails to meet test of our times. Op-ed in the *Financial Times*, March 29.
- Hansen, L. (1982). Large sample properties of generalized method of movements estimators. *Econometrica*, 50(4), 1029–1054. DOI: <https://doi.org/10.2307/1912775>
- Holtz-Eakin, D., Newey, W., & Rosen, H. (1988). Estimating Vector Autoregressions with Panel Data. *Econometrica*, 56, 1371–1395. DOI: <https://doi.org/10.2307/1913103>
- IMF iMaPP. (2021). The integrated Macroprudential Policy (iMaPP) database. Retrieved on 10.04.2021 from <https://www.elibrary-areaer.imf.org/Macroprudential/Pages/Home.aspx>.
- IMF. (2013). *Key Aspects of Macroprudential Policy*. Retrieved on 14.01.2021 from <https://www.imf.org/external/np/pp/eng/2013/061013b.pdf>.
- Jakubik, P., & Hermanek, J. (2008). Stress Testing of the Czech Banking Sector, *Prague Economic Papers*, 17(3), 195–212. DOI: 10.18267/j.pep.329
- Jeanne, O., & Korinek, A. (2020). Macroprudential Regulation Versus Mopping Up After the Crash. *The Review of Economic Studies*, 87(3), 1470–1497. DOI: <https://doi.org/10.1093/restud/rdaa005>
- Jimenez, G., Ongena, S., Peydró, J.-L., & Saurina Salas, J. (2017). Macroprudential policy, countercyclical bank capital buffers and credit supply: Evidence from the Spanish dynamic provisioning experiments. *Journal of Political Economy*, 125(6), 2126 – 2177. DOI: 10.2139/ssrn.2160843
- Kim, S., & Mehrotra, A. (2017). Managing price and financial stability objectives in inflation targeting economics in Asia and the Pacific. *Journal of Financial Stability*, 29, 106–116. DOI: <https://doi.org/10.1016/j.jfs.2017.01.003>
- Kim, S., & Oh, J. (2020). Macroeconomic effects of macroprudential policies: Evidence from LTV and DTI policies in Korea. *Japan & The World Economy*, 53, 100997. DOI: <https://doi.org/10.1016/j.japwor.2020.100997>
- Klinger, T., & Teplý, P. (2014). Systemic Risk of the Global Banking System – An Agent-Based Network Model Approach. *Prague Economic Papers*, 23(1), 24–41. DOI: 10.18267/j.pep.471
- Laidroo, L., & Männasoo, K. (2014). Perils of excessive credit growth: Evidence from 11 new EU member states. *Baltic Journal of Economics*, 14(1–2), 17–24. DOI: <https://doi.org/10.1080/1406099X.2014.942541>
- Lim, C. H., Columba, F., Costa, A., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T., & Wu, X. (2011). Macroprudential policy: What Instruments and How to Use Them? Lessons from Country Experiences. *IMF Working Paper* No. 11/238.
- Lombardi, D., & Siklos, P. L. (2016). Benchmarking macroprudential policies: An initial assessment. *Journal of Financial Stability*, 27, 35–49. DOI: <https://doi.org/10.1016/j.jfs.2016.08.007>
- Luu, H. N., & Vo, X. V. (2021). The Impact of Supervisory Stress Tests on Bank Ex-Ante Risk-Taking Behavior: Empirical Evidence from a Quasi-Natural Experiment. *International Review of Financial Analysis*, 75, May 2021, 101586. DOI: <https://doi.org/10.1016/j.irfa.2020.101586>
- Ma, C. (2020). Financial stability, growth and macroprudential policy. *Journal of International Economics*, 122, 103259. DOI: <https://doi.org/10.1016/j.jinteco.2019.103259>
- Maes, I. (2010). Alexandre Lamfalussy and the origins of the BIS macro-prudential approach to financial stability. *PSL Quarterly Review*, 63(254), 265–292.
- Matysek-Jędrych, A. (2018). Institutional Arrangement for Macroprudential Policy – On Differences Across the EU Countries. *Comparative Economic Research*, 21(2), 37–50. DOI: <https://doi.org/10.2478/cer-2018-0010>
- Mérö, K. (2017). The emergence of macroprudential bank regulation: A review. *Acta Oeconomica*, 67(3), 289–309. DOI: <https://doi.org/10.1556/032.2017.67.3.1>
- Meuleman, E., & Vander V., R. (2020). Macroprudential policy and bank systemic risk. *Journal of Financial Stability*, 47, 100724. DOI: 10.1016/j.jfs.2020.100724
- Mileva, E. (2007). Using Arellano–Bond Dynamic Panel GMM Estimators in Stata. *Tutorial with Examples using Stata 9.0*. Fordham University, Economics Department.
- Morgan, P.J., Regis, P.J., & Salike, N. (2019). LTV policy as a macroprudential tool and its effects on residential mortgage loans. *Journal of Financial Intermediation*, 37, 89–103. DOI: <https://doi.org/10.1016/j.jfi.2018.10.001>
- Nakatani, R. (2020). Macroprudential policy and the probability of a banking crisis. *Journal of Policy Modeling*, 42(6), 1169–1186. DOI: <https://doi.org/10.1016/j.jpolmod.2020.05.007>
- Olszak, M., Roszkowska, S., & Kowalska, I. (2018). Macroprudential policy instruments and procyclicality of loan-loss provisions – Cross-country evidence. *Journal of International Financial Markets, Institutions & Money*, 54, 228–257. DOI: <https://doi.org/10.1016/j.intfin.2018.01.001>

- Olszak, M., Roszkowska, S., & Kowalska, I. (2019). Do macroprudential policy instruments reduce the procyclical impact of capital ratio on bank lending? Cross-country evidence. *Baltic Journal of Economics*, 19(1), 1–38. DOI: <https://doi.org/10.1080/1406099X.2018.1547565>
- Peydró, J.-L. (2016). Macroprudential Policy and Credit Supply. *Swiss Journal of Economics and Statistics*, 152(4), 305–318.
- Poghosyan, T. (2020). How Effective is Macroprudential Policy? Evidence from Lending Restriction Measures in EU Countries. *Journal of Housing Economics*, 49, 101694. DOI: <https://doi.org/10.1016/j.jhe.2020.101694>
- Richter, B., Schularick, M., & Shim, I. (2019). The costs of macroprudential policy. *Journal of International Economics*, 118, 263–282. DOI: <https://doi.org/10.1016/j.jinteco.2018.11.011>
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1), 86–136. DOI: <https://doi.org/10.1177/1536867X0900900106>
- Roodman, D. (2014). XTABOND2: Stata module to extend xtabond dynamic panel data estimator. *Statistical Software Components from Boston College Department of Economics*.
- Sargan, J. D. (1958). The Estimation of Economic Relationships Using Instrumental Variables. *Econometrica*, 26(3), 393–415. DOI:10.2307/1907619
- Shim, I., Bogdanova, B., Shek, J., & Subelyte, A. (2013). Database for Policy Actions on Housing Markets. *BIS Quarterly Review*, (September 2013), 83–95.
- Stawasz-Grabowska, E. (2020). Negative Feedback Loop between Banks and Sovereigns in the Euro Area – Experience of the Crisis and Post-Crisis Perspective. *Comparative Economic Research*, 23(3), 41–61. DOI: 10.18778/1508-2008.23.19
- Vandenbussche, J., Vogel, U., & Detragiache, E. (2015). Macroprudential policies and housing prices: A new database and empirical evidence for Central, Eastern, and Southeastern Europe. *Journal of Money, Credit and Banking*, 47(1), 343–377. DOI: <https://doi.org/10.1111/jmcb.12206>
- White, W. R. (2006), “Procyclicality in the financial system: Do we need a new macrofinancial stabilisation framework?”, *BIS Working Papers*, n. 193, January.
- Zakaria, F., & Fatine, F. A. (2017). Determinants of the Application of Macro Prudential Instruments. *Comparative Economic Research*, 20(3), 117–136. DOI: 10.1515/cer-2017-0023
- Zohair, A., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E., & Wang, N. (2019). Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database. *IMF Working Paper No. 19/66*.

## Vpliv makroprevidnostne politike na rast posojil v devetih gospodarstvih evroobmočja

### Izvleček

V članku raziskujemo vpliv ukrepov (ki so združeni v indeks makroprevidnostne politike, MPI) makroprevidnostne politike na stopnjo rasti kreditov, danih sektorju nefinančnih podjetij in sektorju gospodinjstev, z uporabo empirične raziskovalne metode enokoračnega sistema GMM. Cilj pričujočega članka je preveriti, ali kontrakcijska makroprevidnostna politika zmanjša stopnjo kreditne rasti in ali ekspanzivna makroprevidnostna politika spodbudi stopnjo kreditne rasti v izbranih državah evroobmočja (v Avstriji, Belgiji, Finski, Nemčiji, Irski, Italiji, Nizozemski, Sloveniji in Španiji) v časovnem obdobju od 2008Q4 do 2018Q4. Preverimo dve hipotezi: H1: Poostreitev ukrepov makroprevidnostne politike zmanjša stopnjo kreditne rasti v sektorju nefinančnih podjetij in H2: Poostreitev ukrepov makroprevidnostne politike zmanjša stopnjo kreditne rasti v sektorju gospodinjstev. Na osnovi naših empiričnih rezultatov lahko potrdimo prvo hipotezo. Po drugi strani pa druge hipoteze ne moremo niti potrditi niti zavrniti, saj pojasnjevalna spremenljivka MPI, ki nas zanima, ni statistično značilna v našem drugem modelu.

*Ključne besede:* makroprevidnostna politika, sistemsko tveganje, finančna stabilnost, dinamični panelni podatki, enostopenjski sistem GMM

# Effects of Media Coverage on Budget Transparency in Croatian Local Administrative Units

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## Abstract

This paper evaluates positive and negative media coverage of online local budget transparency (OLBT) and its impact on budget transparency in Croatian local administrative units in 2018. Using multinomial logistic regression, research confirmed a strong impact of media coverage on budget transparency. Positive media coverage of OLBT increases the probability that local administrative units will attain a higher level of transparency, while negative media coverage is accompanied by a higher likelihood of local units' retention in the lower transparency range. The implications of these findings are clearly emphasized through a deeper understanding of the role of the media in public sector economics, precisely in the context of budget transparency. This study contributes to public sector literature by identifying the effects of positive and negative media coverage on budget transparency.

## Introduction

According to the IMF, fiscal transparency is defined as "openness toward the public at large about government structure and functions, fiscal policy intentions, public sector accounts, and projections", and it is based on several pillars that support the promotion of fiscal transparency, bringing the public its essence closest (IMF, 2007). The literature often equates the terms budget transparency and fiscal transparency. As one of the segments of fiscal transparency, budget transparency or openness is related to public reporting. In that sense, budget transparency is closely linked to notions of executive accountability and principles of clarity in budgeting (Caamaño-Alegre, 2013).

Fiscal transparency and the transmission of budget/fiscal information are relevant in improving economic management and promoting fiscal stability (Heald, 2003; Sedmihradská & Haas, 2012). This also includes reducing the overstatement of benefits and understatement of the cost, i.e., reducing fiscal illusion (Afonso, 2014), reducing the magnitude of political budget cycles (Aaskoven, 2016, Alt & Lassen, 2006), decreasing the corruption and increasing government's credit rating (Chen & Neshkova, 2018; de Simone et al., 2017), increasing the efficiency of public governance and spending (de Simone et

al. 2019; Montes, et al., 2019), and overall enhancing fiscal discipline (Jarmuzek, 2006; Wildowicz-Giegel & Kargol-Wasiluk, 2020).

The theoretical aspects and implications of fiscal/budget transparency are explained through principal agent (agency) theory and legitimacy theory. The principal agent theory<sup>1</sup> is explained through the relationship between the principal (citizens, voting body) and the agent (politicians, political body) (Ferejohn, 1986). According to theory, legitimately elected representatives of the voter's will (agents) or politicians are responsible for delivering the promised program, ensuring a certain amount of public goods and access to information regarding the collection and spending of public money. On the other hand, the principals (voters) or citizens are obliged to pay taxes that enable the execution of the promised program, the agreed policies, and the delivery of expected services. The common equality of collection and spending is the most important political document or budget from which agents' actions are readable. The problem arising from the aforementioned relation can be summed up by the situation in which principal-agent interests diverge, i.e. representing politicians' own interests.<sup>2</sup> Relating to this, the right of each individual to access information falls under secondary political interests, i.e. fiscal information is not publicly available or accessible. In the context of transparency, fiscal and budget transparency enable stronger control over the work of politicians, strengthened trust and stronger economic outcomes.

Legitimacy theory puts political performance in the context of legitimacy, defined as "a generalized perception or assumption that the action of an entity is desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions" (Suchman, 1995, p. 574). According to this theory, the organization (the term is synonymously used for a local unit or government) is influenced by different factors. Like the principal-agent theory, this theory highlights the analogy of behaviour and mutual convictions of legitimate entities and social groups to preserve the legitimacy of power. However, an important distinction is a dependence of legitimacy on the collective and its independence of the individual, which implies that the political authority in power can deviate from the individual's value, maintaining its legitimacy as long as those deviations and disappointments do not provoke a

public outcry. An arising issue is a situation in which a loss of legitimacy appears or a mismatch in the behaviour of a legitimate entity and social groups.<sup>3</sup>

The connecting link between problems arising from the above two theories is presented through information (a) symmetry which manifests in providing a certain amount of information by a political body. Benefits arising from information asymmetry (provision of a smaller amount of information) for political authorities are clearly defined through the realization of certain privileges, such as easier stimulation of economic activity or the realization of their benefits.

Thereby, it is usually stated that the existence of press freedom and free reporting reduces information asymmetry. There is a consensus in the literature that the media can support greater fiscal outcomes and transparency (Ademmer & Dreher, 2016; Shi & Svensson, 2006, Strömberg, 2001; Veiga et al., 2017). In this context, the role of the media as a transmitter of information on all government activities is important. Although the role of the media is not limited to fiscal or budget transparency, this paper will focus exclusively on the connection between the media and budget transparency.

How media coverage affects budget transparency is also not a recent issue. However, although theoretical and empirical research generally agree that their connection is positive and that stronger media coverage leads to a stronger degree of transparency, the research so far has mainly focused on the effect of overall media coverage on fiscal or budget transparency without clearly demarcating the impact of positive or negative media releases on transparency.

This research attempts to supplement the existing gap in empirical research by determining whether there is a difference in media influence on budget transparency, considering their positive and negative content connotations. To our knowledge, no empirical evidence currently addresses this question.

The paper is organized as follows: the second part provides a literature review, the third part explains the data and methodology, the fourth part is both results and discussion, and the final part is the conclusion.

<sup>1</sup> A key element of agency theory is the moral hazard problem (Cowden, et al., 2020).

<sup>2</sup> In that sense, fiscal illusion is a key part of agency theory (Bastida, Albaladejo, 2019, p. 17).

<sup>3</sup> The question of the magnitude of allowed deviations and divergences that do not threaten public outrage can be raised through deeper analysis.

## Literature Review

There is growing literature about media coverage and its connection with fiscal/budget transparency, and literature that investigates only one part of them. However, the literature that studies the impact of positive or negative media coverage on budget transparency is still incomplete, according to the author's very best knowledge. But, certain studies distinguish between the effects of positive and negative media coverage and investigate its impacts in other economic contexts. One of these is the research conducted by Grimmelikhuijsen (2011), where the effect of political messages (very positive, slightly positive, and a message that contains both positive and negative information) about air pollution on government competence was measured and where the negative impact of media content in relation to slightly positive media content is associated with a lower assessment of government competence. Zou et al. (2020), through an investigation of the impact of media coverage of a company's IPO, found that negative media significantly affected the price by effectively reducing the under-price. Erlich et al. (2021) investigate the effects of positive, neutral, and negative media attention on bureaucratic behaviour and conclude that positive or neutral media attention is associated with reduced responsiveness, while the effects of negative media attention differ, attention to government failures led to increased responsiveness while attention to corruption led to reduced responsiveness. Linder Müller et al. (2022) found that negative media announcements contribute to increased spending of public money and that negative media coverage creates pressure to help those with poor results avoid blame.

As our research is narrowly focused on budget transparency, we present and discuss recent research papers investigating these sorts of mutual relations. Our primary focus in this section is the budget transparency of municipalities and the media coverage of them.

The research conducted by Laswad et al. (2005) on the New Zealand sample separates the local units with websites, the local units with online financial reporting, and finally, the non-internet financial reporting local units. The authors used logit analysis to assess the different determinants of these three categories. Variable press visibility is measured by how much news appears in the print press. General conclusions confirm that the press visibility variable impacts local units in such a way that local units with high visibility in the press media are more likely to engage Internet (online) financial reporting. By regression model, Gandía & Archidona (2008) investigate voluntary disclosure of information on Spanish City

Council websites determined by press visibility, defined as the amount of news in the print press in which the local authority appears. Press visibility has a strong and positive impact on the voluntary disclosure of information, so authors have stated that these two concepts are fundamentally linked.

In contrast, García & García-García (2010) found a negative relationship between voluntary financial disclosure and press visibility, measured as the number of Google quotes for each local government. The applied methodology is logit analysis. In the explanation, the authors emphasize the role of the media in highlighting controversial and negative aspects of local units' management; therefore, governments that receive strong media coverage will be reluctant to disclose information that the press can use to attack those with governing responsibility.

Grimmelikhuijsen & Welch (2012) explored what institutional factors determine different dimensions of government transparency and assessed the impact of media attention to local environmental issues on local government transparency. In this research, the authors speculate about the two-sided effects of the media on the pro-active disclosure of government information and state that (i) more active media may lead local governments to reduce transparency to prevent loss of reputation and loss of control and (ii) government may recognize that provision of information to media, which transmits it to the citizens can bring more pressure to the level of information disclosure. The authors defined the dependent variable through three frames of transparency regarding decision-making transparency, policy information transparency, and policy outcome transparency, while the media attention variable is defined as the number of newspaper reports. Using OLS estimation, authors conclude that media attention to a municipality's air pollution problems is associated with policy information transparency. Greater media attention increases the transparency of policy information.

Using the regression model, Gandía et al. (2016) researched the connection between Web 1.0 digital transparency and Web 2.0 tools and social media on a sample of 145 Spanish local entities. As an independent variable, they use press visibility defined in the same way as the amount of news in the database, while for the dependent variable, they use a level of digital transparency measured through a Web 1.0 and Web 2.0 Disclosure Index. The general idea of their research is to investigate the impact of social media on digital information transparency, as well as the intensity of use of social media affects their digital transparency. They confirmed that

press visibility brings the highest and positive impact on digital transparency, while the use of social media is positively related to web information transparency. Also, the intensity of using social media (number of tweets) affects transparency. On a sample of 110 Spanish cities using a panel model, Cuadrado-Ballesteros et al. (2017) tested the hypothesis that "local governments tend to be more transparent when the media exert pressure on them". The media is calculated similarly to Laswad et al. (2005) as the amount of news related to each local government. The dependent variable is the municipal transparency index. They found a positive link between media pressure and the level of transparency, meaning that when media pressure is strong, municipal transparency is high; the media is associated with a higher level of public transparency.

## Data, Method, and Hypotheses

In this section, we investigate the impact of the positive and the negative media coverage of online local budget transparency in Croatia. Online local budget transparency (OLBT) was measured by the number of five key local budget documents<sup>4</sup> published online on the official web pages of cities and municipalities between November 2018 and March 2019. OLBT may vary between 0 and 5 depending on the number of published documents. For example, if local units published all five documents, its transparency is expressed as OLBT 5, however, if local units have not published any documents, its transparency is expressed as OLBT 0.

Media coverage was measured in the period between March 2017 and March 2018, and it was calculated as the total and cumulative number of media reports about the online budget transparency of individual local units published in newspapers, radio, television, and on the Internet. Media publications were searched according to the keywords of transparency and openness in a way that duplications were omitted, i.e., if both keywords were contained in a single news, only one news was written. Concerning differences between positive and negative news, positive news was classified if a positive thought, praise, acknowledgment etc. appeared in the posts,<sup>5</sup> while negative news was classified by looking at if the text contained words like complaints, negative objections,

demotivation words, etc.<sup>6</sup> This research includes all 556 local units (128 cities and 428 municipalities) in Croatia.

Based on the above description as well as the literature review, we tested two main hypotheses:

H1: *Positive media coverage of OLBT increases the probability of a higher range of online local budget transparency.*

H2: *Negative media coverage of OLBT decreases the probability of a higher range of online local budget transparency.*

This study follows methodological aspects proposed in the work of Borry (2012), who employed multinomial logistic regression to examine government transparency's determinants. Our empirical analysis starts with assessing the impact of media on local budget transparency, using multinomial (logistic) regression (MLR). In addition, we employ marginal effects to show how the change of media coverage in one unit may affect the change in probability of outcomes.

According to Bayaga (2010, p. 290-291) the main advantages and assumptions for multinomial logistic regression (MLR) are: (i) MLR does not assume a linear relationship between variables, (ii) variables may but do not have to be at intervals, (iii) normality distributed error term is not assumed. MLR allows simultaneous investigations of all categories of dependent variables with respect to one category which serves as a base category (Abdalla, 2012, p. 271-274). When applying the MLR, we can observe a clear link, direction, and impact intensity of the positive as well as the negative media coverage of online local budget transparency, i.e., we can determine the impact of media coverage on each of the six groups of budget transparency of local units (OLBT 0-5). By including determinants of OLBT, this methodological approach also gives us important information about elements that can stabilize or impact OLBT ranges. Summarized, MLR determines the similarities and differences between the transparency of local units concerning the base category of transparency.

We follow previous studies, and as the primary control variables, we include sociodemographic and economic variables (for a comprehensive study of budget/fiscal determinants, see: Stanić, 2018). As a preliminary investigation, correlations between variables were

<sup>4</sup> Five key local budget documents are executive budget proposal, citizens' guide, enacted budget, mid-year and end-year report.

<sup>5</sup> Five key local budget documents are executive budget proposal, citizens' guide, enacted budget, mid-year and end-year report.

<sup>6</sup> Negative media is classified as "four cities – Gospić, Imotski, Valpovo and Vrgorac, and 39 municipalities did not publish a single budget document" <https://www.tportal.hr/biznis/clanak/ijf-porasla-proracunska-transparentnost-lokalnih-jedinica-20170704>.

conducted, which can be found in the tables in the appendix of this paper, along with their characteristics and descriptions.

Population variable has usually been included in previous studies as a control for the difference in transparency by the size of the city. Larger cities are more likely to adopt online budget transparency because of a greater pressure to find ways to provide public services and information to their inhabitants. There is almost a unique statement, the larger the population is, the greater its influence on budget transparency is (de Araujo & Tejedó-Romero, 2016; del Sol, 2013; Caamano-Alegre, et al., 2013; Perez, et al., 2008).

For the case of income per capita, several studies found that income is positively associated with transparency. Income is a factor that influences online transparency, i.e., higher income level indicates a larger tax base, and a more educated and affluent community of citizens. In today's Internet society, more individuals will expect to access data in a convenient electronic format (Borry, 2012, Piotrowski & Van Ryzin, 2007; Styles & Tennyson, 2007). Individuals with higher incomes are more likely to express high levels of demand for transparency and be more likely to be engaged in Internet reporting.

By definition, fiscal capacity is the ability of the government to generate revenue (Martinez-Vazquez & Timofeev, 2008). Alcaide Muñoz et al. (2017) argue that larger cities are more likely to provide information because they can afford it, and that higher fiscal capacity is under greater pressure to justify the spent resources, so agents want to show that they are behaving responsibly. In addition, Ma & Wu (p. 17, 2011) stated that when there are no sufficient budgetary incomes, local governments usually put most expenditure on administrative and payroll expenses and leave other duties less prioritized (e.g., fiscal transparency).

Technological progress is mostly visible in an increasing number of internet users and in the transition of the economy to digitalization. This is an important factor for online budget transparency which is recognized by a growing number of studies. In municipalities where internet access is at a higher level, public financial information availability is likely to be greater, leading to a higher level of budget transparency. In fact, the greater the level of Internet access, the greater the probability of visiting municipal websites (Pérez, et. al., 2008; Gandía & Archidona, 2008).

The average number of employees is a proxy variable for administrative capacity, which assumes that local

government units (LGU) with a larger number of employees have more specialized staff and the ability to disseminate more budget information (Tavares & da Cruz, 2014; Ott et al., 2019a). Additionally, administrative capacity constraints which LGUs face can lead to a limitation in the scope of information distribution about the budget process (Carlitz, 2013).

Political ideology is shown to be one of the determinants of transparency at the local level (Piotrowski & Van Ryzin (2007)). Left-wing parties are assumed to be more willing to provide easier access to financial information, for example, when the left-wing parties are strong in the local council, the local government tends to be more transparent, which is related to the transparency of decision-making and political influence (Grimmelikhuijsen & Welch, 2012). Ultimately, left-wing parties are interested in a larger public sector and expected to provide greater transparency (Guillamón et al., 2011).

## Results and Discussion

In evaluating of media coverage of OLBT, firstly, we estimate the positive and negative impact of the media coverage through the MLR model, and secondly, we assess the marginal effects of positive and negative media coverage of OLBT on local budget transparency.

In Table 1 we present the results of multinomial logistic regression. Variable OLBT as the dependent variable is set under the six categories, with OLBT 5 as the base category. The results are directed towards the strong influence of the determinants of OLBT, and the heterogeneity of that influence, i.e., the variations of different levels of transparency (OLBT 0 - OLBT 4) compared to the base category (OLBT 5) are determined by the selected set of independent variables.

Our findings indicate that higher per capita income significantly increases the probability that local units will be classified into the OLBT 5 range of transparency, and decreases the probability of choosing an OLBT 0 and OLBT 2 local budget transparency level. These findings are in line with the implication that higher income per capita level forces local units to a higher transparency level (e.g., Piotrowski & Van Ryzin, 2007; Alcaide Muñoz et al., 2017). The significance of fiscal capacity is visible in the range of transparency for units that have published 3 and 4 budget documents. Compared with OLBT 5, results suggest a higher probability of selecting an OLBT 3 and OLBT 4 transparency level if units have stronger fiscal

capacity. These results indicate greater importance of the role of local governments' fiscal capacity in maintaining instantaneous levels of budget transparency. Fiscal capacity is a stable and positive factor of more transparent local units (e.g., Styles & Tennyson, 2007; Iszardani & Hardiningsih, 2021). The average number of employees in LGUs has a statistically significant coefficient for local units located in OLBT 0, 3, and 4, indicating that higher employment increases the likelihood of transition to an OLBT 5 transparency. Overall, results suggest that higher employment levels significantly affect the local units, which is particularly emphasized and visible in the case of units in OLBT 4 i.e., in their transit to OLBT 5. This result aligns with the notion that employment is essential to higher transparency (e.g., Ott et al., 2019a).

The Internet significantly impacts OLBT 0, 1, and 4 with reinforcing influences as we move towards higher OLBTs. It is considerably less likely that local units in OLBT 0 will be in that range of transparency if the number of internet users increases, and the same applies to local units in OLBT 1. The same conclusion is valid for OLBT 4, but the coefficients are more expressed (31% and 27%), which means that an increase in the number of internet users in the higher range of OLBT brings a 31% (27%) of the probability of switching to OLBT 5. In general, the results show that the percentage of internet users pressure local units to be more transparent (for similar conclusions, see Gandía & Archidona, 2008; de Araujo & Tejedro-Romero, 2016). The population variable is significant for OLBT 0, 3, and 4 local units. While these coefficients represent a different probability, there are visible traces of transition effects to a higher range of budget transparency for local units in OLBT 0 and OLBT 3 and visible traces of local units' retention in OLBT 4 under a higher population range. Results suggest that units with a larger number of inhabitants in OLBT 3 are more likely (0,38 RRR) to move to a higher range of budget transparency, while units in OLBT 4 under the same number of inhabitants are less likely (2,83 RRR) to move to a total transparency range, i.e., OLBT 5. The slightest significance is visible in the variable that covers the political impact on budget transparency and applies only to OLBT 0 and OLBT 1 units. The significant coefficients indicate that only when left-wing political parties are in power (compared to right-wing parties), local units have a higher probability of transit to a higher transparent unit category. These findings align with numerous studies that found the same evidence of the greater influence of left-wing political parties on increasing budget transparency (del Sol, 2013; Gandía, et al., 2016; Guillamoñ, et al., 2011).

Given the positive and negative media coverage results of OLBT, we can observe that most OLBTs are significantly

determined by media coverage, and its effect is shown as a stronger and more significant determinant for OLBTs retention or transitions. As was expected, positive news positively impacts local units in a way that higher media coverage increases the probability of greater transparency. In contrast, negative news negatively impacts that negative media coverage withdraws local units in minimized transparency.

It is less likely that local units that relate to positive media coverage will retain their current position, i.e., those units tend to transition to a higher range of budget transparency. Units with three documents published (OLBT 3) are less likely to keep their position under positive media coverage (RRR 0,78), i.e., those units tend to transition to a more transparent range if positive news is published. Also, a higher intensity of the impact of positive media coverage is found for OLBT 4. Units within the OLBT 4 range are less likely (0,85 RRR) to select OLBT 4 than OLBT 5. Overall, results suggest a high impact of positive media coverage of OLBT. Variable positive media coverage with significant coefficients provides us evidence for the acceptance of our first hypothesis, which is that positive media brings a higher probability for selecting an OLBT 5 range or a higher range of online local budget transparency.

As for negative coverage of OLBT, there are significant results, mainly connected with a low budget transparency range. Results suggest that negative media coverage increases the likelihood of selecting the current category of transparency and decreases the likelihood for a change in the transparency range. For units settled in OLBT 0 and OLBT 1 ranges, negative coverage is more likely to affect it negatively, i.e., negative media coverage will push them to maintain their position of transparency. It is more likely that a local unit will keep its position within OLBT 0 if negative news occurs (RRR 1,49). The same situation was confirmed for OLBT 1 local units, where it is more likely that units in OLBT 1 will keep their position if negative news about their transparency is published (RRR 1,1). In line with that evidence, we can accept our second hypothesis and conclude that negative media coverage of OLBT decreases the probability of a higher range of online local budget transparency.

Results of marginal effects (Table 2) with more detailed insights suggest similar implications of media coverage.

For local units within OLBT 0 and OLBT 1, an increase in media coverage with positive news by one unit leads to a decrease in the probability that these units will remain in that transparency range by 28% and 52%. Results



**Table 1***Multinomial logistic regression estimation*

	OLBT 0	OLBT 1	OLBT 2	OLBT 3	OLBT 4
	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
Po_media coverage	0.00 (0)	0.00 (0)	0.79 (0.5-1.1)	0.78 (0.6-1.0)*	0.85 (0.7-0.9)***
Ne_media coverage	1.49 (1.0-2.1)**	1.14 (0.9-1.3)*	0.93 (0.7-1.1)	0.96 (0.8-1.0)	0.83 (0.6-1.0)
Population	Ref	Ref	Ref	Ref	Ref
1500-2499	0.58 (0.1-2.4)	1.38 (0.3-4.8)	1.23 (0.4-3.4)	0.96 (0.45-2.0)	1.78 (0.8-3.7)
2500-3499	0.02 (0.0-0.2)***	0.56 (0.0-3.3)	0.61 (0.1-2.5)	0.98 (0.4-2.2)	1.63 (0.7-3.7)
3500-4999	0.00 (0)	0.25 (0.0-2.4)	2.06 (0.6-6.7)	0.91 (0.3-2.2)	1.79 (0.7-4.3)
5000+	0.00 (0)	0.56 (0.0-4.3)	0.34 (0.0-1.6)	0.38 (0.1-0.9)***	2.83 (1.2-6.4)**
Income pc	Ref	Ref	Ref	Ref	Ref
20000-29999	0.49 (0.0-3.9)	1.38 (0.2-7.0)	0.27 (0.0-0.8)**	0.96 (0.3-2.9)	1.23 (0.6-2.5)
30000-39999	0.03 (0.0-0.7)**	0.23 (0.0-1.8)	0.34 (0.1-1.5)*	0.77 (0.2-2.6)	1.24 (0.3-3.8)
40000+	0.00 (0)	0.00 (0)	0.00 (0)	0.33 (0.0-3.7)	1.59 (0.2-5.1)
Internet users	Ref	Ref	Ref	Ref	Ref
20-39.9	0.04 (0.0-0.4)***	0.14 (0.0-0.5)***	0.32 (0.0-1.6)	1.08 (0.3-3.7)	0.31 (0.0-0.9)**
40-59.9	0.05 (0.0-1.4)*	0.10 (0.0-0.5)**	0.40 (0.0-2.2)	0.97 (0.2-3.4)	0.27 (0.0-0.9)**
60-79.9	0.42 (0.0-5.3)	0.08 (0.0-1.2)*	0.57 (0.0-4.2)	0.83 (0.1-3.7)	0.35 (0.0-1.3)
80-99.9	0.35 (0.0-5.3)	0.00 (0)	0.00 (0)	0.88 (0.1-6.2)	0.26 (0.0-1.5)
100+	0.00 (0)	0.00 (0)	0.00 (0)	1.86 (0.0-3.8)	0.37 (0.0-8.6)
Ave_empl	Ref	Ref	Ref	Ref	Ref
6-10	0.27 (0.0-1.4)	1.01 (0.2-3.7)	1.30 (0.4-3.7)	0.35 (0.1-0.8)**	0.53 (0.2-1.0)*
11-15	0.1 (0.0-0.9)**	1.19 (0.2-4.9)	1.09 (0.3-3.7)	1.02 (0.4-2.3)	0.30 (0.1-0.7)***
16-20	0.00 (0)	0.16 (0.0-1.1)**	0.77 (0.1-3.7)	0.39 (0.1-1.2)	0.29 (0.1-0.7)***
21-50	0.00 (0)	0.71 (0.1-4.0)	0.79 (0.2-3.0)	1.31 (0.5-3.0)	0.46 (0.2-1.0)*
50+	0.00 (0)	0.10 (0.0-2.9)	0.67 (0.1-4.0)	0.39 (0.1-1.4)	0.16 (0.0-0.4)***
Fisc_capacity	Ref	Ref	Ref	Ref	Ref
2500-2999	0.73 (0.0-5.7)	1.10 (0.3-3.7)	0.90 (0.3-2.4)	2.26 (1.0-4.8)**	1.28 (0.6-2.5)
3000-4999	0.12 (0.0-2.4)	1.32 (0.3-4.6)	1.38 (0.5-3.3)	3.23 (1.5-6.8)***	2.78 (1.4-5.3)***
5000+	0.81 (0.0-8.8)	0.78 (0.1-4.3)	0.52 (0.1-2.5)	2.04 (0.6-6.0)	1.59 (0.6-3.8)
Ideology	Ref	Ref	Ref	Ref	Ref
1	0.03 (0.0-0.4)***	0.30 (0.0-1.2)*	0.74 (0.2-1.8)	1.04 (0.5-1.9)	0.83 (0.4-1.4)
2	0.00 (0)	0.26 (0.0-1.8)	0.88 (0.2-2.7)	0.97 (0.4-2.3)	0.63 (0.2-1.3)
3	0.15 (0.0-1.5)	0.63 (0.1-2.6)	1.38 (0.5-3.7)	1.46 (0.7-3.0)	1.38 (0.7-2.5)
_cons	37.04 (1.5-90.4)	1.97 (0.1-20.4)	1.54 (0.2-9.6)	0.39 (0.0-2.2)	1.30 (0.2-6.3)
Log likelihood	-665.2590				
Wald chi2	15024.99				
Prob >chi2	0.0000				
Pseude R2	0.1581				
N	556				

Notes: \*\*\* critical value at 1%, \*\* critical value at 5%, \* critical value at 10%. Robust estimation is used. OLBT 5 is the base category  
Source: Author's calculation

**Table 2***Average marginal effects estimates*

	OLBT0	OLBT1	OLBT2	OLBT3	OLBT4	OLBT5
Positive media coverage of OLBT	-.28*** (-.43-.14)	-.52*** (-.72-.33)	.07*** (.04-.11)	.15*** (.09-.22)	.17*** (.11-.24)	.40*** (.29-.51)
Negative media coverage of OLBT	.006** (.00-.01)	.009** (.00-.01)	-.001 (-.01-.00)	-.001 (-.01-.01)	-.028* (-.05-.00)	.01 (-.00-.03)

Notes: Number of observations is 556, robust standard errors, in parentheses is 95% confidential interval, \*\*\*critical value at 1%, \*\* 5%, \* 10%.  
Source: Author's calculation

also implicate an increasing value of probabilities for all OLBTs transparency ranges, starting with OLBT 2. Under the influence of increasing positive media, the higher the level of transparency is, the higher the probability of that transparency. The strongest and the most significant effect of positive news is related to the units that have published three, four, and five budget documents, implying that local units are connected with 7%, 17%, and 40% of change of probability to be in OLBT 3, OLBT 4 and OLBT 5 if positive media coverage is present.

Media coverage in the case of negative news shows less significant impact. For local units with transparency levels 0 and 1 (OLBT 0 and OLBT 1), marginal effects show a significant but low percent of impact, while for the local units in OLBT 4 transparency range results show a somewhat stronger impact, both implications of the impact of negative media coverage on the transparency level have a disparate impact, depending on transparency level. In general, all obtained and significant coefficients align with the expectations. Marginal effects for negative media coverage are significant for OLBT 0 and OLBT 1, meaning that an increase in negative media coverage of OLBT 0 (OLBT 1) by one unit is significantly associated with an increase in the change in probability of a local unit falling into OLBT 0 (OLBT 1) by 0.6 (0.9%). On the contrary, negative media pressure and marginal effects have significant and negative impact on OLBT 4, meaning that an increase in the number of negative coverages decreases the change in probability that the local unit will be part of OLBT 4 by 2.81%.

Although average marginal effects results show similar implications as our central MLR results, it needs to be emphasized that the stronger impact of positive media coverage of OLBT is, compared to the current negative media coverage. Our general conclusion goes to the more important role of positive media coverage.

## Conclusion

Fiscal and budget transparency represents an important economic segment explored by numerous studies. Greater transparency is associated with smaller fiscal illusion, lower corruption, reduced borrowing costs, positive fiscal performance, reduced excessive budget spending and public debt, etc. The literature also provides numerous insights into the determinants of transparency. However, an important segment of transparency is also represented by the media. The public, often insufficiently familiar with the details and basic fiscal guidelines, principles, models of work, or obligations of political authorities, receives important insights and information about undertaken, planned, or legally regulated obligations of political authorities through the media. The role of the media is mainly positively associated with budget transparency and is perceived positively when the media reports on budgets and overall fiscal policy.

Based on previous research, the view of media coverage's positive and significant influence on budget transparency has crystallized. However, previous research has dealt with the evaluation of total media coverage without clearly demarcating and providing evidence on the separate effect of positive or negative media announcements on transparency. Thus, there was still a gap in whether all media announcements and reports bring a similar effect. Is it only important to report on the budget and local units' transparency to achieve higher budget transparency, or does the effect depend on the positive and negative media coverage? In this regard, the question is whether every media news can be treated in an identical manner or through its overall sphere of influence. Does the media directly contribute to being more or less responsible for political behaviour through active positive and negative reporting? Does the media contribute to

more successful budget transparency through positive or negative reports?

This research attempts to answer the above questions. It evaluates positive and negative media coverage of online local budget transparency and its impact on budget transparency in Croatian local units in 2018. In the research, multinomial logistic regression was used, which enabled more detailed insights and unbiased results in the context of the media's influence on certain transparency ranges. According to the research literature and questions, two research hypotheses were formed: H1: Positive media coverage of OLBT increases the probability of a higher range of online local budget transparency, and H2: Negative media coverage of OLBT decreases the probability of a higher range of online local budget transparency. The results confirmed the strong impact of positive and negative media coverage on budget transparency. Positive media significantly contributes to the possibilities for local units to become more transparent, while negative media contributes in the opposite way or in a way that local units affected by the negative media coverage tend to maintain lower levels of transparency, thus confirming both hypotheses. Likewise, through further processing and the use of marginal effects, it was determined that a more stable influence of the positive media compared to the negative media. To our knowledge, no empirical evidence currently supports these results. The implications of the findings in this research are clearly emphasized through a deeper understanding of the role of the media in public

sector economics, precisely in a frame of budget transparency. In that context, the implications can be twofold. First, policymakers should support the development of the media since media coverage plays a significant role in governance and budget transparency, and second, indirect implications can be seen through all other benefits brought by fiscal transparency, e.g., reduction of fiscal illusion, positive fiscal performance, reduction of public debt, etc.

The limitations of this research can be seen in the unavailability of media coverage data in a certain segment of budget transparency. Furthermore, the positive media reports are mostly related to the local units with higher levels of transparency, while the negative media reports are mostly related to the local units at lower levels of transparency. It would be advisable to conduct research over a longer period of time, since there is a trend of changing budget transparency levels over the years, so it can be reasonably assumed that different local units did not receive identical media coverage through positive and negative media at different time intervals. In other words, a broader distribution of media coverage of OLBT throughout the years is assumed. Furthermore, to place this research into a broader context of understanding the role of the media in budget transparency, evaluating the overall media coverage of local units is not irrelevant, either. Finally, for future research, exploring which types of media (TV, newspapers, radio, Internet) contribute the most or are the most related to budget transparency would be justified.

## Appendix

**Table 3**

*OLBT by the characteristics of the sample and correlation with control variables*

	OLBT												p*
	0		1		2		3		4		5		
	N	%	N	%	N	%	N	%	N	%	N	%	
Po_media coverage													<0.000
0	15	3.46	26	5.95	35	8.01	83	18.99	106	24.26	172	39.36	
1	0	0	0	0	3	2.52	7	5.88	29	24.37	80	67.23	
ne_media coverage													<0.000
0	4	0.97	10	2.42	28	6.79	62	15.01	110	26.39	199	48.18	
1	11	7.69	16	11.19	10	6.99	28	19.58	25	17.48	53	37.06	
population													<0.000
0-1499	9	7.96	8	7.08	9	7.96	21	18.58	21	18.58	45	39.82	
1500-2499	5	3.65	11	8.03	11	8.03	25	18.25	32	23.36	53	38.69	
2500-3499	1	1.16	3	3.49	4	4.65	16	18.60	19	22.09	43	50.00	
3500-4999	0	0	1	1.32	11	14.47	15	19.74	16	21.05	33	43.42	
5000+	0	0	3	2.08	3	2.08	13	9.03	47	32.64	78	54.17	

**Table 3**

OLBT by the characteristics of the sample and correlation with control variables (cont.)

	OLBT												p*
	0		1		2		3		4		5		
	N	%	N	%	N	%	N	%	N	%	N	%	
Income pc													<0.000
0-19999	2	5.88	2	5.88	6	17.65	7	20.59	6	17.65	11	32.35	
20000-29999	12	4.24	21	7.42	18	6.36	51	18.02	64	22.61	117	41.34	
30000-39999	1	0.48	3	1.44	14	6.70	31	14.83	57	27.27	103	49.28	
40000+	0	0	0	0	0	0	1	3.33	8	26.67	21	70.0	
Internet													0.007
0-19.99	4	10.81	6	16.22	4	10.81	5	13.51	10	27.03	8	21.62	
20-39.99	7	2.95	15	6.33	16	6.75	44	18.57	55	23.21	100	42.19	
40-59.99	1	0.52	4	2.07	14	7.25	27	13.99	45	23.32	102	52.85	
60-79.99	2	2.90	1	1.45	4	5.80	9	13.04	20	28.99	33	47.83	
80-99.99	1	6.67	0	0	0	0	3	20.0	4	26.67	7	46.67	
100+	0	0	0	0	0	0	2	40.0	1	20.0	2	40.0	
ave_empl													0.046
0-5	5	4.39	6	5.22	8	6.96	21	18.26	33	28.70	42	36.52	
6-10	4	2.04	8	5.44	13	8.84	14	9.52	36	24.49	72	48.98	
11-15	1	1.20	6	7.23	7	8.43	19	22.89	14	16.87	36	43.37	
16-20	0	0	1	2.13	3	6.38	5	10.64	10	21.28	28	59.57	
21-50	5	4.24	4	3.39	5	4.24	27	22.88	33	27.97	44	37.29	
51+	0	0	1	2.17	2	4.35	4	8.70	9	19.57	30	65.22	
Fisc_capacity													0.078
0-2499	6	3.77	9	5.66	13	8.18	18	11.32	31	19.50	82	51.57	
2500-2999	2	1.68	6	5.04	8	6.72	23	19.33	25	21.01	55	46.22	
3000-4999	2	1.08	9	4.84	14	7.53	34	18.28	58	31.18	69	37.10	
5000+	5	5.43	2	2.17	3	3.26	15	16.30	21	22.83	46	50.00	
Ideology													0.296
0	12	4.56	17	6.46	18	6.84	40	15.21	65	24.71	111	42.21	
1	1	0.70	3	2.11	8	5.63	21	14.79	34	23.94	75	52.82	
2	0	0	2	3.51	5	8.77	10	17.54	11	19.30	29	50.88	
3	2	2.13	4	4.26	7	7.54	19	20.21	25	26.60	37	39.36	

Source: Author's calculation. \* p value, two-way Pearson's chi-squared

**Table 4***Description of the socioeconomics and sociodemographic characteristics of the sample and variables*

Variable	N	%	Description	Expected sign	Source
<b>OLBT</b>					
0	15	2.70	Number of published official documents	/	Ott et al. (2019b)
1	26	4.68			
2	38	6.83			
3	90	16.19			
4	135	24.28			
5	252	45.32			
<b>po_ media coverage</b>					
0	437	78.60	1 - the overall number of positive media news	+	Available upon request
1	119	21.40			
<b>ne_ media coverage</b>					
0	413	74.28	1 - the overall number of negative media news	-	Available upon request
1	143	25.72			
<b>pop</b>					
0-1499	113	20.32	Estimated number of inhabitants (in the original value)	+	Croatian Bureau of Statistics (2018)
1500-2499	137	24.64			
2500-3499	86	15.47			
3500-4999	76	13.67			
5000+	144	25.90			
<b>inc_pc</b>					
0-19999	34	6.12	Average annual income per capita	+	Ministry of Regional Development and EU Funds (2018)
20000-29999	283	50.90			
30000-39999	209	37.59			
40000+	30	5.40			
<b>Internet</b>					
0-19.99	37	6.65	Percentage of households with broadband internet access (data transmission speeds of 2 Mbit/s and more)	+	Croatian Regulatory Authority for Network Industries (2017)
20-39.99	237	42.63			
40-59.99	193	34.71			
60-79.99	69	12.41			
80-99.99	15	2.70			
100+	5	0.90			
<b>ave_empl</b>					
0-5	115	20.68	The average number of employees in local units, based on working hours	+	Ministry of Finance, Republic of Croatia (2018)
6-10	147	26.44			
11-15	83	14.93			
16-20	47	8.45			
21-50	118	21.22			
51+	46	8.27			
<b>fisc_cap</b>					
0-2499	159	28.60	Operating revenues minus all grants per capita	+	Ministry of Finance, Republic of Croatia (2018)
2500-2999	119	21.40			
3000-4999	186	33.45			
5000+	92	16.55			

**Table 4**

Description of the socioeconomics and sociodemographic characteristics of the sample and variables (cont.)

Variable	N	%	Description	Expected sign	Source
ideology					
0	263	47.30	Category variables denote: 0 power of right wing; 1 left wing; 2 centre; 3 non-partisan parties		State Electoral Commission of the Republic of Croatia (2017)
1	142	25.54			
2	57	10.25			
3	94	16.91			

Source: Author's calculation

## References

- Aaskoven, L. (2016). Fiscal Transparency, Elections and Public Employment: Evidence from the OECD. *Economics & Politics*, 28(3), 317-41. DOI: <https://doi.org/10.1111/ecpo.12080>.
- Ademmer, E. & Dreher, F. (2015). Constraining Political Budget Cycles: Media Strength and Fiscal Institutions in the Enlarged EU. *Journal of Common Market Studies*, 54(3), 508-24. DOI: <https://doi.org/10.1111/jcms.12306>.
- Afonso, W. B. (2014). Fiscal Illusion in State and Local Finances: A Hindrance to Transparency. *State and Local Government Review*, 46(3), 219-28. DOI: <https://doi.org/10.1177/0160323X145501>.
- Alcaide Muñoz, L., Rodríguez Bolívar, M. P., & López Hernández, A. M. (2017). Transparency in governments: a meta-analytic review of incentives for digital versus hard-copy public financial disclosures. *The American Review of Public Administration*, 47(5), 550-73. DOI: <https://doi.org/10.1177/02750740166290>.
- Alt, J. E. & Lassen, D. D. (2006). Transparency, political polarization, and political budget cycles in OECD Countries. *American Journal of Political Science*, 50(3), 530-50. DOI: <https://doi.org/10.1111/j.1540-5907.2006.00200.x>.
- Bastida, Albaladejo, F., J. (2019). Transparency and government trust. *Public Sector Economics*, 43(1), 15-19. DOI: <https://doi.org/10.3326/pse.43.1.3>.
- Bayaga, A. (2010). Multinomial logistic regression: usage and application in risk analysis. *Journal of Applied Quantitative Methods*, 5(2), 288-97.
- Borry, E. L. (2012). Exploring determinants of governmental transparency: The case of municipal websites as a tool for proactive dissemination. In E-governance and civic engagement: Factors and determinants of e-democracy, A. Manoharan and M. Holzer (Eds.), 25-47. Hershey, PA: Information Science Reference.
- Caamaño-Alegre, J., Lago-Peñas, S., Reyes-Santias, F., & Santiago-Boubeta, A. (2013). Budget transparency in local governments: an empirical analysis. *Local government studies*, 39(2), 182-207. DOI: <https://doi.org/10.1080/03003930.2012.693075>.
- Carlitz, R. (2013). Improving transparency and accountability in the budget process: An assessment of recent initiatives. *Development Policy Review*, 31 (1), 49-67. DOI: <https://doi.org/10.1111/dpr.12019>.
- Chen, C. & Neshkova, M. I. (2018). The effect of fiscal transparency on corruption: A panel cross-country analysis. *Public Administration*, 98(1), 226-43. DOI: <https://doi.org/10.1111/padm.12620>.
- Cowden, B. J., Bendickson, J. S., Bungcayao, J., & Womack, S. (2020). Unicorns and agency theory: Agreeable moral hazard? *Journal of Small Business Strategy*, 30(2), 17-25. DOI: <https://doi.org/10.1108/JBS-03-2019-0125>.
- Croatian Bureau of Statistics (CBS) (2018). Population - Review by Counties. MS Excel tables. Zagreb: Bureau of Statistics. *Croatian Regulatory Authority for Network Industries* (2017). Access to the Internet, Zagreb.
- Cuadrado-Ballesteros, B., Martínez-Ferrero, J., Frias-Aceituno, J. V., & García-Sánchez, I. M. (2017). The role of media pressure in promoting transparency of local governments. *Transylvanian Review of Administrative Sciences*, 13(51), 20-37. DOI: <http://dx.doi.org/10.24193/tras.51E.2>.
- De Araujo, J. F. F. E., & Tejedro-Romero, F. (2016). Local government transparency index: determinants of municipalities' rankings. *International Journal of Public Sector Management*, 29(4), 327-47. DOI: <https://doi.org/10.1108/IJPSM-11-2015-0199>.
- De Simone, E., Bonasia, M., Gaeta, G. L., & Cicatiello, L. (2019). The effect of fiscal transparency on government spending efficiency. *Journal of Economic Studies*, 46(7), 1365-1379. DOI: <https://doi.org/10.1108/JES-03-2019-0125>.
- De Simone, E., Gaeta, G. L., & Mourão, P. R. (2017). The impact of fiscal transparency on corruption: An empirical analysis based on longitudinal data. *The BE Journal of Economic Analysis & Policy*, 17(4), 1-17. DOI: <https://doi.org/10.1515/bejeap-2017-0021>.
- del Sol, D. A. (2013). The institutional, economic and social determinants of local government transparency. *Journal of Economic Policy Reform*, 16(1), 90-107. DOI: <https://doi.org/10.1080/17487870.2012.759422>.
- El-Habil, A. M. (2012). An application on multinomial logistic regression model. *Pakistan journal of statistics and operation research*, 8(2) 271-91. DOI: <https://doi.org/10.18187/pjsor.v8i2.234>.

- Erlich, A., Berliner, D., Palmer-Rubin, B., & Bagozzi, B. E. (2021). Media attention and bureaucratic responsiveness. *Journal of Public Administration Research and Theory*, 31(4), 687-703. DOI: <https://doi.org/10.1093/jopart/muab001>
- Ferejohn, J. (1986). Incumbent performance and electoral control. *Public Choice*, 50(1/3), 5-25. DOI: <https://doi.org/10.1007/BF00124924>.
- Gandía, J. L., & Archidona, M. C. (2008). Determinants of web site information by Spanish city councils. *Online Information Review*, 32(1), 35-57. DOI: <https://doi.org/10.1108/14684520810865976>.
- Gandía, J. L., Marrahí, L. & Huguet, D. (2016). Digital transparency and Web 2.0 in Spanish city councils. *Government Information Quarterly*, 33(1), 28-39. DOI: <https://doi.org/10.1016/j.giq.2015.12.004>.
- García, A. C & García-García, J. (2010). Determinants of Online Reporting of Accounting Information by Spanish Local Government Authorities. *Local Government Studies*, 36(5), 679-95. DOI: <https://doi.org/10.1080/03003930.2010.506980>.
- García-Tabuyo, M., Sáez-Martín, A., & Caba-Pérez, M. D. C. (2016). Mandatory versus voluntary disclosures: Drivers of proactive information provision by local governments in Central America. *Information Development*, 32(4), 1199-1215. DOI: <https://doi.org/10.1177/0266666915595>
- Grimmelikhuijsen, S. (2011). Being transparent or spinning the message? An experiment into the effects of varying message content on trust in government. *Information Polity*, 16(1), 35-50. DOI:10.3233/IP-2011-0222
- Grimmelikhuijsen, S. G. & Welch, E. W. (2012). Developing and testing a theoretical framework for computer-mediated transparency of local governments. *Public Administration Review*, 72(4), 562-71. DOI: <https://doi.org/10.1111/j.1540-6210.2011.02532.x>.
- Guillamón, M. D., Bastida, F., & Benito, B. (2011). The determinants of local government's financial transparency. *Local Government Studies*, 37(4), 391-406. DOI: <https://doi.org/10.1080/03003930.2011.588704>.
- Heald, D. (2003). Fiscal transparency: Concepts, measurement and UK practice. *Public administration*, 81 (4), 723-59,
- IMF (2007, July). Manual on Fiscal Transparency. IMF, Washington DC, Glossary. Retrieved 4/7/2022 from <https://stats.oecd.org/glossary/detail.asp?ID=7294>.
- Izardani, C. G., & Hardiningsih, P. (2021). The Effect of Regional Income, Leverage, Regional Property on Internet Financial Reporting Disclosure. *Jurnal Analisis Bisnis Ekonomi*, 19(1), 30-47. DOI: <https://doi.org/10.31603/bisnisekonomi.v19i1.4049>
- Jarmuzek, M. (2006). Does fiscal transparency matter? The evidence from transition economies. Warsaw, Poland: Center for Social and Economic Research. Retrieved 29/6/2022 from: [https://www.cerge-ei.cz/pdf/gdn/rrc/RRCV\\_77\\_paper\\_03.pdf](https://www.cerge-ei.cz/pdf/gdn/rrc/RRCV_77_paper_03.pdf)
- Laswad, F., Fisher, R. & Oyelere, P. (2005). Determinants of voluntary Internet financial reporting by local government authorities. *Journal of Accounting and Public Policy*, 24(2), 101-21. DOI: <https://doi.org/10.1016/j.jaccpubpol.2004.12.006>.
- Lindermüller, D., Sohn, M., & Hirsch, B. (2022). Negative media reporting and its effects on performance information use in public spending. *Public Management Review*, 24(7), 1024-1047. DOI: <https://doi.org/10.1080/14719037.2021.1882543>
- Lokalni.hr (2018, February). Grad Crikvenica objavio Proračun u malom za 2018. Retrieved from <https://lokalni.vecernji.hr/gradovi/grad-crikvenica-objavio-proracun-u-malom-za-2018-7817>.
- Ma, L., & Wu, J. (2011, May). What drives fiscal transparency? Evidence from provincial governments in China. In 1st Global Conference on Transparency Research, Rutgers University-Newark. Retrieved 5/7/2022 from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1807767](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1807767).
- Martinez-Vazquez, J., & Timofeev, A. (2008). Regional-local dimension of Russia's fiscal equalization. *Journal of Comparative Economics*, 36(1), 157-76. DOI: <https://doi.org/10.1016/j.jce.2007.04.004>.
- Ministry of Finance (2018). Lokalna samouprava, Financijski izvještaji JLP(R)S. Lokalni proračuni. Lokalni proračuni – Arhiva. Zagreb: Ministry of Finance.
- Ministry of Regional Development and EU Funds (2018). *Access to information*. Zagreb: Ministry of Regional Development and EU Funds.:
- Montes, G. C., Bastos, J. C. A., & de Oliveira, A. J. (2019). Fiscal transparency, government effectiveness and government spending efficiency: Some international evidence based on panel data approach. *Economic Modelling*, 79 (June 2019), 211-25. DOI: <https://doi.org/10.1016/j.econmod.2018.10.013>.
- Ott, K., Bronić, M., Petrušić, M., Stanić, B., & Prijaković, S. (2019b). Proračunska transparentnost županija, gradova i općina: studeni 2018.–ožujak 2019. *Newsletter: povremeno glasilo Instituta za javne financije*, 21(117), 1-14. DOI: <https://doi.org/10.3326/nlh.2019.117>.
- Ott, K., Bronić, M., Stanić, B., Klun, M., & Bencina, J. (2019a). Determinants of online local budget transparency in Croatia and Slovenia. *Central European Public Administration Review*, 17(2), 167-87. DOI: 10.17573/cepar.2019.2.08.
- Pérez, C. C., Bolívar, M. P. R., & Hernández, A. M. L. (2008). e-Government process and incentives for online public financial information. *Online Information Review*, 32(3), 379-400. DOI: <https://doi.org/10.1108/14684520810889682>.
- Piotrowski, S. J., & Van Ryzin, G. G. (2007). Citizen attitudes toward transparency in local government. *The American Review of Public Administration*, 37(3), 306-23. DOI: <https://doi.org/10.1177/02750740062967>.
- Sedmihradská, L. & Haas, J. (2012, March). Budget transparency and fiscal performance: Do open budgets matter? Munich Personal RePEc Archive, Retrieved 7/7/2022 from <https://mpra.ub.uni-muenchen.de/42260/>.
- Shi, M. & Svensson, J. (2006). Political budget cycles: Do they differ across countries and why? *Journal of Public Economics*, 90(8-9), 1367-89. DOI: <https://doi.org/10.1016/j.jpubeco.2005.09.009>.
- Stanić, B. (2018). Determinants of subnational budget/fiscal transparency: a review of empirical evidence. *Public Sector Economics*, 42(4), 449-86. DOI: <https://doi.org/10.3326/pse.42.4.4>.
- State Electoral Commission of the Republic of Croatia (2017). Elections and referendums. State Electoral Commission. Available at <https://www.izbori.hr/arhiva-izbora/index.html#/app/lokalni-2017>

- Strömberg, D. (2001) Mass media and public policy. *European Economic Review*, 45(4-6), 652-63. DOI: [https://doi.org/10.1016/S0014-2921\(01\)00106-4](https://doi.org/10.1016/S0014-2921(01)00106-4).
- Styles, A. K., & Tennyson, M. (2007). The accessibility of financial reporting of US municipalities on the Internet. *Journal of Public Budgeting, Accounting & Financial Management*, 19(1), 56-92. DOI: <https://doi.org/10.1108/JPBAFM-19-01-2007-B003>.
- Styles, A. K., & Tennyson, M. (2007). The accessibility of financial reporting of US municipalities on the Internet. *Journal of Public Budgeting, Accounting & Financial Management*, 19(1), 56-92. DOI: <https://doi.org/10.1108/JPBAFM-19-01-2007-B003>
- Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *Academy of Management Review*, 20(3), 571-610. DOI: <https://doi.org/10.5465/amr.1995.9508080331>.
- Tavares, A. F., & da Cruz, N. F. (2014, October). The determinants of local government transparency: a preliminary analysis. Proceedings of the 8th International Conference on Theory and Practice of Electronic Governance (p. 117-23). Association for Computing Machinery, New York, NY, United States. DOI: <https://doi.org/10.1145/2691195.2691291>.
- Tortal.hr (2017, June) IJF: Porasla proračunska transparentnost lokalnih jedinica. Retrieved from <https://www.tportal.hr/biznis/clanak/ijf-porasla-proracunska-transparentnost-lokalnih-jedinica-20170704>.
- Veiga, F., J., Veiga, L. & G., Morozumi, A. (2017). Political budget cycles and media freedom. *Electoral Studies*, 45 (February 2017), 88-99. DOI: <https://doi.org/10.1016/j.electstud.2016.11.008>.
- Wildowicz-Giegiel, A. & Kargol-Wasiluk, A. (2020). The phenomenon of fiscal illusion from theoretical and empirical perspective. *European Research Studies Journal*, 23(2), 670-93. DOI: 10.35808/ersj/1615.
- Zou, G., Li, H., Meng, J. G., & Wu, C. (2020). Asymmetric effect of media tone on IPO underpricing and volatility. *Emerging Markets Finance and Trade*, 56(11), 2474-2490. DOI: <https://doi.org/10.1080/1540496X.2019.1643320>
- 34 portal (2017, Juni). Proračun Općine Velika potpuno je transparentan. Retrieved from <https://www.034portal.hr/index.php?id=27414>.

## Učinki medijskega poročanja na preglednost proračuna v hrvaških lokalnih upravnih enotah

### Izvleček

Ta članek raziskuje pozitivno in negativno medijsko poročanje o spletni preglednosti lokalnih proračunov (OLBT) in njegov vpliv na preglednost proračuna v hrvaških lokalnih upravnih enotah v letu 2018. Z uporabo multinomialne logistične regresije je raziskava potrdila močan vpliv medijskega poročanja na proračunsko preglednost. Pozitivno medijsko poročanje vodi k povečanju verjetnosti, da bodo lokalne upravne enote dosegle višjo raven preglednosti, medtem ko negativno medijsko poročanje spremlja večja verjetnost, da bodo lokalne upravne enote ostale v nižjem območju preglednosti. Posledice teh ugotovitev so jasno poudarjene s poglobljenim razumevanjem vloge medijev v ekonomiji javnega sektorja, prav v kontekstu proračunske preglednosti. Ta raziskava prispeva k literaturi o javnem sektorju z opredelitvijo ločenih učinkov pozitivnega in negativnega medijskega poročanja na proračunsko preglednost.

*Ključne besede:* fiskalna preglednost, preglednost proračuna, lokalne upravne enote, medijsko poročanje, Hrvaška



# The Importance of Educational Service Quality for Customer Satisfaction and Organizational Reputation

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## Abstract

This paper aims to enhance the understanding of the concepts of service quality, customer satisfaction with service, and organizational reputation in the context of educational services. The conceptual framework for testing the relationship between the three constructs was developed and tested on a sample of 97 educational service users. The results showed no significant difference between perceived and expected service quality. However, a positive relationship was found between customer satisfaction and three subconstructs of perceived service quality. Also, a significant positive correlation between organizational reputation and three latent variables of perceived service quality and a positive relationship between satisfaction and organizational reputation.

## Introduction

In developed countries, there is a predominantly knowledge-based, service-oriented society. In modern society, lifelong education is constantly gaining importance. The competition in the education market is becoming stronger, clients are becoming more demanding and are seeking appropriate and individually tailored education. Due to the epidemic, education has recently moved from lecture halls to locations that are more easily accessible to clients and more time-friendly. Location no longer represents an important factor in the decision-making process when choosing an educational institution. The quality of educational services is certainly an important dimension in choosing education. Knowing the quality of educational services perceived by the client is necessary to differentiate the offer, ensure client satisfaction, and spread a positive image about the educational organization (Lovelock & Wright, 1999). Providing quality services is a crucial strategy for the survival and success of an educational organization in the market.

Service providers, both indirect and direct, play a central role in service delivery within the organization. In addition to the importance of service

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providers, clients of the services also play an important role. The concept of service quality has different meanings for different service clients. However, since customers are the ones who largely determine the fate of the organization, it is necessary to follow their expectations and perceptions of quality. It is not enough for services to meet standards and regulations; it is necessary to maintain and increase client satisfaction to enable mutual positive recognition (Kotler, 1996). Service quality leads to satisfied clients, positively impacting word-of-mouth about the organization, loyalty, client purchasing intentions, and the organization's financial success (Wang, 2003).

Reviewing the literature, we found many discrepancies regarding the links and similarities between service quality and satisfaction. Some indisputable differences exist, with satisfaction being a one-time experience related to a specific service or product, while quality involves a longer-term relationship. Additionally, the emotional involvement of clients is present in satisfaction, while emotional elements are not present in quality. Perceived service quality can vary greatly from client to client and achieve varying degrees of satisfaction, mainly due to differing client expectations. Oliver (1997) explains that quality is not the same as satisfaction, but that quality is one of the causes of satisfaction. Quality is defined as the difference between the client's expectations and perceptions, while satisfaction primarily responds to this difference. Satisfaction can only be formed based on direct experience, while quality can also be inferred without this experience (1997). While the relationship between perceived quality and satisfaction has been widely studied in various service fields, we observe a lack of research in the field of education, particularly in terms of addressing the difference between perceived and expected quality and the relationship between the concepts of perceived quality and reputation, and satisfaction and reputation.

Zeithaml and Bittner (1996) explain that perceived service quality is just one component of customer satisfaction, which also reflects the relationship between price and quality, personal perceptions of the customer, and other influences at the time of service delivery. Perceived quality is the overall assessment of the entity's superiority or excellence, while objective quality is the result of the aforementioned comparison between expectations and perceptions of service delivery.

Poor service quality puts an organization in a bad position and consequently drives away dissatisfied customers (Lovelock & Wirtz, 2011). A satisfied customer positively influences the reputation of the organization by spreading

positive word-of-mouth about the organization and its brand (Kotler, 1996).

Existing literature on the subject area shows that service organizations can improve their performance and competitive advantage by improving service quality, ensuring customer satisfaction, and increasing their reputation.

Competition in education is becoming more intense, and consequently, concepts such as service quality, organizational reputation, and customer loyalty are key to the organization's survival (Teeroovengadum et al., 2019). This paper aims to deepen knowledge in studying concepts such as service quality, customer satisfaction with service, and organizational reputation and to examine the relationship between these constructs in the context of educational organizations from Slovenia. While extensive research has been conducted on the link between service quality and satisfaction in educational organizations, the present study aims to fill a significant gap in the literature. Specifically, the role of reputation in this relationship has received limited attention, with only a few studies addressing this aspect. Notably, to the best of our knowledge, no previous research has investigated this topic in the context of Slovenia.

The paper begins with a literature review, summarizing previous research, and with a conceptual framework. The methodology section describes the data collection, including the sample selection. Reliability and validity are discussed to ensure data quality. Results are presented, followed by conclusions that summarize key findings. The discussion section interprets the results, compares them to prior research, lists research limitations, and suggests future research directions.

## Literature review

### Educational service quality

In education, quality is a fundamental strategic direction. Quality of education is a generic concept. Understanding quality depends on cultural characteristics, institutional frameworks, socio-political events in which education takes place, and educational objectives and forms, and levels of education (Bregar, Margarita, & Radovan, 2010).

Numerous authors attempting to define service quality in education agree that quality is easier to recognize than to define. Education contains all the characteristics of service activities. Educational services are heterogeneous, intangible, inseparable from participants in

implementation, and variable. Educational organizations operate in an environment that must be directed toward understanding the role and importance of service quality, and this environment is highly competitive. In this case, a competitive environment means that education participants become more demanding in choosing an educational organization. Therefore, educational organizations need to understand the desires and expectations of potential participants, which can be done by determining the expectations of participants regarding the quality of education services (Ford, Mathew, & Beatriz, 1999).

Zeithaml et al. (1990) emphasize that understanding customer expectations is essential for ensuring quality. Therefore, providing excellent services following customer expectations requires the organization to understand customer expectations.

Authors studying service quality in education use three interrelated quality criteria: the degree to which the educational service meets the needs of customers, differences in the quantity of some desired material elements of the educational service, and compliance with educational standards.

From theoretical perspectives, we understand quality as an absolute concept and quality as a relative concept. Absolute quality is similar to an ideal, where there is no deviation from the highest standards that cannot be surpassed. Regarding relative quality of services, quality is not understood as an attribute of a particular service but as something attributed to that service. In this case, quality is judged by determining whether the service meets the set standards. Quality in the relative sense is a multidimensional phenomenon that is associated with various aspects of expectations. Harvey and Green (1993) propose a classification of quality concepts in education, including quality as uniqueness, perfection and consistency, suitability for purpose, value for money, and transformation.

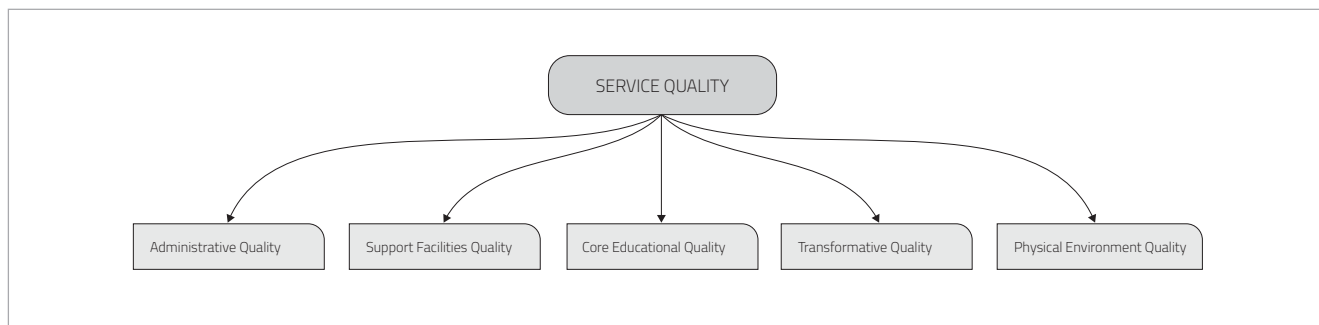
Educational services quality has experienced a significant breakthrough during the COVID pandemic. There was a sudden and intense shift from predominantly traditional learning to virtual learning. The pandemic forced educational organizations to adopt digital technologies. Research on online education reveals five attributes that educational institutions must adopt: student interaction, level of student concentration in online classrooms, increasing student satisfaction with digital learning, the usefulness of the system, and diversity of assessment

tests (Ramírez-Hurtado, Hernández-Díaz, López-Sánchez, & Pérez-León, 2020).

Abdullah (2006) developed a model called HEDPERF (Higher Education PERFORMANCE) for measuring perceived quality in higher education. It was mainly based on developing service quality dimensions from the client's perspective and considered the quality of academic staff services and the non-academic aspect of the client's educational experience. Using the model, educational institutions can determine how different dimensions affect overall service quality, become aware of the strengths and weaknesses of these dimensions, and their impact on more efficient resource management to provide quality service to clients (Abdullah, 2006).

The HEDQUAL model was designed for MBA programs in the higher education sector (Icli & Anil, 2014). It includes five dimensions of service quality: academic quality, administrative quality, library service quality, quality of library service delivery, quality of career opportunities, and quality of support services. The HEISQUEL model considers operational and technical aspects of service quality. The model measures service quality using seven dimensions of service quality: teacher profile, curriculum, facility and equipment, staff and other support personnel, employment quality, safety and security, and student skill development. The HESQUEL model presented in Figure 1 was developed by Viraiyan et al. (2016) to assess the quality of higher education services in Mauritius. The model considers five main dimensions and a total of eleven sub-dimensions, including administrative quality (attitude and behavior of administrative staff), physical environment (learning environment, general infrastructure, and support infrastructure), the fundamental quality of education (attitude and behavior of academic staff, curriculum, pedagogy, and academic staff competencies), as well as the quality of support facilities and quality of transformation (Viraiyan, Kama-lanabhan, & Keshwar, 2016).

The quality of education services has become an important competitive advantage in recent years. Care for quality must be deliberate and become part of the strategy of educational organization leadership and employees. In addition to knowing the expectations of customers who directly receive services, other direct customers such as sponsors, future employers, society as a whole, and employees in the organization are also important. Quality of education services is not only important at the time when the customer is confronted with the service, as it can significantly impact the quality of life in the future. To ensure quality education

**Figure 1***The Higher Educational Service Quality (HESQUAL) Model*

Source: Adapted from Viraiyan et al. (2016)

services, competent staff in the organization who can adapt to changes are essential.

### Customer satisfaction

Customer satisfaction is the fulfillment of their expectations (Oliver, 1997) or their emotional reaction to experiences with certain services compared to their expectations (Parasuraman, Berry, & Zeithaml, 1988, p. 16). Oliver (ibid.) further explains that meeting customer needs gives or increases pleasure or reduces a deficiency, similar to solving a life problem. Ule and Kline (1996) define satisfaction as one of the most desirable post-purchase effects for both providers and customers. Satisfaction is a feeling of pleasure or disappointment that results from comparing perceived service quality or the result of the comparison to one's own expectations. Based on past experiences, advice from acquaintances, information and promises from the organization, and competition, the customer forms their expectations. If perceived quality is lower than expected, the customer is dissatisfied. If the result meets or exceeds expectations, the customer is satisfied, very satisfied, or delighted (Kotler, 1998). Customer expectations can be subjective or objective. Therefore, satisfaction results from the customer's evaluation of the service based on comparing their perception with expectations.

Customer satisfaction is a complex phenomenon. The theory of (dis)confirmation of expectations or the disconfirmation theory, and the perceived performance theory are most commonly used to define customer satisfaction. The theory of (dis)confirmation of expectations explains satisfaction as a result of the intersection between the customer's expectations in the pre-purchase phase and their evaluation in the post-purchase phase. At the end of the service delivery, customers feel that their expectations were either positively or negatively fulfilled. The perceived performance theory defines customer satisfaction as a direct function of the characteristics and performance of the service or product.

Within this theory, satisfaction is the result of complex cognitive and emotional processes and other mental and physical influences (Milfelner, Pisnik Korda, & Mumel, 2010).

Various definitions of satisfaction have three common elements (Giese & Cote, 2000), namely, customer satisfaction is an emotional or perceptual response that can vary in intensity, the response always focuses on a specific element of customer satisfaction, such as expectation or purchasing experience, and the response occurs at a certain time after the experience.

Customer satisfaction is important to an organization, as it creates a competitive advantage, distinguishes customers from competitors, increases loyalty, enhances positive word-of-mouth, reduces costs of error correction, and reduces costs of error correction. Therefore, organizations should pay sufficient attention to monitoring satisfaction (Lovelock & Wright, 1999).

### Organizational reputation

Reputation is an important intangible asset for an organization. Building a positive reputation takes time and careful management, as even small mistakes can significantly impact reputation. Restoring a damaged reputation can require a lot of time and effort. An organization's reputation is influenced by all of its interactions with the public, employees, competitors, partners, customers, product and service quality, and environmental awareness, among others. An organization's reputation can be thought of as the opinions expressed by various stakeholders about the organization in the form of connections between them.

There are many different definitions of reputation. Barnett et al. (2005) proposed a unified definition and defined cooperative reputation as the collection of assessments about an organization made by observers based on financial, social, and environmental evaluations. It is evident that an

organization's reputation is composed of the perceptions of different stakeholders based on their experiences with the organization and compared to its competitors (Fombrun, 1996). Gotsi and Wilson (2001) define reputation as the overall evaluation of an organization by customers based on their direct experiences with the organization and various forms of communication, including the use of symbols by the organization.

An organization's reputation stems from evaluations by stakeholders, including direct customers, investors, competitors, local communities, the wider public, and employees. Service customers expect reliability from an organization and demand that services from respected and reputable organizations are of higher quality and more reliable than those from their less respected competitors, regardless of price. Local communities expect responsibility from an organization, investors demand credibility, and employees require trust. Therefore, an organization must consider all key stakeholders to achieve a positive reputation. This involves creating pride among employees, empowering them, developing their trust, demonstrating profitability to investors, maintaining stability, acting socially responsible towards society, and showing special consideration for the environment. For service customers, it is important that the organization provides good customer service and high-quality services (Fombrun, 1996).

### Conceptual framework and hypotheses development

We can assume that differences in ratings between perceived and expected service quality are not random but are due to systematic reasons. Various factors can contribute to the gap between expected and perceived service quality, such as the difference between the factors that clients perceive as important and those that service providers consider important for clients. A study on the gap between expected and perceived service quality conducted at a university in Lahore, Pakistan, showed that there were differences between students' expectations and perceptions, with no significant differences in empathy and safety (Ali, Ali, & Ahmad, 2019). The results of a study conducted at a postgraduate university in Iran showed a significant difference between customer expectations and perceived quality, particularly for the responsiveness dimension, followed by empathy, reliability, and trust (Abaria, Yarmohammadian, & Esteki, 2011). Other studies addressing this gap were implemented outside the field of educational services (e.g. Chan, Liu, and Li, 2019). Hence, we hypothesize:

*H1: Ratings of expected service quality significantly differ from actual ratings of perceived service quality.*

Cronin and Taylor (1992) empirically demonstrated in their research that positively perceived service quality leads to customer satisfaction. Lovelock and Wirtz (2011) state that service quality is crucial for customer satisfaction and that quality is equated with maximum satisfaction. Similarly, a study in the field of education found that service quality has a positive impact on customer satisfaction. Annamdevula (2017) found a strong correlation (Munteanu et. al, 2010) between service quality and customer satisfaction. Improving customer satisfaction leads to improving service quality, reducing complaints, strengthening the organization's reputation, and enhancing competitiveness. In the field of education, there have been only rare studies indicating a positive relationship between perceived quality and satisfaction (Shah, 2009; Pedro et. al., 2018, Singh & Jasial, 2021). According to that, we frame the following hypothesis:

*H2: Perceived service quality is positively related to customer satisfaction.*

Selnes (1993) defines reputation as directly linked to quality and explains that the perception of quality is associated with the brand name. Eunsang et al. (1993) explains that reputation can be enhanced by providing quality service. Shamma and Hassan (2009) demonstrated in their research that the experience with an organization, which is mainly dependent on service staff, has the greatest impact on the organization's reputation rating. Staff is the direct link between the customer and the organization and, along with the environment, is the main determinant of service quality. Therefore, the staff rating strongly influences the overall quality rating and, thus, the organization's reputation. Chen (2010) describes a positive relationship between reputation and service quality. Twaissi and Al-Kilani (2015) studied the impact of perceived service quality on student behavior and found that dimensions of perceived quality affect students' intention to recommend the educational institution to others. Therefore, we hypothesize:

*H3: Perceived service quality is positively related to the organization's reputation.*

Walsh et al. (2006) found that reputation and customer satisfaction are strongly interrelated. Stahl et al. (2003) report that an organization's reputation is gained over long periods of high customer satisfaction and is a source of sustainable competitive advantage for organizations. Anderson and Sullivan (1993), and Bonits et al. (2007) also report that high satisfaction leads to a greater reputation. Satisfied customer returns spread the word and enhance the organization's reputation (Marolt & Gomišček, 2005). In the context of education, significant predictors of student

satisfaction were found to include the perceived quality of teaching, organizational identification, and institutional reputation (Hassani & Wilkins, 2022). Also, Quazi et al. (2021) found that university reputation can indirectly influence students' satisfaction level. Thus, we propose the following hypotheses:

H4: *Satisfaction is positively related to the reputation of the organization.*

## Methodology

### Data collection

The data for this study was collected through a combination of online and hard-copy questionnaires distributed during various events. The measurement instrument used in the study was developed based on a literature review. For quality, we used adapted items from the SERVQUAL scale, which comprised 18 items developed by Parasuraman, Berry, & Zeithaml (1988). The scale for education was adapted from Faganel (2010), and satisfaction was measured using the adapted Oliver scale (1997) with seven items. Reputation was measured using an adapted scale developed by Fombrun and co-authors (2000) with eleven items.

We used Likert-type statements for quality to measure expected quality, perceived quality, and reputation, ranging from 1 - 'strongly disagree' to 7 - 'strongly agree'. Satisfaction was measured using a 7-point scale ranging from 'very dissatisfied' to 'very satisfied'. For reputation, a 7-point scale, with 1 being "not at all true" and 7 being "completely true" was used.

### Sample

A non-random sample from inside an educational organization in Slovenia was used for this research. The questionnaire was distributed in hard copy between 17 December 2021 and 12 January 2022 to LU customers. Customers who were not present during this period were sent a link to the questionnaire at their e-mail addresses. We received 97 fully completed questionnaires, out of which we excluded 5 partially completed questionnaires from further analysis. The anonymity of the respondents was maintained during the survey.

Of the 97 respondents, the majority were female (77.3%), and the most represented age groups were groups between 36 to 45 years (20.6%), and between 46 and 55 years (26.8%).

Concerning education, the majority of respondents have finished secondary school (44.3%). Most respondents were participants in one of the training or learning courses at LU.

### Validity and reliability of the scales

Exploratory factor analysis was conducted to test the validity and reliability of the scales. The factor analysis for the perceived service quality construct showed that the Kaiser-Meyer-Olkin statistic was 0.918, and Bartlett's test was significant at  $p < 0.001$ . Based on factor loadings, three factors were distinguished, explaining almost 78% of the measured variables' variability. We named the first-factor empathy, trust, and responsiveness, the second reliability, and the third tangibles based on the statements describing each factor. For all the factors, Cronbach's alphas were higher than 0.8 for all three sub-constructs, indicating the appropriate reliability of the perceived service quality scales (Table 1).

The factor analysis for the customer satisfaction construct resulted in a Kaiser-Meyer-Olkin statistic of 0.858 at  $p < 0.001$ . One factor explaining almost 73% of the variability of the measured variables was obtained. Factor loadings were higher than 0.6, and Cronbach's alpha was higher than 0.9, indicating convergent validity and reliability of the satisfaction scale (Table 2).

The factor analysis for the organizational reputation yielded a significant ( $p < 0.001$ ) Kaiser-Meyer-Olkin statistic (0.931). One factor explained 76% of the variability of all measured variables. Factor loadings were higher than 0.6, indicating convergent validity. Based on Cronbach's alpha, the reliability of the measurement was exemplary ( $\alpha = 0.961$ ) (Table 3).

## Results

To test the hypotheses, new variables were calculated by averaging the single indicators of each factor obtained from the factor analysis, resulting in a new composite variable.

The newly generated latent variables were not normally distributed, so we used a non-parametric test for two dependent samples, the Wilcoxon signed-ranks test, to test H1. Table 4 shows the results of the ranks. It can be seen that  $|Z| > 1.96$  and  $p/2 < 0$ . There are no statistically significant differences between perceived and expected service quality, so H1 should be rejected.

Hypotheses H2, H3, and H4 were tested using the Spearman correlation coefficient. First, we examined

**Table 1**

*Items, its means, standard deviations, and constructs for perceived quality construct*

	Items	Mean	SD	F1	F2	F3	Chr. α
Empathy, trust, and responsiveness	Q12 The staff is always respectful when operating with me.	6.70	0.648	0.877			0.968
	Q13 The staff is always understanding when operating with me.	6.67	0.657	0.809			
	Q7 The staff is professional and friendly.	6.73	0.604	0.730			
	Q1 When solving problems, I can always rely on employee assistance.	6.55	0.778	0.713			
	Q10 The employees have all the necessary knowledge to answer questions.	6.63	0.601	0.687			
	Q9 The administrative staff is always polite.	6.69	0.651	0.684			
	Q8 Employees always instill confidence in us.	6.54	0.804	0.680			
	Q14 The employees act in accordance with my interests.	6.55	0.764	0.629			
	Q11 The employees give me all the necessary individual attention.	6.53	0.805	0.583			
Q6 There is always a willingness to help.	6.62	0.728	0.568				
Reliability	Q3 I am always informed about the time and place of service performances.	6.59	0.899		0.919		0.958
	Q4 I am always informed about the time and place of service performances in a timely manner.	6.54	0.969		0.878		
	Q5 The guaranteed services are immediately performed.	6.41	0.875		0.683		
Tangibles	Q17 Labels, poster, and scripts look attractive.	6.40	0.825			0.781	0.808
	Q15 Organization is modernly equipped, has well organized premises and suitable equipment for education.	6.58	0.719			0.552	
	Q2 Services are always performed before the promised time.	6.46	0.804			0.530	
	Q16 Business hours are appropriate.	6.42	0.899			0.518	
	Q18 The location is easily accessible.					0.507	
Total variance extracted = 77.9 %							

Source: Authors' research

**Table 2**

*Items, its means, and standard deviations, for satisfaction construct*

Items	Mean	SD	F1	Chr. α
S6 My decision to cooperate with educational organization was a smart one.	6.62	0.699	0.925	0.933
S2 educational organization provides me with quality services.	6.56	0.750	0.892	
S7 Cooperation with educational organization is exactly what I need.	6.42	0.956	0.838	
S3 I also intend to cooperate with the educational organization in the future.	6.52	0.779	0.804	
S5 I am satisfied with the offer of the educational organization.	6.37	0.928	0.802	
S4 I am ready to recommend cooperation with educational organization to my friends and acquaintances.	6.65	0.722	0.745	
Total variance extracted = 72.52 %				

Source: Authors' research

**Table 3***Items, its means, and standard deviations, for reputation construct*

Items	Mean	SD	F1	Chr. $\alpha$
R10 Educational organization is a trusted organization which I respect and admire.	6.58	0.719	0.939	0.961
R8 Educational organization has excellent leadership.	6.58	0.762	0.932	
R9 Educational organization has a clear vision and future.	6.56	0.736	0.899	
R7 Educational organization seems like an organization where it would be good to work.	6.54	0.791	0.886	
R4 Educational organization is environmentally conscious.	6.65	0.646	0.869	
R6 Educational organization strives to satisfy its customers.	6.56	0.707	0.867	
R3 Educational organization responds to the needs of people and environment.	6.43	0.853	0.821	
R1 Educational organization is socially responsible.	6.63	0.634	0.821	
R5 Educational organization is better than the competition.	6.22	0.96	0.786	
R11 Educational organization is a financially stable organization.	6.44	0.924	0.751	
Total variance extracted = 76.05%				

*Source: Authors' research***Table 4***Wilcoxon signed rank test for differences between perceived and expected service quality*

Expected – perceived value	Rank	N	Rank m	Sum of ranks	Significance
Empathy, trust, and responsiveness	Negative rank	18	15.56	280,00	n.s.
	Positive rank	22	24.55	540,00	
		57			
	Negative rank	10	16.20	162,00	n.s.
	Positive rank	17	12.71	216,00	
		70			
Tangibles	Negative rank	24	23.67	568,00	n.s.
	Positive rank	19	19.89	378,00	
		54			

*Source: Authors' research*

how a single subconstruct of perceived service quality relates to satisfaction. Table 5 displays the data, indicating that the relationships between satisfaction and three subconstructs of perceived service quality (empathy – trust – responsiveness, reliability, and tangibles) are positive and significant at  $p < 0.01$ . Therefore, we supported H2.

Additionally, we explored the correlation between reputation and three latent variables of perceived service quality (empathy - trust - responsiveness, reliability, and tangibles).

The correlation is statistically significant and positive for reputation and empathy, trust, and responsiveness ( $R = 0.659$ ), for reputation and reliability ( $R = 0.610$ ), and for reputation and tangibles ( $R = 0.756$ ). Therefore, we also supported H3.

Finally, we tested the relationship between satisfaction and reputation. According to the results in Table 5, there is a significant relationship ( $p < 0.001$ ) between the variables ( $p = 0.00$ ). The correlation coefficient is strong and positive ( $R = 0.789$ ). Thus, hypothesis H4 was also supported.



**Table 5***Correlations between the constructs*

	Satisfaction	Reputation
Empathy, trust, and responsiveness	0.705	0.659
Reliability	0.622	0.610
Tangibles	0.765	0.756
Satisfaction	1	0.789

*Note: All relationships were significant at  $p < 0.001$* 

## Conclusions and Discussion

### Implications for theory and practice

Our study presents the results of testing four hypotheses related to service quality, customer satisfaction, and reputation in the context of educational services. The main implications for theory and practice are as follows.

First, despite the fact that students may have unrealistic expectations of the educational services they are receiving, leading to a perceived value that is lower than their expected value, even if the services are of high quality, we did not find any differences between the respondent's perceived and expected quality. Also, students' expectations of educational services may vary based on their prior experiences, cultural background, and personal beliefs, making it challenging to accurately represent their expected value. In our case, this was, to some point, not so much the case, since respondents were already engaged with the organization for quite a time, and, therefore, also could build some realistic expectations. However, we see the importance of educational organizations focusing on educating their students about the services they provide and setting realistic expectations to avoid expectation bias.

Second, our study suggests a positive correlation between service quality dimensions (empathy, trust, responsiveness, reliability, and tangibles) and satisfaction. In the context of previous studies in educational services, this is in line with the general stream of research. This suggests that improving the main relevant aspects of service quality can lead to higher levels of student satisfaction. For educational organizations, this means that they should focus more on improving their service quality in these areas to enhance the satisfaction of their

students. This could involve training staff to be more empathetic, responsive, and trustworthy, improving the reliability of their systems and processes, and ensuring that their facilities and learning materials are of high quality. Moreover, satisfied students are more likely to positively perceive and recommend the educational organization to others. This can help the organization attract and retain more students and enhance its community reputation. Therefore, the educational organization can benefit from investing in improving the quality of its services, which can positively impact its overall performance.

Third, the relationship between service quality and reputation was also found to be strong and positive. For an educational organization, a positive reputation is crucial for attracting and retaining students, securing funding, and competing with other organizations. Moreover, a positive reputation can lead to increased student enrolment, higher student satisfaction, and increased financial support. These benefits can help the educational organization to thrive and compete more effectively with other organizations. Therefore, by improving service quality aspects, an educational organization can enhance its reputation in the market. The results suggest that students perceive the educational organization as more reputable if they experience high levels of empathy, trust, responsiveness, reliability, and tangibles, meaning the educational organization should prioritize investing in improving these aspects of service quality to enhance its reputation in the eyes of the students, parents, and other stakeholders.

Finally, since the results of our study indicate that satisfaction is positively related to reputation, satisfied students are more likely to remain enrolled in the educational organization, leading to increased retention rates, which also contribute to a positive reputation. Moreover, a satisfied student is more likely to provide positive feedback and support to the organization, leading to the increased financial support of stakeholders and founders, and added value in the marketing communication context. Educational organizations should prioritize high satisfaction levels to maintain and enhance their reputation. They can achieve this by improving service quality, enhancing the learning experience, providing access to adequate resources, and prioritizing students' well-being and satisfaction.

Further investigation could consider the long-term effects of the variables examined in this study and how these effects may evolve or change over extended periods. Also, potential mediating or moderating factors that could influence the relationship between the

variables studied, including exogenous and endogenous variables inside the structural model. Also, additional variables, such as perceived value or loyalty, might explain the observed effects or modify their strength could be considered.

### Limitations

The study only explored the relationship between the three constructs in the context of educational services and may not be applicable to other types of services or industries. Also, the small sample size, orientation on the specific region, educational institution, or demographic,

may not be representative of the population and may limit the generalizability of the findings.

Using a single questionnaire to measure both the dependent and independent variables can also pose a risk of common method variance, which has the potential to significantly impact research findings (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This may be due to individuals who may form inaccurate correlations between consistency patterns, which can influence their implicit theories or job schema and subsequently affect their attention towards and encoding of respondents' behaviors, as well as their ability to recall them later (Smither, Collins, & Buda, 1989).

## References

- Abaria, A. A. F., Yarmohammadian, M. H., & Esteki, M. (2011). Assessment of quality of education a non-governmental university via SERVQUAL model. *Procedia Social and Behavioral Science*, 15, 2299-2304. DOI: <http://dx.doi.org/10.1016/j.sbspro.2011.04.097>
- Abdullah, F. (2006). The development of HEdPERF: a new measuring instrument of service quality for the higher education sector. *International Journal of Consumer Studies*, 30(6), 569-581. DOI: <http://dx.doi.org/10.1111/j.1470-6431.2005.00480.x>
- Ali, H. Y., Ali, H. F., & Ahmad, M. B. (2019). Difference between Expectations and Perceptions of Students Regarding Service Quality of Public Sector HEIs. *Bulletin of Education and Research*, 41(1), 131-146.
- Anderson, E. W. & Sullivan, M. W. (1993). The Antecedents and Consequences of Customer Satisfaction for Firms. *Marketing Science*, 12(2), 125-143. DOI: <https://doi.org/10.1287/mksc.12.2.125>
- Annamdevula, S., (2017). Relationship between service quality, satisfaction, motivation and loyalty: A multi-dimensional perspective. *Quality Assurance in Education*, 25(2), 171-188. DOI: <https://doi.org/10.1108/QAE-04-2013-0016>
- Barnett, M., Jermier, J., & Lafferty, B. A. (2005). Corporate Reputation: The Definitional Landscape. *Corporate Reputation Review*, 9(1), 26-38. DOI: <https://doi.org/10.1057/palgrave.crr.1550012>
- Bonits, N., Brooker, D. L., & Serenko, A. (2007). The Mediating Effect of Organizational Reputation on Customer Loyalty and Service Recommendation in the Banking Industry. *Management Decision*, 45(9), 1426-1445. DOI: <https://doi.org/10.1108/00251740710828681>
- Bregar, L., Margerita, Z., & Radovan, M. (2010). *Osnove e-izobraževanja*. Ljubljana: Andragoški center Slovenije.
- Chan, C.-S. (2019). Expectation-Perception Evaluation of Theme Park Service Quality in Zhengzhou Fantawild. *Journal of Park and Recreation Administration*, 37(2), 99-107. DOI: <https://doi.org/10.18666/JPra-2019-9157>
- Chen, Y.-S. (2010). The Drivers of Green Brand Equity: Green Brand Image, Green Satisfaction, and Green Trust. *Journal of Business Ethics*, 93(2), 307-319. DOI: <https://doi.org/10.1007/s10551-009-0223-9>
- Cronin, J. J., & Taylor, S. A. (1992). Measuring service quality: A reexamination and extension. *Journal of Marketing*, 56(3), 55-68. DOI: <https://doi.org/10.1177/002224299205600304>
- Eunsang, Y., Guffey, H. J., & Kijewski, V. (1993). The effects of information and company reputation on intentions to buy a business service. *Journal of Business Research*, 27(3), 215-228. DOI: [https://doi.org/10.1016/0148-2963\(93\)90027-M](https://doi.org/10.1016/0148-2963(93)90027-M)
- Faganel, A. (2010). *Zaznavanje kakovosti visokošolskih storitev*, Koper: s.n.
- Fombrun, C. J. (1996). *Reputation: Realizing Value from the Corporate Image*. Boston: Harvard Business School Press.
- Fombrun, C. J. & Gardberg, N. (2000). Who's Tops in Corporate Reputation? *Corporate Reputation Review*, 3(1), 13-17. DOI: <https://doi.org/10.1057/palgrave.crr.1540095>
- Ford, J. B., Mathew, J. & Beatriz, J. (1999). Importance-performance analysis as a strategic tool for service marketers: the case of service quality perceptions of business students in New Zealand and the USA. *Journal of Services Marketing*, 13(2), 171-186. DOI: <https://doi.org/10.1108/08876049910266068>
- Giese, J. & Cote, J. (2000). *Defining Consumer Satisfaction*. Retrieved from [www.amsreview.org/articles/giese01-2000.pdf](http://www.amsreview.org/articles/giese01-2000.pdf)
- Gotsi, M. & Wilson, A. M. (2001). Corporate reputation: seeking a definition. *An International Journal*, 6(1), 24-30. DOI: <https://doi.org/10.1108/13563280110381189>
- Harvey, L. & Green, D. (1993). Defining Quality. *Assessment & Evaluation in Higher Education*, 18(1), 9-34. DOI: <https://doi.org/10.1080/0260293930180102>

- Hassani, A. A. A. & Wilkins, S. (2022). Student retention in higher education: the influences of organizational identification and institution reputation on student satisfaction and behaviors. *International Journal of Educational Management*, 36(6), 1046-1064. DOI: <https://doi.org/10.1108/IJEM-03-2022-0123>
- Icli, G. E. & Anil, N. (2014). The HEDQUAL scale: A new measurement scale of service quality for MBA programs in higher education. *Journal of Business Management*, 45(3), 31-43.
- Kotler, P. (1996). *Marketing Management*. Ljubljana: Slovenska knjiga.
- Kotler, P. (1998). *Marketing Management*. Ljubljana: Slovenska knjiga.
- Lovelock, C. H. & Wright, L. (1999). *Principles of Service Marketing and Management*. New Jersey: Prentice Hall.
- Lovelock, C. & Wirtz, J. (2011). *Services Marketing: People, Technology, Strategy*. New Jersey: One Lake Street, Upper Saddle River.
- Marolt, J. & Gomišček, B. (2005). *Management kakovosti*. Kranj: Moderna organizacija.
- Mendes, L., Pedro, E. D. M. & Lourenço, L. (2018). Perceived Service Quality and Students' Satisfaction in Higher Education: The Influence of Teaching Methods. *International Journal for Quality Research Forthcoming*, 12(1), 165. DOI: <https://doi.org/10.18421/IJQR12.01-10>
- Milfelner, B., Pismanik Korda, A., & Mumel, D. (2010). Zaznana vrednost, zadovoljstvo in zvestoba z bančnimi storitvami v Sloveniji. *Akademija MM*, 10(16), 63-77.
- Munteanu, C., Ceobanu, C., Bobâlcă, C., & Anton, O. (2010). An analysis of customer satisfaction in a higher education context. *International Journal of Public Sector Management*, 23(2), 124-140. DOI: <https://doi.org/10.1108/09513551011022483>
- Oliver, R. L. (1997). *Satisfaction: A behavioral perspective on the customer*. New York: McGraw-Hill.
- Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1988). Servqual: A Multiple-Item Scale for Measuring Consumer Perceptions Service Quality. *Journal of Retailing*, 64(1), 12-40.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*, 88(5), 879-903. DOI: <https://doi.org/10.1037/0021-9010.88.5.879>
- Qazi, Z., Qazi, W., Raza, S. A., & Yousufi, S. Q. (2021). The Antecedents Affecting University Reputation and Student Satisfaction: A Study in Higher Education Context. *Corporate Reputation Review*, 25(4), 1-19. DOI: <https://doi.org/10.1057/s41299-021-00126-4>
- Ramírez Hurtado, J. M., Hernández Díaz, A. G., López Sánchez, A. D., & Pérez León, V. E. (2021). Measuring Online Teaching Service Quality in Higher Education in the COVID-19 Environment. *International Journal of Environmental Research and Public Health*, 18(5), 2403. DOI: <https://doi.org/10.3390/ijerph18052403>
- Selnes, F. (1993). An Examination of the Effect of Product Performance on Brand, reputation, Satisfaction and Loyalty. *European Journal of Marketing*, 27(9), 19-35. DOI: <https://doi.org/10.1108/03090569310043179>
- Shah, A. (2009). The Impact of Quality on Satisfaction, Revenue, and Cost as Perceived by Providers of Higher Education. *Journal of Marketing for Higher Education*, 19(2), 125-141. DOI: <https://doi.org/10.1080/08841240903451324>
- Shamma, H. M. & Hassan, S. (2009). Customer and non-customer perspectives for examining corporate reputation. *Journal of Product & Brand Management*, 18(5), 326-337. DOI: <https://doi.org/10.1108/10610420910981800> <https://doi.org/10.1108/10610420910981800>
- Singh, S. & Singh Jasial, S. (2021). Moderating effect of perceived trust on service quality – student satisfaction relationship: evidence from Indian higher management education institutions. *Journal of Marketing for Higher Education*, 31(2), 280-304. DOI: <https://doi.org/10.1080/08841241.2020.1825029>
- Smither, J. W., Collins, H., & Buda, R. (1989). When ratee satisfaction influences performance evaluations: A case of illusory correlation. *Journal of Applied Psychology*, 74(4), pp. 599-605. DOI: <https://doi.org/10.1037/0021-9010.74.4.599>
- Stahl, K. H., Matzler, K., & Hinterhuber, H. H. (2003). Linking customer lifetime value with shareholder value. *Industrial Marketing Management*, 32(4), 267-279. DOI: [https://doi.org/10.1016/S0019-8501\(02\)00188-8](https://doi.org/10.1016/S0019-8501(02)00188-8)
- Teeroovengadum, V., Nunkoo, R., Gronroos, C., Kamalanabhan, T. J., & Seebaluck, A. K. (2019). Higher education service quality, student satisfaction and loyalty: Validating the HESQUAL scale and testing an improved structural model. *Quality Assurance in Education*, 27(4), 427-445. DOI: <https://doi.org/10.1108/QAE-01-2019-0003>
- Twaissi, N. M. & Al-Kilani, M. H. (2015). The Impact of Perceived Service Quality on Students' Intentions in Higher Education in a Jordanian Governmental University. *International Business Research*, 8(5), 81-92. DOI: <https://doi.org/10.5539/ibr.v8n5p81>
- Ule, M. & Kline, M. (1996). *Psihologija tržnega komuniciranja*. Ljubljana: Fakulteta za družbene vede.
- Viraiyan, T., Kamalanabhan, T. J., & Keshwar, S. A. (2016). An analysis of higher education service quality in Mauritius using hesqual. *International Journal of Business Research*, 16(2), 89-104. DOI: <https://dx.doi.org/10.18374/IJBR-16-2.7>
- Walsh, G., Dinnie, K., & Wiedmann, K.-P. (2006). How do corporate reputation and customer satisfaction impact customer defection? A study of private energy customers in Germany. *Journal of Services Marketing*, 20(6), 412-420. DOI: <https://doi.org/10.1108/08876040610691301>
- Wang, Y. (2003). The antecedents of service quality and product quality and their influences on bank reputation: Evidence from the banking industry in China. *Journal of Service Theory and Practice*, 13(1), 72-83. DOI: <https://doi.org/10.1108/09604520310456726>
- Zeithaml, V. A., Gremler, D. D., & Bitner, M. J. (1996). *Services Marketing*. New York: McGraw-Hill.
- Zeithaml, V. A., Parasuraman, A., & Berry, L. L. (1990). *Delivering Quality Service: Balancing Customer Perceptions and Expectations*. New York: The free press.

# Pomen kakovosti izobraževalnih storitev za zadovoljstvo odjemalcev in ugled organizacije

## *Izvleček*

Namen članka je izboljšati razumevanje konceptov kakovosti storitev, zadovoljstva odjemalcev s storitvami in organizacijskega ugleda v kontekstu izobraževalnih storitev. Razvit je bil konceptualni okvir za preverjanje povezav med temi tremi konstrukti, ki je bil testiran na vzorcu 97 uporabnikov izobraževalnih storitev. Rezultati niso pokazali pomembne razlike med zaznano in pričakovano kakovostjo storitev. Ugotovljena pozitivna povezava med zadovoljstvom uporabnikov in tremi podkonstrukti zaznane kakovosti storitev. Prav tako je bila ugotovljena značilna pozitivna povezanost med organizacijskim ugledom in tremi latentnimi spremenljivkami zaznane kakovosti storitev ter pozitivna povezanost med zadovoljstvom odjemalcev in ugledom organizacije.

*Ključne besede:* zadovoljstvo odjemalcev, ugled organizacije, izvajanje storitev, zaznana kakovost storitev, kakovost izobraževalnih storitev

# The Influence of Organizational Factors on the Adoption of Energy Efficiency Measures in Companies

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## Abstract

This paper aims to research the organizational factors influencing the implementation of energy efficiency measures in companies. The analysis was performed on a sample of companies from Serbia included in the World Bank Enterprise Survey. The raw data collected by the World Bank were utilized to analyze the correlation between various organizational factors and the adoption of energy efficiency measures. The analysis revealed a statistically significant correlation between management maturity and the implementation of energy efficiency measures in companies. These findings suggest that improving energy efficiency is not an isolated process but rather closely related to the maturity of management practices, highlighting the importance of comprehensive organizational development for achieving optimal energy management.

## Introduction

Energy management in companies appears to be more important now than ever before. Global political, environmental, and economic crises have confronted companies with challenges such as high energy prices, unreliable energy supply, and the responsibility to mitigate climate change (Economist Intelligence, 2023). Embracing renewable energy and enhancing energy efficiency across all sectors of society have been identified as crucial for overcoming today's energy challenges (Mihic et al., 2014). According to the European Commission (2020), approximately three-quarters of the EU's net domestic energy use can be attributed to domestic production activities by European businesses. The high cost of energy supply increases overall business costs, negatively impacting companies' competitiveness. Therefore, improving energy efficiency can contribute to overall organizational efficiency while reducing environmental pollution (Di Foggia, 2021). The energy system in commercial buildings profoundly impacts work and management processes within an organization. Comfort within the building directly affects the productivity of employees and/or users, energy consumption costs are reflected in the overall business, and the level of carbon dioxide emissions affects the image of the company (Mihic et al., 2012). Consequently, implementing energy efficiency measures within

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an organization is a form of organizational improvement and bears similarity to innovation. Hence, it is reasonable to assume that certain factors influencing innovation or corporate entrepreneurship within an organization could also influence the determination and commitment of the organization to adopt energy efficiency measures.

According to Capehart et al. (2006, p. 1) energy management is the efficient and effective use of energy to maximize profits (minimize costs) and enhance competitive positions. The same authors state that some desirable sub-objectives of energy management programs include: 1) improving energy efficiency and reducing energy use, thereby reducing costs, 2) reducing greenhouse gas emissions and improving air quality, 3) cultivating good communications on energy matters, 4) developing and maintaining effective monitoring, reporting, and management strategies for wise energy usage, 5) finding new and better ways to increase returns from energy investments through research and development, 6) developing interest in and dedication to the energy management program from all employees, 7) reducing the impacts of curtailments, brownouts, or any interruption in energy supplies (Capehart et al. 2006, p. 1). Like the previously mentioned authors, Harris (2016, p. 3) points out that energy management attempts to analyze where energy is wasted in buildings and identify cost-effective solutions. In this context, it is essential to mention the definition of the energy management system (EMS), which is, according to ISO (2018), a set of interrelated or interacting elements to establish an energy policy and energy objectives and processes and procedures to achieve those objectives. EMS is an essential tool for energy management as it provides organizations with information that enables them to support better decisions by monitoring and measuring energy consumption, modeling future energy consumption trends, and analyzing current costs. EMS also allows organizations to automate several tasks, such as gathering meter and equipment status data and reporting key performance indicators regarding energy consumption to management. Without appropriate support from EMS, organizations cannot correctly measure energy usage and monitor the effectiveness of their energy improvement measures (Antunes et al., 2014).

Over the past two decades, significant advancements in digital technologies have contributed to improving energy efficiency in residential and commercial buildings and industrial processes. These technologies fall within the Internet of Things, Big Data, Artificial Intelligence, Edge Computing, Cloud Computing, and Blockchain (Vučković & Pitić, 2022). Energy-efficient technologies significantly

promise to reduce financial costs and environmental damage associated with energy consumption. However, these technologies appear to be adopted by consumers and businesses to a lesser extent than would be justified solely on financial grounds. This phenomenon is referred to as the "energy paradox" or "energy efficiency gap" (Gerarden et al., 2017). The energy efficiency gap can be defined as the disparity between the cost-minimizing level of energy efficiency and the actual level achieved (Allcott & Greenstone, 2012). Market failures and barriers to energy efficiency can explain the gap between cost-effective energy efficiency measures and the measures implemented (Backlund et al., 2012). Numerous studies have demonstrated that overcoming internal barriers is crucial for improving energy efficiency within organizations.

Given the crucial role of energy in companies' competitiveness, there is a need to integrate energy management into strategic management. Strategic management has undergone significant changes in the 21st century due to market shifts brought about by the Fourth Industrial Revolution, necessitating organizations to create new business models that can timely and proactively respond to external challenges (Schwab, 2016). Consequently, modern organizations must redefine their management systems to be more customer-oriented, constantly innovate their products, improve efficiency, and address the community's and natural environment's needs.

The literature often describes the application of energy efficiency measures in organizations as a function of the energy management system and market conditions. However, the influence of general organizational factors, reflected in the maturity of strategic management and organizational characteristics, has not been adequately explored. Investigating these factors could shed light on the necessary organizational changes required to increase the adoption of energy efficiency measures. This approach would facilitate the establishment of a corporate foundation necessary for optimal energy efficiency improvements.

The remainder of the paper will focus on the theoretical and practical analysis of organizational factors influencing companies' adoption of energy efficiency measures. Firstly, this paper will provide a comprehensive review and comment on previous research on factors that influence decision-making when implementing energy efficiency measures in companies. Subsequently, the article will outline the methodology employed in this research. The main emphasis will be on presenting the findings, followed by a relevant discussion.

## Literature Review

Based on an extensive literature review, Cagno et al. (2013) identified several organizational factors identified in research as barriers to decision-making regarding improving energy efficiency in companies. Those factors are complex decision chains, lack of internal control, information on costs and benefits, imperfect evaluation criteria, and lack of sharing objectives. Fresner et al. (2017) researched improving energy efficiency in small and medium-sized enterprises in Europe. They found that the lack of information, awareness, and financial resources is the main obstacle to the greater use of energy-saving potential. Based on a sample of 480 small and medium-sized enterprises in China, Kostka et al. (2013) found that apart from the previously mentioned barriers, small and medium-sized firms that lack clear management responsibilities for energy efficiency show less investment activity in energy-efficient practices and technologies. Through research on barriers to improving energy efficiency in the steel industry in Indonesia, Soepardi et al. (2018) determined that the managerial-organizational factor has the biggest direct effect on improvements and is the most significant factor. In this case, the managerial-organizational factor includes the low status of the in-house management program related to energy efficiency measures, resistance to change, and a complex decision chain. Blomqvist et al. (2022) point out that the main barriers to improving the energy efficiency in buildings in Sweden are: 1) a lack of time to work on energy efficiency or that other tasks are prioritized, 2) a tight working group, which may hinder the capability and know-how when investigating energy efficiency investments, 3) energy manager lacks influence, uncertainty about the future of the business, and management does not prioritize energy issues. Cantore (2017) finds that firms' internal management and organizational factors, rather than top-down or other external market conditions increase firms' likelihood to invest in energy-efficient technologies.

Moreover, experience in adopting energy-efficient technologies and the commitment of top management are also crucial in this regard. According to Olsthoorn et al. (2017), organizations that are more likely to adopt energy efficiency measures are those with energy managers in place and have also conducted energy audits in the past. Based on the previously presented research results, it can be concluded that organizational factors positively influence decision-making on implementing energy efficiency measures and can be considered barriers or drivers. In this regard, it is proposed to establish an energy management system in the organization, which would enable constant energy savings and carbon footprint reduction.

Several energy management maturity models are described in the literature, providing a systematic framework for benchmarking and performance improvement (Introna et al., 2014). These maturity models are mainly based on the principles of the international standard for energy management - ISO 50001 (ISO, 2018; Antunes et al., 2014; Introna et al., 2014; Jovanović & Filipović, 2016; Jin et al., 2021; Monteiro et al., 2022). When energy efficiency is perceived as a strategic goal, companies tend to have a high level of energy management. The better the energy management system is, the more likely the chances are for a positive decision on energy-efficiency investment (Cooremans & Schönenberger, 2019). The presented models highlight the importance of achieving high energy management maturity as a prerequisite for improving energy efficiency in organizations. However, these models do not sufficiently consider the possible influence of general organizational aspects on adopting energy efficiency measures. In this regard, there is considerable scope for research in this domain. As mentioned earlier, improving energy efficiency in an organization is a type of organizational improvement that can be compared to innovation. Accordingly, there is a basis to check whether organizational factors that affect innovation in companies also affect the implementation of energy efficiency measures.

According to Pitić & Vučković (2021), organizational factors that positively contribute to innovation in organizations are: 1) a formalized, written business strategy with clear key performance indicators, 2) production targets such as production volume, quality, efficiency, waste, or on-time delivery, 3) as many performance indicators that are monitored at the company, 4) internationally recognized quality certification, 5) regular implementation of formal training programs for company's permanent, full-time employees, 6) high awareness of management and employees about the company's production targets, 7) spending on the acquisition of external knowledge, 8) spending on research and development activities within the company. It was also found that organizations with many employees operate on the international market and have difficulties in achieving their goals, more often introducing innovations in their products and processes.

## Methodology

Based on the literature review, it is evident that factors related to energy management systems play a crucial role in decision-making regarding adopting energy efficiency measures in organizations. Therefore, it is important to

identify and examine the influence of several of these factors. Additionally, considering the methodological similarity between implementing energy efficiency measures and introducing organizational innovations, it is worth investigating whether strategic management factors affect energy efficiency improvements in companies.

The analysis in this paper was conducted using a sample of 339 organizations obtained from The World Bank Enterprise Survey (The World Bank, 2019), which focuses on the business environment in Serbia. The World Bank provides access to the data collected in the survey at the individual company level, making it suitable for various statistical analyses. In this study, the raw data collected during the World Bank Enterprise Survey in Serbia were subjected to further statistical processing by the authors.

The World Bank Enterprise Survey in Serbia was conducted in 2019 and included companies from various industries and sizes regarding the number of employees. The survey covered topics such as general firm/establishment information, infrastructure, and services, sales and supplies, management practices, competition, innovation, capacity, time use of top management, land and permits, crime, finance, business-government relations, labor, business environment, performance, green economy module, and environment-related aspects. The sample consisted of companies ranging in size from five to 13 thousand employees (The World Bank, 2019).

The World Bank Enterprise Survey sample in Serbia was selected using stratified random sampling. The country was stratified by industry, establishment size, and region. As is standard for The World Bank Enterprise Surveys, the survey in Serbia employed the following establishment size stratification: small (5 to 19 employees), medium (20 to 99 employees), and large (100 or more employees). Regional stratification was carried out across four equally populated regions of Serbia. The industries covered by the survey included manufacturing, retail trade, wholesale trade, construction, hotel or restaurant, and services. The survey was implemented through a two-stage procedure. Initially, a screener questionnaire was conducted over the phone to determine eligibility and schedule appointments. Subsequently, face-to-face interviews were conducted with each establishment's Manager/Owner/Director. The questionnaires consisted of common questions (core module) as well as additional manufacturing- and services-specific questions. The response rate was 36.5% (The World Bank, 2020).

Based on the raw data collected as part of the World Bank Enterprise Survey in Serbia, the authors of this paper

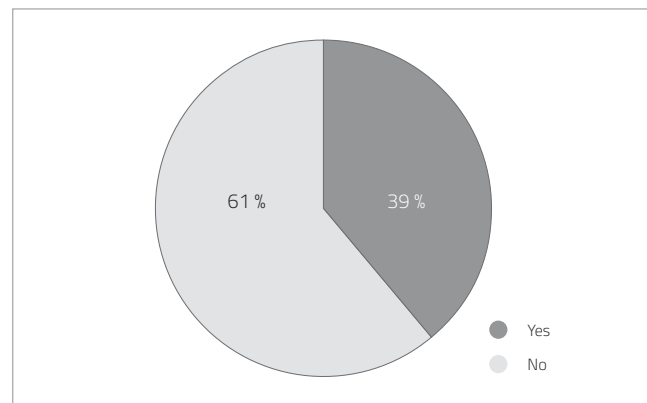
conducted a correlation analysis between organizational characteristics and the adoption of energy efficiency measures in companies in Serbia. The correlation analysis was performed using the Chi-square coefficient and Cramer's V test. Sixteen organizational characteristics, selected as independent variables, were derived from the questionnaire based on a review of relevant literature and the assumption that these characteristics may influence the adoption of energy efficiency measures. The dependent variable focused on whether a particular organization had adopted any energy efficiency measure in the previous three years. All variables were categorical since the questionnaire consisted of closed questions. The analysis was conducted using SPSS software.

## Results and Discussion

Based on the raw data collected from the World Bank Enterprise Survey in Serbia, we discovered that more than half of the companies in Serbia did not adopt energy efficiency measures within 3 years before the survey (Figure 1).

**Figure 1**

*Adoption of energy efficiency measures over the last three years*



Source: The World Bank, 2019 and authors' calculation

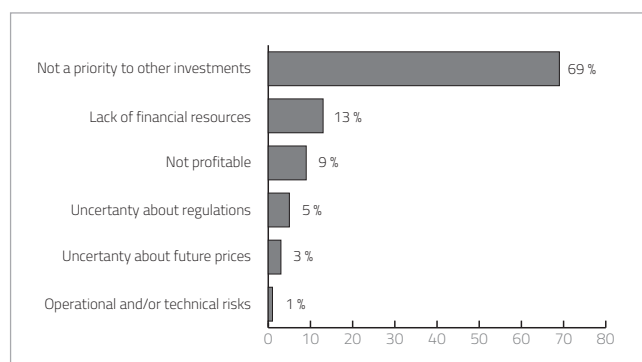
As the most important reason for not adopting energy efficiency measures, the respondents pointed out that adopting these measures is not a priority relative to other investments (Figure 2).

The results presented in Figures 1 and 2 indicate that there is not a sufficiently raised awareness in Serbia of the need to reduce energy consumption and the multiple benefits that the implementation of energy efficiency measures brings.



**Figure 2**

*Reasons for not adopting energy efficiency measures over the last three years*



Source: *The World Bank, 2019 and authors' calculation*

Based on the raw data collected within the World Bank Enterprise Survey in Serbia, this paper further presents the results of the correlation analysis between certain variables of energy management, organization's management, and the adoption of energy efficiency measures within three years before the survey. Table 1 shows the results of the correlation analysis between these variables.

The correlation analysis presented in Table 1, reveals that the implementation of energy efficiency measures in companies is largely influenced by factors within the internal organizational environment. The research demonstrates that companies with a higher management maturity are more likely to have adopted energy efficiency measures in the past three years. Specifically, companies that implemented energy efficiency measures also had: 1) a formalized, written business strategy with clear key performance indicators, 2) strategic objectives that address environmental or climate change issues, 3) production targets related to volume, quality, efficiency, waste, or on-time delivery, 4) an internationally recognized quality certificate, and 5) a performance monitoring system. Additionally, the analysis indicates that companies that adopted energy efficiency measures in the past three years are predominantly large companies operating in international markets. However, the industry to which a company belongs does not appear to influence the adoption of energy efficiency measures.

Furthermore, the correlation analysis reveals that companies with a high energy management maturity are likelier to have adopted energy efficiency measures in the past three years. Specifically, companies that implemented energy efficiency measures also applied the energy performance standard and had: 1) a manager responsible for environmental and climate change issues, 2) an

energy consumption monitoring system, and 3) targets for energy consumption. Moreover, the analysis demonstrates that companies that introduced product and/or process innovation in the past three years were more likely to have implemented energy efficiency measures during the same period.

Based on the correlation analysis results, each organizational factor's influence on adopting energy efficiency measures is explained in greater detail.

Having a formalized, written business strategy with clear key performance indicators positively affects an organization's adoption of energy efficiency measures. Namely, companies use strategy to define the direction of their long-term business and how they strive to achieve a sustainable competitive advantage. In this regard, companies, through their strategies, among other things, express their commitment to achieving business efficiency and in recent years, their commitment to reducing energy consumption and environmental footprint. Thus, the very existence of an organizational strategy is the basis for defining and implementing specific energy efficiency measures. Closely related to this factor is the one that indicates that having strategic objectives that mention environmental or climate change issues also positively affects the implementation of energy efficiency measures. Namely, with the growing problem of climate change, many organizations have decided to integrate their impact on the environment into their organizational strategies. An essential pillar of the strategy of many modern organizations is reducing energy consumption, waste in production and services, water use, and emission of harmful substances, and using more energy from renewable sources. In this way, companies can contribute to sustainable development. Accordingly, organizations aware of the importance and benefits of reducing energy consumption create strategies whose integral part is the implementation of energy efficiency measures.

Defining production goals regarding production volume, quality, efficiency, waste, and on-time delivery also positively affects the implementation of energy efficiency measures in an organization. Namely, business goals imply effectiveness and efficiency in performing business activities. Efficiency is measured as the ratio of invested input and achieved output, and organizations aspire to produce their products or services at the lowest possible costs. Energy costs in buildings and production processes also contribute to the organization's total costs. Therefore, organizations that strive for production efficiency also strive for energy efficiency. In other words, organizations that define clear and precise production goals

**Table 1***Correlation between organizational factors and the adoption of energy efficiency measures*

Organizational factors	Energy efficiency	Adoption of energy efficiency measures over the last three years (Yes/No)	
		Chi square	Cramer's V
Having a formalized, written business strategy with clear key performance indicators (Yes/No)		24.211**	0.272**
Having strategic objectives that mention environmental or climate change issues (Yes/No)		24.672**	0.273**
Having production targets such as production volume, quality, efficiency, waste, or on-time delivery (Yes/No)		4.535*	0.149*
Monitoring of performance indicators (Yes/No)		11.774**	0.242**
Internationally recognized quality certification (Yes/No)		23.203**	0.268**
The main market in which the company sells its main product (Local / National / International)		7.592*	0.151*
Company's size - number of employees (Small / Medium / Large)		10.093**	0.174**
Company's main activity and product (Manufacturing / Retail trade / Wholesale trade / Construction / Hotel or restaurant / Services)		10.673	0.179
Having a manager responsible for environmental and climate change issues (Yes/No)		18.976**	0.239**
Monitoring of energy consumption (Yes/No)		29.586**	0.299**
Having targets for energy consumption (Yes/No)		64.505**	0.441**
Application of energy performance standard (Yes/No)		26.639**	0.288**
Introduction of new or improved products or services over the last three years (Yes/No)		12.604**	0.196**
Introduction of new or improved processes over the last three years (Yes/No)		4.903*	0.122*

Source: The World Bank, 2019 and authors' calculation

Notes: A mark (\*) indicates a correlation where the significance is less than 0.05, while (\*\*) indicates a correlation with a significance less than 0.01. The brackets show the answers offered in the questionnaire for each question concerning the given organizational characteristics.

also strive to improve energy efficiency, thereby reducing their overall costs.

Monitoring performance indicators in the organization is another factor that positively affects the more frequent application of energy efficiency measures in organizations. Namely, the indicators include measuring various aspects of organizational performance, including those related to business efficiency. Organizations that strive to have insight into the efficiency of operations, i.e., consumption of resources concerning the achieved performance, inevitably try to look at energy costs as well. Insight into energy consumption and costs is a prerequisite for spotting room for improvement in energy

efficiency. Therefore, only organisations that are aware of their costs and performance will strive to improve the organization's overall efficiency by implementing energy efficiency measures.

Correlation analysis has determined that organizations with a certified international quality management standard introduce energy efficiency measures more regularly. Namely, these standards prescribe establishing a management system in the organization based on principles that, among other things, imply the implementation of continuous improvements. These ongoing improvements are implemented to meet the needs of users better, but also to improve organizational efficiency. In

this regard, organizations whose management systems align with international quality standards systematically look for opportunities for continuous improvement, and energy efficiency measures are recognized as one of such opportunities.

Applying energy efficiency measures is more common in large companies and companies operating in the international market. Namely, large companies are also significant energy consumers, so they try to reduce costs in this domain as much as possible. Also, large companies, unlike small and medium-sized ones, often have sufficient financial resources to implement energy efficiency measures. However, it should be noted that many energy efficiency measures require minimal investment, and sometimes they are entirely free, so they can be applied even by organizations with smaller financial resources. Smaller companies can also improve their business in the long term by reducing energy consumption, but it is necessary to work on raising their awareness of this.

International companies more often apply energy efficiency measures when it comes to the market in which they operate dominantly. Namely, these companies compete with a significant number and stronger competitors than local or national companies, so they take more care of their costs and strive to improve efficiency wherever possible. The fact is that high energy costs make end products more expensive and reduce the competitiveness of companies, regardless of the market in which they operate. Therefore, improving energy efficiency could be a way for companies to strengthen their international position and accelerate their development in local or national markets.

The sector in which the company operates has no influence on adopting energy efficiency measures, which indicates that these measures benefit organizations in all industries. In other words, the adoption of energy efficiency measures can improve the business of both manufacturing and service organizations.

When it comes to variables related to energy management, the correlation analysis has shown that organizations, which monitor energy consumption, have goals related to energy consumption, have a manager responsible for the environment, apply energy performance standards, and have implemented energy efficiency measures recently. The prerequisite for implementing energy efficiency measures in an organization is a system for regular monitoring and energy consumption planning. In this regard, it is clear that the implementation of energy efficiency measures must be preceded

by establishing an energy management system in an organization, which would be based on the principles of transparency, traceability, and repeatability.

In this research, it was shown that organizations that implemented product and/or process innovation three years before the research also implemented some of the energy efficiency measures in the same period. In other words, highly innovative organizations more often implement energy efficiency measures. This result can be interpreted as the fact that the modern business environment requires companies to be innovative and committed to sustainable development. Consequently, innovation and reducing energy consumption are often the pillars of proactive companies' strategies and therefore go hand in hand.

## Conclusion

The problem of climate change is gaining momentum, and its negative consequences are becoming visible in every part of the world. In this regard, organizations worldwide are proactively or legally compelled to take measures to reduce their environmental footprint while ensuring their business results are not jeopardized. Caring for the environment also often contributes to a better organizational image and greater competitiveness. Improving energy efficiency in organizations leads to multiple benefits, including reduced energy consumption, lower energy costs, decreased emissions of harmful gases and particles, and improved comfort for building users. These benefits are crucial for organizations, and thus the adoption of energy efficiency measures represents a type of organizational improvement that positively reflects on the long-term competitive advantage of the organization in various ways.

This paper presents the results of a correlation analysis that examined whether and which organizational factors influence the adoption of energy efficiency measures in companies in Serbia. The research utilized raw data from the World Bank Enterprise Survey in Serbia in 2019. The correlation analysis revealed that higher management maturity positively contributes to implementing energy efficiency measures in companies. In other words, strategically oriented companies with functional energy management systems and innovative products and processes are more likely to apply energy efficiency measures. Furthermore, the analysis found that larger companies and those operating in the international market are more inclined to adopt energy efficiency measures. However,

the industry in which the company operates does not affect the application of energy efficiency measures.

Consequently, improving energy efficiency should become part of an organization's business strategy, strategic goals, and plans. Following the research results presented in this paper, including energy management in the business strategy, goals, and indicators of an organization's performance increases the likelihood that the organization will promptly implement measures to improve energy efficiency. In other words, including energy efficiency in the organization's strategic management serves as the foundation for a systematic and dedicated energy management approach.

Through the business strategy, organizations define the necessary actions to direct their business toward creating a long-term competitive advantage. A strategic framework is established for implementing energy efficiency measures that enable optimal energy consumption by including energy efficiency in the business strategy. However, to contribute to optimal results, energy management within an organization must align with the guidelines defining a functional management system. The guidelines for establishing a functional energy management system are outlined in the ISO 50001 Standard. Nevertheless, many organizations dedicated to optimal

energy consumption can successfully manage their energy management systems without certification according to this standard. The energy management system is based on the same principles as any other management system within an organization. Therefore, it is possible to establish an energy management system that contributes to optimal energy consumption even without certification. Nonetheless, such a system must include elements defined by the ISO 50001 Standard, such as energy management system procedures, energy management goals, energy performance indicators, methods for planning, monitoring, and forecasting energy consumption, record-keeping of energy consumption, and the appointment of a responsible person for the energy management system. Adhering to these guidelines enables consistent implementation of the part of the business strategy concerning the organization's energy efficiency.

The analysis presented in this paper is limited exclusively to the factors of the internal organizational environment. However, scientific literature indicates that various external factors, such as energy prices, influence decision-making regarding implementing energy efficiency measures in companies. Therefore, future research should examine the combined influence of external and internal factors, particularly in today's technological development and global energy crises.

## References

- Allcott, H. & Greenstone, M. (2012). Is there an energy efficiency gap? *Journal of Economic Perspectives*, 26(1), 3-28. DOI: 10.1257/jep.26.1.3
- Antunes, P., Carreira, P., & da Silva, M. M. (2014). Towards an energy management maturity model. *Energy policy*, 73, 803-814. DOI: 10.1016/j.enpol.2014.06.011
- Backlund, S., Thollander, P., Palm, J., & Ottosson, M. (2012). Extending the energy efficiency gap. *Energy Policy*, 51, 392-396. DOI: 10.1016/j.enpol.2012.08.042
- Blomqvist, S., Ödlund, L., & Rohdin, P. (2022). Understanding energy efficiency decisions in the building sector – A survey of barriers and drivers in Sweden. *Cleaner Engineering and Technology*, 9, 100527. DOI: 10.1016/j.clet.2022.100527
- Cagno, E., Worrell, E., Trianni, A., & Pugliese, G. (2013). A novel approach for barriers to industrial energy efficiency. *Renewable and Sustainable Energy Reviews*, 19, 290-308. DOI: 10.1016/j.rser.2012.11.007
- Cantore, N. (2017). Factors affecting the adoption of energy efficiency in the manufacturing sector of developing countries. *Energy Efficiency*, 10(3), 743-752. DOI: 10.1007/s12053-016-9474-3
- Capehart, B. L., Turner, W. C., & Kennedy, W. J. (2006). *Guide to energy management*. Boca Raton, USA: Crc Press.
- Cooremans, C. & Schönenberger, A. (2019). Energy management: A key driver of energy-efficiency investment? *Journal of Cleaner Production*, 230, 264-275. DOI: 10.1016/j.jclepro.2019.04.333
- Di Foggia, G. (2021). Energy-efficient products and competitiveness in the manufacturing sector. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 33. DOI: 10.3390/joitmc7010033
- EC (2023). *Energy use by businesses and households – statistics*. European Commission – Eurostat. Retrieved from [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy\\_use\\_by\\_businesses\\_and\\_households\\_-\\_statistics&oldid=583806](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_use_by_businesses_and_households_-_statistics&oldid=583806)
- Economist Intelligence (2023). *Energy Outlook 2023*. A Report by EIU. Retrieved from <https://www.eiu.com/n/campaigns/energy-in-2023/>
- Fresner, J., Morea, F., Krenn, C., Uson, J. A., & Tomasi, F. (2017). Energy efficiency in small and medium enterprises: Lessons learned from 280 energy audits across Europe. *Journal of Cleaner Production*, 142, 1650-1660. DOI: 10.1016/j.jclepro.2016.11.126

- Gerarden, T. D., Newell, R. G., & Stavins, R. N. (2017). Assessing the energy-efficiency gap. *Journal of economic literature*, 55(4), 1486-1525. DOI: 10.1257/jel.20161360
- Harris, D. (2016). *A guide to energy management in buildings*. Abingdon, UK: Taylor & Francis.
- Introna, V., Cesarotti, V., Benedetti, M., Biagiotti, S., & Rotunno, R. (2014). Energy Management Maturity Model: an organisational tool to foster the continuous reduction of energy consumption in companies. *Journal of cleaner production*, 83, 108-117. DOI: 10.1016/j.jclepro.2014.07.001
- ISO (2018). *ISO 50001: Energy management systems – Requirements with guidance for use*. Geneva, Switzerland: International Standardization Organisation.
- Jin, Y., Long, Y., Jin, S., Yang, Q., Chen, B., Li, Y., & Xu, L. (2021). An energy management maturity model for China: Linking ISO 50001:2018 and domestic practices. *Journal of Cleaner Production*, 290, 125168. DOI: 10.1016/j.jclepro.2020.125168
- Jovanović, B. & Filipović, J. (2016). ISO 50001 standard-based energy management maturity model – proposal and validation in industry. *Journal of Cleaner Production*, 112, 2744-2755. DOI: 10.1016/j.jclepro.2015.10.023
- Kostka, G., Moslener, U., & Andreas, J. (2013). Barriers to increasing energy efficiency: evidence from small-and medium-sized enterprises in China. *Journal of Cleaner Production*, 57, 59-68. DOI: 10.1016/j.jclepro.2013.06.025
- Mihic, M. M., Petrovic, D. C., & Vuckovic, A. M. (2014). Comparative analysis of global trends in energy sustainability. *Environmental Engineering & Management Journal (EEMJ)*, 13(4). DOI: 10.30638/eemj.2014.099
- Mihic, M. M., Petrovic, D. C., Vučković, A. M., Obradović, V. L., & Đurović, D. M. (2012). Application and importance of cost-benefit analysis to energy efficiency projects in public buildings: The case of Serbia. *Thermal Science*, 16(3), 915-929. DOI: 10.2298/TSCI110911090M
- Monteiro, N. J., de Oliveira, R. M. E. S., da Costa, S. E. G., Deschamps, F., & de Lima, E. P. (2022). Energy Management Maturity Models: Literature Review and Classification. *Industrial Engineering and Operations Management: XXVIII IJCIEOM, Mexico City, Mexico, July 17-20, 2022*, 49-58. DOI: 10.1007/978-3-031-14763-0\_5
- Olsthoorn, M., Schleich, J., & Hirzel, S. (2017). Adoption of energy efficiency measures for non-residential buildings: technological and organisational heterogeneity in the trade, commerce and services sector. *Ecological Economics*, 136, 240-254. DOI: 10.1016/j.ecolecon.2017.02.022
- Pitić, G. & Vučković, A. (2021). Organisational Factors of Innovativeness in Serbian Enterprises. *Naše gospodarstvo/Our economy*, 67(2), 20-28. DOI: 10.2478/ngoe-2021-0009
- Schwab, K. (2016). *The Fourth Industrial Revolution*. Geneva, Switzerland: World Economic Forum.
- Soepardi, A., Pratikto, P., Santoso, P. B., Tama, I. P., & Thollander, P. (2018). Linking of barriers to energy efficiency improvement in Indonesia's steel industry. *Energies*, 11(1), 234. DOI: 10.3390/en11010234
- The World Bank (2019). *The Serbia 2019 Enterprise Survey Data Set*. Retrieved from <https://www.enterprisesurveys.org/en/data/exploreconomies/2019/serbia>
- The World Bank (2020). *The Serbia 2019 Enterprise Survey*. Retrieved from <https://microdata.worldbank.org/index.php/catalog/3721>
- Vučković, A. & Pitić, G. (2022). New technologies in energy management systems of buildings. *Ekonomika preduzeća*, 70(1-2), 75-86. DOI: 10.5937/EKOPRE2202075P

## Vpliv organizacijskih dejavnikov na sprejemanje ukrepov energetske učinkovitosti v podjetjih

### Izvleček

Namen tega članka je raziskati organizacijske dejavnike, ki vplivajo na sprejemanje ukrepov za energetske učinkovitost v podjetjih. Analiza je bila opravljena na vzorcu podjetij iz Srbije, vključenih v raziskavo Svetovne banke o podjetjih. Za analizo povezanosti med različnimi organizacijskimi dejavniki in izvajanjem ukrepov za energetske učinkovitost so bili uporabljeni neobdelani podatki, ki jih je zbrala Svetovna banka. Analiza je pokazala statistično pomembno povezanost med zrelostjo upravljanja in izvajanjem ukrepov za energetske učinkovitost v podjetjih. Te ugotovitve kažejo, da izboljšanje energetske učinkovitosti ni izoliran proces, temveč je tesno povezan z zrelostjo upravljalških praks, kar poudarja pomen celovitega organizacijskega razvoja za doseganje optimalnega upravljanja z energijo.

*Ključne besede:* energetska učinkovitost, energetske upravljanje, zrelost upravljanja, organizacijski dejavniki, Srbija

# Tourism Demand in Tunisia: A VECM Approach

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## Abstract

This research aimed to study the determinants of tourism demand in Tunisia from 1995 to 2019 with four independent variables: gross domestic product, consumer price index, the real exchange rate, and air transport passengers carried. The research employed the Unit root test, Co-integration test, and Vector Error Correction model (VECM) to examine the variables' short- and long-run relationship dynamics. The results show that co-integrating relations exist among the variables; all independent variables negatively impact tourism demand except Air transport. Depending on the results obtained, policymakers should be aware of the negative effect of the country's political instability on the extent of external tourism demand. In this sense, the government must restore political stability to encourage tourists to visit Tunisia. Future studies should consider factors such as the economy's trade openness and oil prices.

## Introduction

Tourism is one of the world's major economic sectors, mainly because of the creation of wealth and employment (Hącia, 2019) and its positive spillover effects. It represents the key lever of socio-economic development in many developing countries. In a globalized world, where this sector is growing strongly and continuously, Tunisia must seize this strategic opportunity to position itself favourably and sustainably on the chessboard of the global tourism industry. Tunisia's tourism competitiveness has always been held thanks to its natural assets, geographical position, thousand-year-old history, and rich and diversified heritage. Tourism is a significant source of economic growth in this country (Suhel & Bashir, 2018) because of its contribution to covering the trade balance deficit (Jin et al., 2021) and solving the unemployment problem. At the same time, the tourism sector in Tunisia reveals a strong seasonal behaviour, resulting in a concentration of demand limited to a few months of the year. The key reason for such a situation is Tunisian tourism's seaside nature, which attracts the largest public during the high season (July, August, and September). The seasonality negatively

affects the profitability of this sector and its financial performance. To remedy this situation, the tourism authorities are anxious to spread the tourism demand over the year, bringing multiple benefits.

## Literature Review

Several studies have examined the variables that impact tourism demand since the earliest research on this subject was published in the 1960s. These studies employed varying methodologies and considered different timeframes and geographical regions. Great strides have since been made by relying on the ever-increasing availability of data and the advancement of econometric methods. This paper responds to numerous empirical studies relating to tourism demand.

The study related to the determinants of tourism demand (Martins et al., 2017), which employs an unbalanced panel of 218 countries from 1995 to 2012, shows that an increase in global GDP per capita, a devaluation of the country's currency, as well as a decrease in relative domestic costs, raise tourism demand. The same approach was adopted in the study of Pavlic and co-authors (2015), which indicated the stability of the long-term equilibrium relationship between tourist arrivals, economic openness, the real effective exchange rate, and gross domestic flows from 1996-2013 in Croatia. Similarly, Ongan and co-authors (2017) examine the effects of real exchange rates and income on inbound tourism (tourist arrivals) of the United States from Germany, France, the United Kingdom, the Netherlands, Italy, Spain, and Sweden in the period from 1996Q3 to 2015Q1. Panel co-integration analysis was performed using the cross-sectional dependence test and the common correlated effects (CCE) technique. According to these empirical findings, tourists visiting the United States, were sensitive to changes of the real exchange rate more than to changes in GDP. Conversely, to French tourists, GDP gained importance, while the real exchange rate was of higher significance to British tourists. Rafiei and Abbaspoor (2021) investigated the impact of the exchange rate increase on Iran's domestic tourism demand. Following their findings, demand for domestic travel decreases for all households after the exchange rate was raised by 50%.

Applying panel data collected over seven years for 32 countries (2000-2007), Göçer and co-authors (2010) analyzed the socio-economic factors influencing Turkey's demand for international tourists. They found out, firstly, that the actual income of different groups in their countries of origin, the value of trade between the origin countries and Turkey, and the accommodation capacity are positively related to

tourism demand. Contrary to what was expected, travel costs and exchange rates positively affected the number of tourists. The authors explain this finding by elucidating that Turkey provides relatively low-cost vacation packages. The researchers considered the official visits of the Turkish president and prime minister to the countries of origin in their model, which further illuminates the uniqueness of this study. It showed that this variable has a positive value despite its statistical irrelevance.

Using a panel data approach, Tavares and Leitaó (2016) examined the factors influencing Brazil's international tourism demand. The authors endeavoured to determine the most important factors for foreign tourists to travel to Brazil from 2004 to 2013 using exchange rate, distance, and inflation rate as independent variables. They showed that the exchange rate was positively correlated to tourism demand. Khoshnevis Yazdi and Khanalizadeh (2016) used the Gravity framework to determine the coefficients of the factors that affected foreign tourism demand in the United States from 1995 to 2014. Autoregressive Distributed Lag methods were used to look at a panel dataset of tourists' visits in 14 countries. The findings show that the real gross domestic product, consumer price index, real exchange rate, and certain events considerably affect the number of people who want to travel internationally. Baghirov and Sarkhanov (2023) examined the relationship between tourism receipts, the volume of foreign visitors, and the consumer price index in a few African nations with significant tourism receipts. According to their findings, there is a statistically significant long-term relationship between tourism revenues, the number of international tourists, and the consumer price index, with the number of international tourists having a positive effect and the consumer price index having a negative impact.

Given tourism's role in the Tunisian economy, our research completed what had been approached in some previous studies (e. g., Balsalobre-Lorente et al., 2021); the task at hand was selecting the determinants of tourism demand in Tunisia using the independent variables that were used in previous studies, such as real gross domestic product, consumer price index, and air transport.

## Data and Model Estimation

### Data

As Ivanovski and co-authors (2018) indicated, visitor arrivals remain the primary metric in tourism-demand research. In our study, tourism demand (TOURISM) is evaluated by the number of tourists arriving from the

country of origin to the destination country (Tunisia). CPI is Consumer price index (2010 = 100) of the country of origin to CPI of the destination country (Tunisia), GDP is real gross domestic product per capita of the country of origin to destination (Tunisia) GDP/capita, in \$ US courants, REXCH is the real exchange rate in LCU per US\$, the air transport (AIR TRANSPORT) is the total number of passengers carried at flights in the international airports in Tunisia. We used annual time series data on tourist arrivals from 1995-2019 as a dependent variable for the international tourism demand. The data for all variables were gathered from the World Bank database.

## Model

Our research is based on Khoshnevis Yazdi and Khanalizadeh (2016) methodology, with some changes to the variables employed to accommodate the accessible data and the Tunisian study case. We employed the Unit root test, Co-integration test (Bozkurt, 2014), and Vector Error Correction Model (VECM) by using the Eviews-10 package. The model is the following:

$$TOURISM = F(CPI, GPD, REXCH, AIRTRANSPORT) \quad (1)$$

where:

*TOURISM* is international tourism demand (the number of visitors)

*CPI* is the consumer price index (Consumer price index (2010 = 100))

*GDP* is real gross domestic product (GDP per capita (in current US\$))

*REXCH* is real exchange rate (Official exchange rate (LCU per US\$, period average)

*AIRTRANSPORT* represents passengers carried by air transport.

In the research we used the Johansen Co-integration test and the Vector Error Correction model (VECM) to investigate the long-term equilibrium and short-term dynamic relationship between tourism demand and selected independent variables for Tunisia. The VECM model is commonly used to investigate long-term and short-term equilibrium relationships including co-integration variables. If the variables in this study are cointegrated, the VECM equation is as follows:

$$\begin{aligned} \Delta TOURISM_t = & \beta_0 + \sum_{i=0}^n \beta_1 \Delta TOURISM_{t-i} + \\ & + \sum_{i=0}^n \beta_2 \Delta CPI_{t-i} + \sum_{i=0}^n \beta_3 \Delta GPD_{t-i} + \\ & + \sum_{i=0}^n \beta_4 \Delta REXCH_{t-i} + \sum_{i=0}^n \beta_5 \Delta AIRTRANSPORT_{t-i} + U_t \end{aligned} \quad (2)$$

where:

$\Delta$  is the 1st difference,  $t$  is time,  $i$  is number of lags

$ECT_{t-1}$  is the error correction term lagged one period

$\beta_6$  is the long-run coefficient of the error correction term

$\beta_0$  is the intercept (constant)

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  are coefficients, and

$U$  is error term.

## Findings

### Descriptive statistics

To test the determinants of tourism demand in Tunisia, we began the empirical research with a preliminary analysis of the variables utilized. The descriptive statistics are shown in Table 1.

Descriptive statistics show the unique features of the data used. For example, the average mean and median value of GDP (3.42E+10), i.e., real GDP, is the highest among the values of other variables (i.e., CPI = 96.46180, TOURISM = 6157080, REXCH = 1.537644, AIR TRANSPORT = 266883, respectively). Table 1 also demonstrates that 27.48830 is the maximum and 4.76E+10 is the minimum value of GDP, thus, this variable is highly volatile. The statistics of kurtosis and skewness were also computed from a sample of 25 observations. The findings show that all the variables are positively skewed except the GDP value. Evidence derived from the Jarque – Bera (JB) normality test shows that all the variables used in the model are normally distributed. The variables are first differenced and computed by the ratio relative to the prior observation.

### Stationarity testing

First, our study performs unit root tests for tourism demand and other independent variables (CPI, GDP, REXCH, and AIR TRANSPORT). If these variables are non-stationary, it will be necessary to establish the orders of integration for the variables in question. Table 2 shows the result of PP and ADF tests. The tests are employed to identify the existence of unit root in each series and, therefore, to allow us to establish whether the variables are stationary of order 0, I (0), or if they follow a non-stationary trend of order 1, I (1) or even of a higher order.

As can be seen from Table 2, all the series at non-stationary because the null hypotheses are not rejected at a 5 percent level of significance for a constant, and a



constant and a trend in all cases. However, all five variables are stationary at 1st difference; I (1) as the H0 of unit roots at difference are rejected at 1 percent significance level for both the constant and the constant plus trend case. This analysis demonstrates that no data series is stationary at the level, however, they are stationary at the first difference. As a result, these variables may have a long-term relationship. Thus, keeping this view, we employ Johansen's co-integration approach to discover long-run relations as the next step.

### Johansen co-integration test

This research employs Johansen co-integration test (Bozkurt, 2014). When all time series are non-stationary,

assessing whether there is a long-term relationship between the variables is necessary. The author uses the VAR (Vector Autoregressive) order of 2 as selected by the Akaike criterion based on the levels of the VAR model (Table 3). The findings from Johansen co-integration tests show a unique long-term or equilibrium link between variables. Both trace statistics and  $\lambda$ -max statistics demonstrate that there appears to be one co-integrating vector at a 5% significance level (Table 4).

The co-integration analysis makes it possible to identify the proper relationship between two variables by investigating the existence of a co-integrating vector (Tang & Tan, 2015). In our example, the Johansen test

**Table 1**

*Descriptive statistics of model parameters*

	TOURISM	CPI	GDP	REXCH	AIRTRANSPORT
Mean	6157080.	96.46180	3.42E+10	1.537644	2668837
Median	5998000.	89.46071	3.88E+10	1.370683	2054679
Maximum	9429000.	155.3250	4.76E+10	2.934433	4648608
Minimum	3885000.	63.11477	1.80E+10	0.945750	1371200
Std. Dev.	1413026.	26.22821	1.03E+10	0.508429	1070935
Skewness	0.328579	0.693842	-0.264807	1.418518	0.659198
Kurtosis	2.446240	2.443492	1.462616	4.175255	1.939310
Jarque-Bera	0.769279	2.328509	2.754208	9.822909	2.982534
Probability	0.680696	0.312155	0.252308	0.007362	0.225087
Sum	1.54E+08	2411.545	8.54E+11	38.44110	66720926
Sum Sq. Dev.	4.79E+13	16510.05	2.54E+21	6.203990	2.75E+13
Observations	025	025	025	025	025

Source: Author's research

**Table 2**

*Stationarity test results*

			TOURISM	CIP	GDP	REXCH	AIRTRANSPORT
PP test	Level	t-Stat	-0.5860	-1.5680	2.0236	-1.8274	-0.4512
		Prob	0.8562	0.4829	0.9997	0.3586	0.8846
	First Diff	t-Stat	-4.1869***	-3.1141**	-4.4865***	-8.4209***	-3.9136***
		Prob	0.0038	0.0395	0.0020	0.0000	0.0070
ADF test	Level	t-Stat	-0.8438	-1.6661	3.5524	-1.9943	-0.5102
		Prob	0.7880	0.4349	1.0000	0.2870	0.8728
	First Diff	t-Stat	-4.2328***	-3.1243**	-4.3140***	-6.3427***	-4.2951***
			0.0034	0.0387	0.0034	0.0000	0.0031
Order of integration			1	1	1	1	1

Notes: (\*\*) Significant at 5%, (\*\*\*) Significant at 1%  
Source: Author's research

is performed under the assumption of the existence of a constant (C) and a trend. Two statistics appear in this test: the trace statistic and the max-eigenvalue statistic (the maximum eigenvalue). These two statistics show compatible results here. The trace statistics reveal the existence of the 5% confidence interval of three co-integrating vectors, while, the maximum eigenvalue indicates two co-integrating vectors. Therefore, it is concluded that these series are co-integrated, and thus, a long-run relationship between the TOURISM of Tunisia and the other independent variables exists.

### Vector Error Correction Model (VECM) Results

The estimate of the VECM is presented in Table 5. The estimated coefficient for CPI is negative and significant

in the long run (-1.90), which could lead to the conclusion that tourism arrival in Tunisia could be increased by decreasing the cost of living. A tourism price index would be more accurate and easily available (Khoshnevis Yazdi & Khanalizadeh, 2016). The tourists are, however, not sensitive to prices related to their destinations. The county where the airport is located has experienced increased tourism inflows, fueled mainly by foreign visitors (Doerr et al., 2020).

The estimated coefficient for the real exchange rate (REXCH) is not significant at 1% and hurts international tourism demand (Chi, 2020). This is compliant with economic theory, as fluctuations in exchange rates affect international tourism, the number of arrivals, and tourists head to the most attractive country in terms of prices

**Table 3**

*Optimal lag selection by Akaike Information Criterion (AIC)*

Lag	LogL.	LR.	FPE.	AIC.	SC.	HQ.
00	-56.91071	NA	0.000150	5.383540	5.630387	5.445622
01	83.75025	207.9336	6.83e-09	-4.673935	-3.192856*	-4.301448
02	121.3701	39.25549*	3.28e-09*	-5.771313*	-3.056001	-5.088419*

Source: Author's research

**Table 4**

*Johansen co-integration tests results*

Unrestricted co-integration rank test (trace)				
Hypothesized		Trace	0.050	
No. of CE(s)	Eigenvalue	Statistics	Critical Value	Prob.**
None *	00.902020	116.8699	69.81889	0.0000
At most 1 *	00.707532	63.44107	47.85613	0.0009
At most 2 *	00.575110	35.16487	29.79707	0.0109
At most 3	00.375399	15.47857	15.49471	0.0503
At most 4 *	00.183182	4.653786	3.841466	0.0310

The trace test reveals three co-integrating equations at the 0.05 level

Unrestricted co-integration rank test (maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistics	Critical Value	Prob.**
None *	0.902020	53.42879	33.87687	0.0001
At most 1 *	0.707532	28.27620	27.58434	0.0407
At most 2	0.575110	19.68630	21.13162	0.0786
At most 3	0.375399	10.82478	14.26460	0.1632
At most 4 *	0.183182	4.653786	3.841466	0.0310

Max-eigenvalue test shows 2 co-integrating equations at the 0.05 level

Source: Author's calculation

regardless of the inflation policy in this country. The rise in the exchange rate leads to a decrease in foreign tourist demand, and the real exchange rate coefficient of -0.85 indicates that a decrease in the exchange rate by one unit leads to an increase in tourism arrivals by 0.85 units lagged by one period (Table 5).

### The Granger causality test

The findings of the Granger causality test are shown in Table 6. We can conclude that the CPI and REXCH cause the TOURISM one-way because the null hypothesis of no causality was rejected at a 5% significance level in both cases. On the other hand, we can not confirm any causal relationship between tourism and GDP or air transport. Some other causalities are confirmed among independent variables (i.e., CPI and GDP, GDP, and AIR TRANSPORT).

### Residual diagnostics

All applied methodological approaches are based on VAR specification. Thus, VAR model reliability has been examined to guarantee that the model satisfies the requirements of a good regression. The diagnostic tests are Q-statistic probabilities adjusted test, inverse roots of AR characteristic polynomial and Jarque-Bera for normal distribution. Findings in Figure 1 demonstrate that the model passed the auto-correlation test since all Q-statistics are

statistically insignificant, thus, the model is well specified. On the other hand, the residuals aren't normally distributed since the Jarque-Bera statistic (Figure 2) is statistically significant, rejecting the null hypothesis of normal distribution of residuals.

To give as clear clarification as possible based on what is stated above, the lag order 2, the VAR (2nd order) model is reinstated. Ten test stationarities of the VAR model and the moduli of the reciprocal roots are shown in Figure 3, which demonstrates that the moduli of the reciprocal of each characteristic root are in the circle. Thus, it may be said, the lag- order 2 is appropriate, and the established VAR model is stable after going through the stability test.

## Discussion

When comparing our results with previous studies, we primarily conclude that the real GDP, consumer price index, and real exchange rate have a long-term impact on international tourism demand. The idea that prices and the real exchange rate have a negative relationship with tourist arrivals appears to match the same results concluded by Khoshnevis Yazdi and Khanalizadeh (2016), Rafiei and Abbaspoor (2021), Tung and Thang (2022) and Tung and Cuong (2020). Alternatively, it contradicts those of Tavares and Leitao (2016).

**Table 5**

*VECM estimation results*

	Coef	Std.-Error	t-Statistics	Prob
C (1)	-1.212104	0.294291	-4.118718	0.0008
C (2)= D(TOURISM(-1))	0.394082	0.240101	1.641315	0.1202
C (3)= D(CPI(-1))	-1.90613	1.608106	-1.18755	0.0014
C (4)= D(GDP(-1))	-0.906846	1.292018	-0.701883	0.4928
C (5)= D(REXCH(-1))	-0.858978	1.564181	-0.549155	0.5905
C (6)= D(AIRTRANSPORT(-1))	0.350029	0.363475	0.963006	0.3499
C (7)=c	1.612641	0.452593	3.563113	0.0026
R2	0.541416	Mean dependent var		0.170587
Adjusted R2	0.369447	S.D. dependent var		0.584038
S.E. of regression	0.463769	Akaike info criterion		1.546929
Sum squared resid.	3.441306	Schwarz criterion		1.892515
Log-likelihood	-10.78969	Hannan-Quinn criteria		1.633843
F- statistics	3.148333	Durbin-Watson stat		1.984140
Prob (F-statistics)	0.031068			

Source: Author's calculation

**Table 6***Granger causality test results*

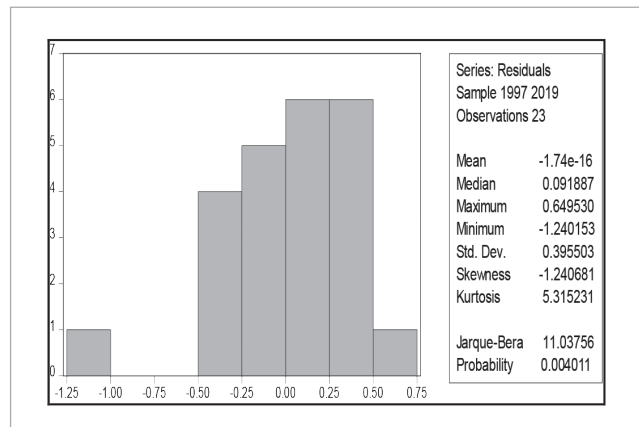
Null hypothesis	Obs	F-Statistics	Prob.
TOURISM is not caused by CPI	24	4.56266	0.0446
CPI is not caused by TOURISM		0.96493	0.3371
TOURISM is not caused by GDP	24	0.50951	0.4832
GDP is not caused by TOURISM		1.81962	0.1917
TOURISM is not caused by REXCH	24	5.50493	0.0289
REXCH is not caused by TOURISM		0.73144	0.4021
TOURISM is not caused by AIR TRANSPORT	24	0.27663	0.6044
AIR TRANSPORT is not caused by TOURISM		0.57607	0.4563
CPI is not caused by GDP	24	6.49798	0.0187
GDP is not caused by CPI		2.74189	0.1126
CPI is not caused by REXCH	24	3.48346	0.0760
REXCH is not caused by CPI		1.73987	0.2014
CPI is not caused by AIR TRANSPORT	24	0.07351	0.7889
AIR TRANSPORT is not caused by CPI		3.19445	0.0883
GDP is not caused by REXCH	24	1.70077	0.2063
REXCH is not caused by GDP		0.24749	0.6240
GDP is caused by AIR TRANSPORT	24	5.86797	0.0245
AIR TRANSPORT is not caused by GDP		2.42460	0.1344
REXCH is not caused by AIR TRANSPORT	24	2.29418	0.1448
AIR TRANSPORT is not caused by REXCH		0.58234	0.4539

*Source: Author's calculation***Figure 1***Q-statistics probabilities adjusted test*

Auto-correlation	Partial-correlation		AC	PAC	Q-Stat	Prob*.
.   ..	.   ..	01	-0.009	-0.009	0.0019	0.965
.  **..	.  **..	02	0.342	0.342	3.2092	0.201
**  ..	**  ..	03	-0.272	-0.302	5.3303	0.149
.   . .	.   . .	04	-0.016	-0.135	5.3381	0.254
. *  . .	.  * . .	05	-0.144	0.076	5.9974	0.306
.   . .	.   . .	06	0.050	0.036	6.0808	0.414
. *  . .	**  . .	07	-0.176	-0.245	7.1957	0.409
.   . .	. *  . .	08	-0.050	-0.114	7.2904	0.506
. *  . .	.   . .	09	-0.180	-0.017	8.6255	0.473
. *  . .	. *  . .	10	-0.099	-0.162	9.0591	0.527
.   . .	.   . .	11	-0.049	-0.062	9.1721	0.606
.   . .	.   . .	12	0.029	0.046	9.2147	0.684

*Source: Author's calculation*

**Figure 2**  
Normal distribution



Source: Author's research

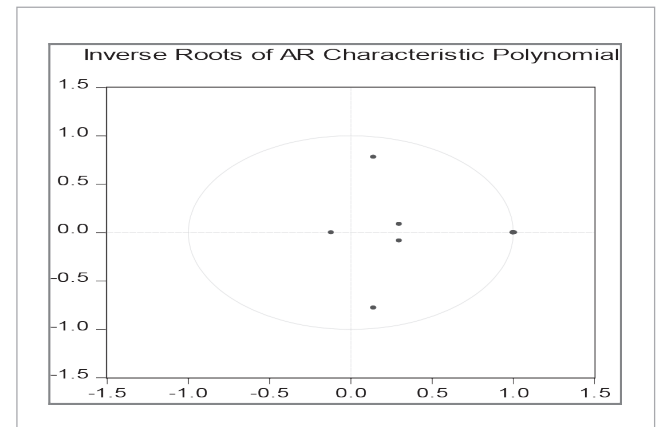
One of the main findings obtained from the study is that CPI is a relevant element (0.0014), which can be understood to be flexible. Prices have a significant effect on tourism in Tunisia. Based on the chosen model, the expected estimates for the relative living costs for tourists in Tunisia are -1.90613, consistent with Baghirov's and Sarkhanov's (2023) findings.

International travel to Tunisia is notably influenced by the real exchange rate, infrastructure, political stability, and absence of violence, as pointed out by Adeola and co-authors (2018). Therefore, violence has become a risk factor for tourism in Tunisia (Arab Spring). If Tunisia has greater political stability and no violence, tourist arrivals will grow.

## Conclusion and Policy Implications

The tourism industry in Tunisia represents a significant part of the country's economic development, with tourism activities generating nearly 6% of the GDP and displaying a growth rate close to that of the national economy. With receipts amounting to more than 2300 million TND (€ 1,06995) in 2001, tourism covered nearly half of the Tunisian trade deficit under the combined effect of the 2008 financial crisis and the events of September 11, 2001, after which international tourism recorded a significant decline (international arrivals - 1.3%). To illustrate further, according to statistics collected from TNTOT (Tunisian National Tourist Office), tourism indicators underwent various changes between 2000 and 2001. The tourism sector led to growth that accounted for more than (+ 6.5%) of non-resident inflows.

**Figure 3**  
Inverse roots of AR characteristic polynomial



Source: Author's research

Our research, hence, tests the determinants of tourism demand in Tunisia during the period 1997-2019 using the Co-integration test and the VECM model based on the number of incoming tourists as a dependent variable and CPI, GDP, REXCH, and AIR TRANSPORT as independent variables. The results of the study showed that the real exchange rate (REXCH) has a negative effect on international tourism demand, as the fluctuations in exchange rates affect international tourism, as well as the number of arrivals, due to tourists heading to the most desirable country in terms of prices, regardless of the inflation policy adopted in that potential destination. The increase in exchange rate leads to a decrease in international tourism demand. Herein, the reduction of the real exchange rate factor indicates an increase in the exchange rate associated with tourist arrivals.

The estimated long-term price elasticity might suggest that tourist arrivals in Tunisia could be increased by decreasing costs of living (prices). Concurrently, discovering the estimated coefficient for CPI is a positive and significant endeavor. It implies that the issue of living costs in destination countries remains essential even though a slight change in the CPI ratio may lead to decreased tourist arrivals in Tunisia. The tourists, however, are not price-sensitive regarding costs of living, despite the travel price index acting as an accurate and readily available tool.

The district with the airport evidenced more noticeable and significant increases in incoming tourists, with foreign visitors accounting for most of these increases. Based on the assessment findings, additional suggestions to policymakers and travel providers would be of great importance: The qualitative leap envisaged in Tunisia

requires sustainable demand and the inclusion of new investors, not to mention the development of private and public sector partnerships. To allow this sector to become independent and fulfill its full potential in the economic growth of Tunisia, it becomes vital to move towards a total rebranding of this industry's image concerning its local markets. Therefore, the country's image becomes crucial in deciding on a destination.

Integrating tourist sites, cultures, traditions, and national heritage reduces uncertainty and allows the

native population to better understand this sector's significance. Promotional efforts are required to reestablish consumer and company confidence while creating more robust product quality assurances and certification. Comparable strategies have enabled Tunisia to offer diversified, flexible, and high-quality tourism, which has been affected very little by exogenous factors and global externalities. Future studies should focus mainly on factors such as the economy's trade openness, oil prices, marketing spending, and the willingness for tourist consumption.

## References

- Adeola, O., Boso, N., & Evans, O. (2018). Drivers of international tourism demand in Africa. *Business Economics*, 53(1), 25–36. DOI: <https://doi.org/10.1057/S11369-017-0051-3>
- Baghirov, A., & Sarkhanov, T. (2023). The Influence of Incoming Tourists and Consumer Price Index on Tourism Receipts. *African Journal of Hospitality, Tourism and Leisure*, 12(1), 16–30. DOI: <https://doi.org/10.46222/ajhtl.19770720.351>
- Balsalobre-Lorente, D., Driha, O. M., Bekun, F. V., & Adedoyin, F. F. (2021). The asymmetric impact of air transport on economic growth in Spain: fresh evidence from the tourism-led growth hypothesis. *Current Issues in Tourism*, 24(4), 503–519. DOI: <https://doi.org/10.1080/13683500.2020.1720624>
- Bozkurt, C. (2014). Money, Inflation and Growth Relationship: The Turkish Case. *International Journal of Economics and Financial Issues*, 4(2), 309–322. Retrieved from <https://www.econjournals.com/index.php/ijefi/article/view/750>
- Chi, J. (2020). The impact of third-country exchange rate risk on international air travel flows The case of Korean outbound tourism demand. *Transport Policy*, 89, 66–78. DOI: <https://doi.org/10.1016/J.TRANPOL.2020.01.012>
- Doerr, L., Dorn, F., Gaebler, S., & Potrafke, N. (2020). How new airport infrastructure promotes tourism: evidence from a synthetic control approach in German regions. *Regional Studies*, 54(10), 1402–1412. DOI: <https://doi.org/10.1080/00343404.2020.1714022>
- Göçer, İ., Görmüş, Ş., & Göçer, S. (2010). The socio-economic determinant of tourism demand in Turkey: A panel data approach. *International Research Journal of Finance and Economics*, 55, 88–99. Retrieved from <http://www.eurojournals.com/finance.htm>
- Haçia, E. (2019). The role of tourism in the development of the city. *Transportation Research Procedia*, 39(2), 104–111. <https://doi.org/10.1016/j.trpro.2019.06.012>
- Ivanovski, Z., Milenkovski, A., & Narasanov, Z. (2018). Time Series Forecasting Using a Moving Average Model for Extrapolation of Number of Tourists. *UTMS Journal of Economics*, 9(2), 121–132.
- Jin, X. (Cathy), Bao, J., & Qu, M. (2021). Can tourism be a policy tool to moderate the trade balance? *Annals of Tourism Research*, 86. DOI: <https://doi.org/10.1016/J.ANNALS.2020.102946>
- Khoshnevis Yazdi, S., & Khanalizadeh, B. (2016). *Tourism demand: a panel data approach.*, 20(8), 787–800. DOI: <https://doi.org/10.1080/13683500.2016.1170772>
- Martins, L. F., Gan, Y., & Ferreira-Lopes, A. (2017). An empirical analysis of the influence of macroeconomic determinants on World tourism demand. *Tourism Management*, 61, 248–260. DOI: <https://doi.org/10.1016/J.TOURMAN.2017.01.008>
- Ongan, S., Işık, C., & Özdemir, D. (2017). The Effects of Real Exchange Rates and Income on International Tourism Demand for the USA from Some European Union Countries. *Economies* 2017, 5(4), 51. DOI: <https://doi.org/10.3390/ECONOMIES5040051>
- Pavlic, I., Svilokos, T., & Tolic, M. S. (2015). Tourism, Real Effective Exchange Rate, and Economic Growth: Empirical Evidence for Croatia. *International Journal of Tourism Research*, 17(3), 282–291. DOI: <https://doi.org/10.1002/JTR.1986>
- Rafei, F., & Abbaspoor, N. (2021). The impact of exchange rate on domestic tourism demand of Iran. *Anatolia*, 33(3), 451–462. DOI: <https://doi.org/10.1080/13032917.2021.1964553>
- Suhel, S., & Bashir, A. (2018). The role of tourism toward economic growth in the local economy. *Economic Journal of Emerging Markets*, 10(1), 32–39. DOI: <https://doi.org/10.20885/EJEM.VOL10.ISS1.ART4>

- Tang, C. F., & Tan, E. C. (2015). Does tourism effectively stimulate Malaysia's economic growth? *Tourism Management*, 46, 158–163. DOI: <https://doi.org/10.1016/j.TOURMAN.2014.06.020>
- Tavares, J. M., & Leitao, N. C. (2016). *The determinants of international tourism demand for Brazil*, 23(4), 834–845. DOI: <https://doi.org/10.5367/TE.2016.0540>
- Tung, L. T., & Cuong, L. K. (2020). Impact of Tourism on Poverty Reduction - Evidence from an Emerging Tourism Market. *Montenegrin Journal of Economics*, 16(3), 45–55. Retrieved from <https://ideas.repec.org/a/mje/mjejn/v16y2020i345-55.html>
- Tung, L. T., & Thang, P. N. (2022). Impact of exchange rate on foreign tourist demand: Evidence from developing countries. *GeoJournal of Tourism and Geosites Year XV*, 45(4), 1579. DOI: <https://doi.org/10.30892/gtg.454spl06-977>

## Turistično povpraševanje v Tuniziji: VECM pristop

### Izvleček

Namen te raziskave je bil preučiti determinante turističnega povpraševanja v Tuniziji od leta 1995 do leta 2019 s štirimi neodvisnimi spremenljivkami: bruto domačim proizvodom, indeksom cen življenjskih potrebščin, realnim menjalnim tečajem in številom prepeljanih potnikov v zračnem prometu. V raziskavi so bili uporabljeni testi enotskih korenov, kointegracijski test in model vektorske korekcije napak (VECM) za preučitev dinamike kratkoročnih in dolgoročnih razmerij med spremenljivkami. Rezultati kažejo, da med spremenljivkami obstajajo kointegracijski odnosi; vse neodvisne spremenljivke negativno vplivajo na turistično povpraševanje, razen letalskega prevoza. Glede na dobljene rezultate bi se morali oblikovalci politik zavedati negativnega vpliva politične nestabilnosti države na obseg zunanjega turističnega povpraševanja. V tem smislu mora vlada ponovno vzpostaviti politično stabilnost, da bi turiste spodbudila k obisku Tunizije. Prihodnje študije bi morale upoštevati dejavnike, kot so trgovinska odprtost gospodarstva in cene nafte.

*Ključne besede:* turistična industrija, turistično povpraševanje, VECM, kointegracija, Tunizija

# Future Tendencies of Non-fungible Tokens

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## Abstract

Blockchain has been one of the key innovations in information technology in the last 15 years. An important aspect of applying blockchain technology is the creation of so-called non-fungible tokens (NFTs). Although the name resembles cryptocurrencies because of the word token, in practice, NFTs do not represent electronic money but a digital certificate of ownership of an asset. They effectively behave like tokens whose total supply is one, and it is immutable. Considering their technical and conceptual basis, NFTs can be defined as digital certificates of ownership based on blockchain technology, the possession of which proves the indisputable ownership of the purchased digital asset. The subject of this paper is the conceptual basis of NFTs and the scope of their application in digital business. It aims to determine the value factors of NFTs and whether an expansion of their use can be expected in the future. The results of our research show that the essential advantage that NFTs bring to digital business is authentication. NFTs also enable the continuous collection of royalties by the author. The last, but potentially most powerful value generator of NFTs, is the creation of an ecosystem, where an online community is formed based on the initial forms of digital assets. Without standardization and regulation by states, NFTs will remain in the market niche of intensive Internet users.

## Introduction

Blockchain has been one of the key innovations in information technology in the last 15 years. Along with Big Data, the Internet of Things, and machine learning, it is considered the driving force behind the fourth industrial revolution. The importance of blockchain for the future of electronic business is also confirmed by the European Union's efforts to become a global leader in developing blockchain-based platforms and applications. The European Commission has adopted a digital strategy, which states that blockchain will change the way information is shared and business is done online and that it needs to be regulated in accordance with European values and ideals (Beck, 2022). Although it was not directly named, the principles

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of its functioning were explained in the Bitcoin white paper (Nakamoto, 2008). This is precisely why uninformed individuals consider cryptocurrencies the only sphere of blockchain application. Thanks to its application in the decentralized management of large databases, blockchain has also found application in other processes of electronic business. Thus, blockchain has become the preferred choice where many participants, without mutual trust, manage records of data created continuously.

An important aspect of the application of blockchain technology is the creation of so-called non-fungible tokens (NFTs). They were created much later than the early forms of cryptocurrencies. Although the name resembles cryptocurrencies because of the word token, in practice, NFTs do not represent electronic money but a digital certificate of ownership of an asset (Nadini et al., 2021). Thanks to blockchain performances, digital ownership can be recorded, verified, and ultimately changed, if necessary, within an online community, without the involvement of a centralized institution. More importantly, NFTs, unlike cryptocurrencies, are designed to be non-fungible, i.e., each of these tokens confirms the ownership of a unique digital asset by only one holder (Bao & Rouband, 2022).

The paper's subject is the conceptual basis of NFTs and the scope of their application in digital business. It aims to determine the value factors of NFTs and whether an expansion of their use can be expected in the future. To achieve this aim, the paper will analyze a number of current examples while presenting assumptions and providing predictions of future trends.

The paper is organized into three parts. The first part explains both the functioning principles of blockchain technology, which form the technical basis of NFTs, and their conceptual basis through the explanation of the principle of irreplaceability. In the second part of the paper, the focus is on aspects of NFTs application. In this part, for each of the key areas in which NFTs have been applied, an appropriate number of examples is given to better understand the scale and depth of their influence. Finally, in the third part of the paper, the key factors of the value of NFTs are analyzed. Based on the previously mentioned, predictions of further directions of development of this concept are made.

## Theoretical Background

Blockchain technology represents a reliable data record created in an environment where there is no mutual trust between participants, nor a central institution, entrusted

with managing the system (Scardovi, 2016, p. 36). The blockchain is a new technology, but its foundations are based on previously known technologies and methods, such as asymmetric cryptography, timestamping, Merkle tree, hash function, and smart contracts. It enables data entry in the so-called ledger that records transactions between two parties so that records, once entered cannot be subsequently changed (Iansiti & Lakhani, 2017). The term transaction does not refer to payments only but to any instruction that leads to a change in the system's state. To enter a new transaction, it is necessary to reach the consensus of the participants, among whom there is no mutual trust. This is achieved through the so-called consensus algorithm (Schneider, 1990). After the transaction is accepted, the ledger is synchronized, meaning all participants have the same information about its current state. Therefore, their future decisions when achieving the consensus will be based on the same premises. Data can be shared among members regardless of time, space, or administrative constraints (Walport, 2015, p. 5).

Blockchain makes the technical basis of cryptocurrencies. Transactions change the state of the system because one participant - the payer - reduces his cryptocurrency balance, while the other participant - the payee - has an increase in his balance. Depending on the applied consensus algorithm, transactions are packed into blocks representing the blockchain's building unit. Each subsequent block to be inserted must be in accordance with the data contained in the previously accepted blocks.

Cryptocurrencies come in two forms – coins and tokens. Coins are those cryptocurrencies that have their blockchain. Such are the most famous and commonly used cryptocurrencies - Bitcoin, Ethereum, Litecoin, etc. Tokens do not have their blockchain but are created by some application or platform on an existing blockchain. In this sense, the Ethereum blockchain is very important because it supports embedding intelligent contracts. Using smart contracts, tokens can be used not only as electronic money in the original sense but also as a means to initiate a certain process when conditions are met. Among the tokens with the highest market capitalization are Uniswap and Chainlink. Since 99% of cryptocurrency usage is a speculative investment, the users do not matter to what class their cryptocurrency belongs to. The existence of the term token in the name of NFTs is why many consider them a class of cryptocurrencies.

The characteristic that separates NFTs from cryptocurrencies is non-fungibility. To understand non-fungibility, it is necessary to explain what constitutes the fungibility of a commodity. Those commodities whose one piece can be

replaced by another without loss of value have fulfilled the property of fungibility. For example, a consumer buys any can of soda in the market because all products are made in the same way, have the same mass, and have the same chemical and nutritional composition. That is why the two cans of a specific soda are fungible. In the case of classified agricultural products, all units are considered to have the same properties. Thus, the distributor pays the same price for each first-class apple unit because they are interchangeable. Fungibility is inherent to financial products. A US\$10 bill is exchangeable for another US\$10 bill, as exchanging them does not change the total value.

Moreover, a US\$10 bill is exchangeable for 2 US\$5 bills. In this situation, the owner of a US\$10 bill receives a larger number of other bills, but the total value does not change. In recent times, one can also talk about the exchangeability of money that has a physical form (coins and bills) for deposit money (money in a bank account) in those situations where there are no costs for such transactions. In addition to money, stocks are also fungible. Any stock of the same class (for example, common stocks) of a specific company is interchangeable for another because they all represent the same share of ownership and simultaneously have the same market value.

Finally, cryptocurrencies are fungible. Their creation can be determined by a mathematical algorithm that increases the supply at a certain rate (as with Bitcoin), or their supply can be determined and created in advance. Whichever of these two options is applied, practically all coins (or tokens) of a cryptocurrency are worth the same at the same time. That is why one Bitcoin is exchangeable for another; the owner can be indifferent to who he got his Bitcoin from because they are all the same.

The above does not apply to NFTs. They effectively behave like tokens whose total supply is one, and it is immutable. Therefore, owning one NFT excludes the possibility of other users owning it, because it is indivisible, so there is no possibility of co-ownership. It is irreplaceable because by exchanging it, the owner cannot get another token that has the same value, for the previous reason that the second token will not refer to the same digital asset. The only way for the owner to remain with the same value they already own is to not exchange the token. These tokens are called non-fungible because they represent a unique value to their owners.

Considering their technical and conceptual basis, NFTs can be defined as digital certificates of ownership based on blockchain technology, the possession of which proves the indisputable ownership of the purchased digital asset

(Wang et al., 2021). Connecting an NFT to some form of digital asset becomes liquid and marketable. All changes related to the possession of liquid assets are recorded in the corresponding blockchain. Thanks to the immutability of content and the need for each transaction to be authenticated by the initiator, the blockchain is a reliable tool for keeping records of NFTs ownership and an efficient means of recording the changes that occur. The next part of the paper will focus on the key aspects of applying NFTs.

## Application Areas of NFTs

There are several aspects of the application of NFTs. Some of them, like digital art and collectibles, are self-imposed, while others, like video games, are less obvious but potentially very lucrative applications (Fortnow & Terry, 2021, p. 25).

### Digital arts

Digital art refers to works of art whose creation was done digitally and should remain in digital form. This does not mean that one cannot obtain a physical form of some of these creations (for example, photographs can be printed). Still, their primary purpose is digital preservation and distribution. Photographs, digital graphics, 3D models, gif animations, audio and video content are obvious examples of digital art. In addition to traditional professions such as photographers, actors, or singers, who participate in creating digital assets, digital artists - graphic designers, 3D modelers, or animation engineers - are taking an increasingly important position. To sell a piece of digital art as an NFT, it must have a theme and content that is of interest to potential buyers. Works of art that are part of a wider series can have a special value because then, in addition to their own value, they also derive value from the possibility of creating a collection.

Another important thing is the processing. Old photographs can be processed to combine an authentic setting with modern themes, giving familiar characters or surroundings a whole new context. Video materials for sale are often processed so that the end scene coincides with the opening scene so that in the case of automatic replay, the video loops seamlessly. A whole new dimension of digital art was initiated in 2023 with the application of artificial intelligence (AI) in the process. Using AI algorithms, any user can create a digital work of art, which is created based on photos and graphic solutions that a certain AI service has access to and can use as a basis for

further work. In addition to the undoubted legal problem regarding copyright that this process can create, another problem is the possession of the newly created works since the user does not have exclusivity (Vincent, 2023). With adequate regulation, this is precisely where NFT can be a solution.

### **Collectibles**

Collecting is a trendy and expensive hobby in Western culture. In the United States, there is a significantly developed community of cards collectors, usually related to a certain theme (for example, many individuals have been collecting cards of baseball players for generations). NFTs enable the collection of digital forms of assets, some of which can be considered works of art. For example, NFL player Rob Gronkowski created four cards related to the seasons in which he won championship titles. The cards were sold as NFTs and art pieces, as digital artist Black Madre designed them. Each series has 87 unique illustrated cards because Gronkowski wore the number 87 on his jersey during his career. A collector buys an NFT that refers to only one card in one series, for example, 1/87 in the 2014/2015 series. Possession of this NFT gives the collector ownership of that card, but it does not mean he possesses other cards in the same series nor the cards numbered 1/87 in the remaining three series (Daniels, 2021).

### **Video games**

During the second decade of the 21st century, video games have already transformed monetization. Initially, video games were sold once at a premium price, which varied depending on the size of the game and the investment in production (Tomić, 2017, p. 240). With the advent of microtransactions, publishers began to charge for certain in-game content, whereby the game in its basic form could be available for free or at a certain price. The content most often sold through microtransactions are cosmetic changes to the appearance of in-game characters (so-called skins) or enhancements that make gameplay easier and reduce the time required to progress (Statt, 2013). The second group is particularly present in mobile video games, where, with characteristically casual gaming, a player needs a lot of time to progress. Over time, gamers have faced a problem regarding their investments in video games. The amounts they spent in microtransactions were many times higher than previously paid premium prices for an entire game.

On the other hand, a secondary market was created where players who no longer wanted to play a game could sell their game account, thereby selling their previous investments. Publishers usually do not approve such trades, so players are exposed to the danger of having their accounts suspended. Therefore, in some video games, developers implemented microtransactions via NFTs. This ensures the authenticity and uniqueness of enhancements and skins purchased in-game. For example, some games offered certain microtransactions as very rare or unique at a high price. However, there was nothing stopping the publisher from offering a larger amount of these exclusive microtransactions after a certain time, putting the player who made the first purchase at a disadvantage. The ability to purchase unique skins, which makes his character different from all others in the gaming community, gives the player great added value. That is why the video game F1 Delta Time introduced the practice of registering all purchased in-game items as NFTs. Each player thus has a unique driver, his equipment, and the characteristics of the racing car he drives. The online multiplayer video game Axie Infinity involves characters created by players whose uniqueness is protected by an NFT (Paul, 2023).

### **Virtual worlds**

Over the past few years, several virtual worlds have been created, intended to be populated by user avatars. Virtual worlds are a kind of video game with a different purpose than the classic ones. The user/player of a virtual world guides his avatar practically through a virtual form of life - he buys a house, furnishes it, finds a job, earns money, buys and sells various items, meets other avatars, and socializes with them (Tucci, 2023). The concept of virtual worlds gained particular importance after the change of the name of the company Facebook to Meta and their announcement that in the future, they will work on the development of the Metaverse - a virtual universe in which all the virtual worlds of social networks and video games will meet and which should be the next stage of Internet development (Klein, 2021). In this context, the virtual world Decentraland was born, in which users/players buy lots, build houses and equip their avatars using NFTs while paying with the cryptocurrency MANA. The moment in which it started functioning played a big role in the growth of its popularity, as it was three weeks before the declaration of the COVID-19 global pandemic. Not only did the video game industry experience an extraordinary growth of 23% during 2020 (Williams, 2022), but at the end of that year and the beginning of the following year,

NFTs also became extremely relevant. The amounts paid for real estate in virtual worlds can be very high, even up to several thousand US dollars (Howcroft, 2021).

## Methodology

A SWOT analysis will be performed to identify the drivers of NFTs value. It represents a helpful tool for sizing up a product's market capabilities and deficiencies, its opportunities, and the external threats to its future (Thompson, Strickland & Gamble, 2007, p. 97). It includes the analysis of four aspects of the product: strengths, weaknesses, opportunities, and threats. While strengths and weaknesses refer to the product's characteristics, opportunities and threats, have an exogenous character because they are based on the environment.

## Results

### Strengths

The essential advantage that NFT brings to digital business is authentication. One of the main problems in the trade of works of art and collectibles is the confirmation of authenticity. There are numerous examples of selling counterfeit art or antiques at high prices. Also, there are cases of selling real masterpieces of old painters at low prices due to the impossibility of proving and confirming their provenance. Thanks to their provenance performance, NFTs offer an undeniable ability to authenticate a digital object. Each NFT is essentially an intelligent contract recorded on the blockchain (Chandra, 2022). Each smart contract has its address that can be accessed. By accessing a specific NFT, one can check the complete history of its possession regarding changes in ownership and the amount of cryptocurrencies paid for purchases. Determining the complete origin can eventually lead to the author. With adequate verification, a buyer always knows if the NFT refers to the specific digital object he wants to own and if that object is exactly what the seller claims it to be.

Equally important as the routine authentication of digital objects is their scarcity. Just as there cannot be two original works of art, the NFT should ensure the uniqueness of the digital object to which it refers. Scarcity is one of the primary sources of value for collectibles, along with age, belonging to a specific collection, and subjective emotional value. While it is difficult to talk about historical

aspect as a value factor in digital objects, NFTs confirm scarcity and belonging to a certain series (if such exists).

Being a variant of an intelligent contract, NFT enables the continuous collection of royalties by the author. Unlike works of art or collectibles, where the author generates income only once in case of a sale, NFT allows the author to receive a certain percentage of the sale price for each secondary sale. The address of the author's digital wallet can be entered into the smart contract, which allows him to automatically receive percentage for each subsequent resale. The condition for realizing continuous royalties is that successive trades are realized on the same digital marketplace where the digital item was initially sold. The smart contract may not link secondary sales on other digital marketplaces to the author's digital wallet, in which case he may be left without subsequent royalties.

### Weaknesses

At this time, it is impossible to give a completely objective prediction of the future of the NFTs. Limitations in such an attempt are numerous. First, it is a very young concept whose success has been sudden and unpredictable. Just as it was not possible to predict the rise of this concept, it is also impossible to predict the circumstances that could stand in the way of its development. Second, it is based on a technology that is also young and innovative, which is very present in academic, professional, and general literature but has not yet shown its full potential. Blockchain is a technology that is still expected to offer more than it has delivered to e-business. Third, NFTs closest relatives - cryptocurrencies - are unpredictable and have an equally uncertain future. Therefore, there is no similar product, service, or concept whose experiences can be used to form completely reliable predictions. Finally, the unpredictability of NFTs is also contributed to by the fact that this concept was not created in response to an articulated user need. At times when most authors were discussing the meaning and role of cryptocurrencies in modern finance, NFTs appeared with different attributes and application possibilities. Their performance began to be exploited initially by enthusiasts and later by an ever-widening circle of users. Therefore, when discussing the future of NFTs, the following question should be answered. If both cryptocurrencies and NFTs were created when no one was looking for such digital products, and if, despite that, they survived and began to develop and evolve, what exactly needs to happen for them to disappear completely?

A rough prediction of the future of NFTs can be made based on experience with cryptocurrencies. Although,

from year to year, cryptocurrencies recorded a greater number of active operational solutions and an increasing number of users, at the same time, their separation from the traditional financial system grew (Gowda & Chakravorty, 2021; Wolf, 2022). Instead of becoming the electronic money of the new generation of the Internet, as initially conceived, cryptocurrencies are being implemented as an instrument of speculative investment. With the growth of the total number of users, paradoxically, the number of opponents of this concept also increased. Cryptocurrencies have created their online community, certainly numerous and diversified, but simultaneously separated from everything that can be considered traditional. There is a high probability that NFTs will have a similar fate. Although they have great potential to create their own self-sustaining online community, NFTs have gone one step ahead of the needs of the average internet user with their innovation. However, the main spheres of application of NFTs also differ from the needs of the average internet user. In the following, the key advantages of NFTs, which are the main generators of their value, will be analyzed.

### Opportunities

A potentially powerful value generator of NFTs is the creation of an ecosystem, where an online community is formed based on the initial forms of digital assets. The meaning of community formation refers to deeper exploitation of the topic, whereby NFT and accompanying contents achieve the effect of commercial synergy. For example, Bored Ape Yacht Club, one of the most famous NFT series, gives token holders membership in an online community. The project started with private chat rooms and evolved into social events, luxury goods consumption, and an actual yacht party. SupDucks grew from a series of hand-drawn ducks into a virtual world-type video game, while the Gutter Cat Gang project grew from anthropomorphic cat cards into extravagant social events (Kaczynski & Kominers, 2021). From the above, it can be concluded that one of the key value generators of NFT is its ability to integrate into current commercial flows on the Internet and exploit their virality. By adding NFTs to the business model, the degree of exclusivity is raised and allows for building an online community identity of the "chosen ones."

### Threats

An NFT is essentially a permanent proof of ownership of a digital asset. Blockchain, as its technical basis, ensures the unlimited duration of each token in theory. However, blockchain only records tokens as proof of asset ownership,

while the digital asset cannot be stored in it. The authors have two options: commercial cloud storage providers, or the InterPlanetary file system (IFPS), which, due to its decentralized structure, is more reminiscent of the principles on which the blockchain is based. The problem with cloud storage systems is that no matter how reliable the providers claim these services to be, they all have a single point of failure (Ranjithprabhu & Sasirega, 2014). A natural disaster, sabotage, war, or simply bankruptcy of the provider can lead to the loss of control over the servers used to store data, thereby losing all digital assets stored on them. IFPS uses the peer-to-peer principle for data storage and thus creates a branched decentralized network of participants who share data. The advantage of this approach is that the exit of one member or a smaller group does not cause any damage to the system. However, the problem is that this method is not commercial, so its long-term sustainability is questioned.

## Discussion

The NFTs owe their high popularity to cryptocurrencies, which paved the way for high-tech products in finance a decade earlier. Thanks to this, NFTs have become a current topic practically from the day of their creation, in contrast to Bitcoin, which spent the first two years of its existence outside the focus of both academic authors and mainstream media. It can be concluded that cryptocurrencies have prepared the public for a new generation of financial products and also for a new approach to electronic business. Therefore, NFTs are more easily accepted by users.

Another feature that cryptocurrencies and NFTs have in common is that they are not a response to consumer demand. On the contrary, both products represent a supply that creates its demand, not previously articulated. Speaking of the attention that cryptocurrencies and NFTs are getting and the amounts invested in them, one could conclude that consumers were not aware that they needed such products. Such a conclusion would undoubtedly be wrong; both products owe a large part of their success to innovation, exclusivity, and exploitation of ICT development trends. The innovation of cryptocurrencies and NFTs is undeniable; however, their long-term applicability must be proven. This is the segment where cryptocurrencies are still failing because their application is practically non-existent outside of speculative investments. At the same time, NFTs will try to prove their essential applicability in the years to come. Exclusivity seems attractive to investors in both cryptocurrencies and NFTs. Early investments in cryptocurrencies were difficult and borderline illegal.

The number of investors during the first four years of Bitcoin's functioning remained very small, even after this topic became present in public. Therefore, in 2012-2016, many investors wanted to invest money in some cryptocurrency without understanding the technology behind them and the possibilities of their application. NFTs are, by their very nature, exclusive. By owning an NFT, an investor prevents everyone else from owning it, often giving them a sense of importance and power. In this sense, investing in NFTs has a deeper meaning for the investor than investing in cryptocurrencies. In addition to speculating on the token's growth, the investor buys a sense of uniqueness and advantage over others. Finally, computerizing society and business takes on more advanced and unexpected forms. Although social networks were considered the highest form of users' interaction, over time, the first forms of virtual worlds were developed, and the developments of meta universes were announced, in which users can interact with a large dose of reality. NFTs fit into the vision of Internet 4.0, based on connectivity with objects and devices, AI, and machine learning.

## Conclusion

The future of NFTs is challenging to predict, especially since their present lasts too short to make any predictions. It is evident that there is a market for innovative products at the global level and that the Internet community has grown enough to be able to absorb technological novelties, no matter how atypical they may be at first glance. In the context of continuous informatization of society and business, it can be expected that NFTs are here to stay and will not disappear or become marginalized like, for example, centralized forms of electronic money. There are several drivers of NFT expansion in 2023, including NFT-backed video games tokenization, continuous efforts to create a functional metaverse, and, above all, at this moment, the sudden impetus of AI and the art patterns created with its help. Standardization procedure and regulation by states are genuinely needed in this situation. Otherwise, NFTs will remain just another market niche of intensive Internet users.

## References

- Bao, H., & Rouband, D. (2022). Non-Fungible Token: A Systematic Review and Research Agenda. *Journal of Risk and financial management*, 15(5), 215. DOI: <https://doi.org/10.3390/jrfm15050215>
- Beck, D. (2022). The EU wants to be a leader in blockchain technology. Analytics. Wine, September 14. Retrieved May 14, 2023, from <https://analytics.wine/the-eu-wants-to-be-leader-in-blockchain-technology/>
- Chandra, Y. (2022). Non-fungible token-enabled entrepreneurship: A conceptual framework. *Journal of Business Venturing Insights*, 18, e00323. DOI: <https://doi.org/10.1016/j.jbvi.2022.e00323>
- Daniels, T. (2021). Rob Gronkowski Reveals 'Championship Series NFT Collection' Rare Digital Cards. *Bleacherreport*, March 9, Retrieved May 21, 2023, from <https://bleacherreport.com/articles/2935201-rob-gronkowski-reveals-championship-series-nft-collection-rare-digital-cards>
- Fortnow, M., & Terry, Q. (2021). *The NFT handbook: how to create, sell and buy non-fungible tokens*. New York: Wiley.
- Gowda, N., & Chakravorty, C. (2021). Comparative study on cryptocurrency transaction and banking transaction. *Global Transitions Proceedings*, 2(2), 530-534. DOI: <https://doi.org/10.1016/j.gltip.2021.08.064>
- Howcroft, E. (2021). Virtual real estate plot sells for close to \$1 mln. *Reuters*, June 18, Retrieved August 17, 2022, from <https://www.reuters.com/technology/virtual-real-estate-plot-sells-close-1-mln-2021-06-18/>
- Iansiti, M. & Lakhani, K.R. (2017). The truth about blockchain. *Harvard Business Review*, 95(1), 118-127.
- Kaczynski, S., & Kominers, S.D. (2021). How NFTs create value. *Harvard business review*. November 10, online version, Retrieved August 10, 2022, from <https://hbr.org/2021/11/how-nfts-create-value>
- Klein, P. (2021). Is the Metaverse the Next Major Phase of the Internet? *The Medium*, December 21, Retrieved August 1, 2022, from <https://medium.com/mit-initiative-on-the-digital-economy/is-the-metaverse-the-next-major-phase-of-the-internet-dd8891193e2a>
- Nadini, M., Alessandretti, L., Di Giacinto, F., Martino, M., Aiello, L. M., & Baronchelli, A. (2021). Mapping the NFT revolution: Market trends, trade networks, and visual features. *Scientific Reports* 11, 1-11.
- Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system, Retrieved August 1, 2022, from <https://bitcoin.org/bitcoin.pdf>
- Paul, C. (2023). Top 10 latest NFT trends 2023 – NFTs in AI, Games and Beyond. *The Medium*, February 15. Retrieved May 5, 2023, from <https://medium.com/javarevisited/top-10-latest-nft-trends-2023-nfts-in-ai-games-beyond-55383c87301b>
- Ranjithprabhu, K. & Sasirega, D. (2014). Eliminating Single Point of Failure and Data Loss in Cloud Computing. *International Journal of Science and Research*, 3(4), 335-337.

- Scardovi, C. (2016). *Restructuring and innovation in banking*. London, UK: Springer
- Schneider, F. (1990). Implementing Fault-Tolerant Services Using the State Machine Approach: A Tutorial. *ACM Computing Surveys*, 22(4), 299–319. DOI: <https://doi.org/10.1145/98163.98167>
- Statt, N. (2013). Micropayments, mega angst, and the future of console games (N). *CNet*, December 19, Retrieved August 17, 2022, from <https://www.cnet.com/tech/services-and-software/micropayments-mega-angst-and-the-future-of-console-games/>
- Thompson, A. A., Strickland, A. J., & Gamble, J. E. (2007). *Crafting and Executing Strategy-Concepts and Cases*, (15th Edition). New York: McGraw-Hill/Irwin.
- Tomić, N. (2017). Effects of micro transactions on video games industry = Efekat mikrotransakcija na industriju video igara. *Megatrend review*, 14(3), 239-257.
- Tucci, L. (2023). *What is the metaverse? An explanation and in-depth guide*. TechTarget.com, May 8, Retrieved May 15, 2023, from <https://www.techtarget.com/whatis/feature/The-metaverse-explained-Everything-you-need-to-know>
- Vincent, J. (2022). The scary truth about AI copyright is nobody knows what will happen next. *The Verge*, November 15, Retrieved May 5, 2023, from <https://www.theverge.com/23444685/generative-ai-copyright-infringement-legal-fair-use-training-data>
- Wang, Q., Li, R., Wang, Q., & S. Chen (2021). *Non-Fungible Token (NFT): Overview, Evaluation, Opportunities and Challenges*. Retrieved August 3, 2022, from <https://arxiv.org/abs/2105.07447>
- Williams, L. (2022). A Pandemic Is a Dream Come True for Gamers. *Bloomberg*, January 16, Retrieved August 10, 2022, from <https://www.bloomberg.com/opinion/articles/2022-01-16/pandemic-s-boost-for-video-game-industry-is-a-dream-come-true-kyh9nekz#x-j4y7vzkg>
- Wolf, M. (2022). Cryptocurrencies are not the new monetary system we need. *Financial times*, July 5, Retrieved August 4, 2022, from <https://www.ft.com/content/f2faec9-6d42-4d78-9c68-1f59795789a7>

## Prihodnji trendi nezamenljivih žetonov

### Izvilleček

Veriženje blokov je ena ključnih inovacij na področju informacijske tehnologije v zadnjih 15 letih. Pomemben vidik uporabe tehnologije veriženja blokov je ustvarjanje tako imenovanih nezamenljivih žetonov (non-fungible tokens (NFTs)). Čeprav ime zaradi besede žeton spominja na kriptovalute, v praksi NFTs ne predstavljajo elektronskega denarja, temveč digitalno potrdilo o lastništvu sredstva. Dejansko se obnašajo kot žetoni, katerih skupna ponudba je 1 in je nespremenljiva. Glede na njihovo tehnično in konceptualno podlago lahko NFTs opredelimo kot digitalna potrdila o lastništvu, ki temeljijo na tehnologiji veriženja blokov in katerih posedovanje dokazuje nesporno lastništvo kupljenega digitalnega sredstva. Predmet tega prispevka je konceptualna osnova NFTs in obseg njihove uporabe v digitalnem poslovanju. Njegov namen je ugotoviti vrednostne dejavnike NFTs in ali je v prihodnosti mogoče pričakovati širitev njihove uporabe. Rezultati naše raziskave kažejo, da je bistvena prednost, ki jo NFTs prinašajo v digitalno poslovanje, avtentifikacija. NFTs omogočajo tudi kontinuirano pobiranje avtorskih honorarjev. Zadnji, a potencialno najmočnejši generator vrednosti NFTs, je ustvarjanje ekosistema, v katerem se na podlagi začetnih oblik digitalnih sredstev oblikuje spletna skupnost. Brez standardizacije in regulacije s strani držav bodo NFTs ostali v tržni niši intenzivnih uporabnikov interneta.

*Ključne besede:* umetna inteligenca, veriženje blokov, kriptovalute, nezamenljivi žetoni, ekskluzivnost





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