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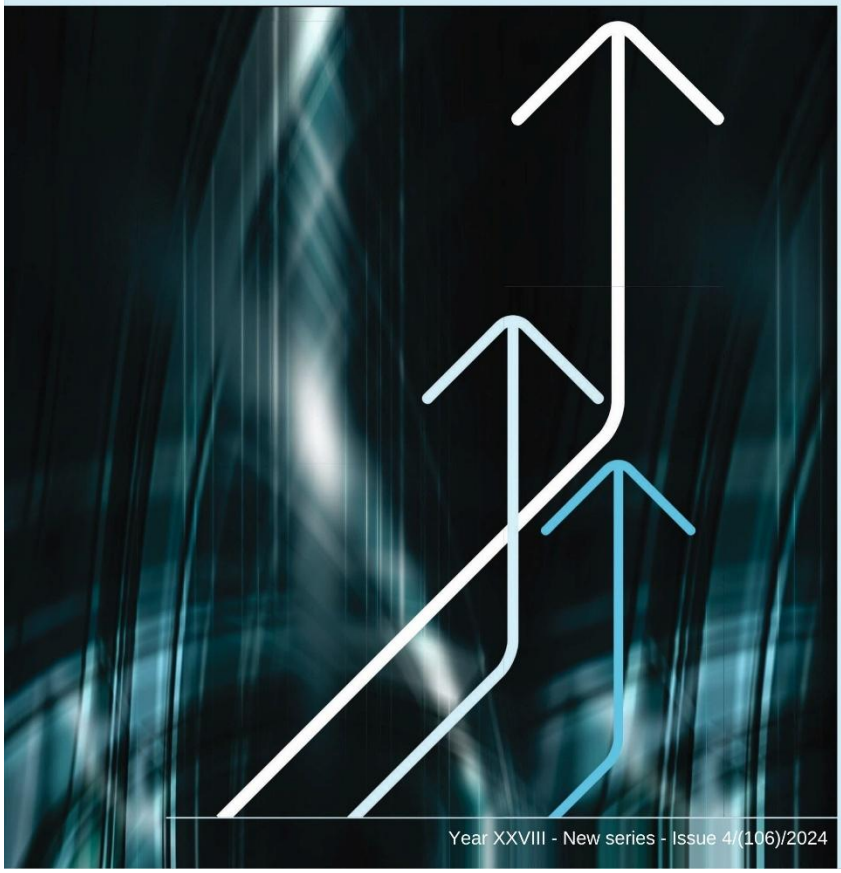
# Financial Studies



Year XXVIII - New series - Issue 4/(106)/2024

"VICTOR SLĂVESCU" CENTRE FOR FINANCIAL
AND MONETARY RESEARCH

# FINANCIAL STUDIES

ROMANIAN ACADEMY
"COSTIN C. KIRIȚESCU" NATIONAL INSTITUTE FOR ECONOMIC RESEARCH
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# FINANCIAL LITERACY, ACCESS TO FINANCE AND THE PROVISION OF SCHOOL RESOURCES AMONG PRIVATE SCHOOLS IN NIGERIA

**Tunji S. ONAKOYA, PhD Candidate***
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**Abstract**

This study provides empirical data to expose the role of school owners' financial literacy in the relationship between access to finance and the provision of school resources among private schools in south-west Nigeria. A multistage sampling technique was adopted to determine the participants who participated as respondents in the study. Three research instruments were adopted for the study. The instruments used were the private school access to finance questionnaire, a financial literacy questionnaire, and a school resources checklist. Data collected were analysed using inferential statistics of multiple regression and mediation analysis. The findings show that access to finance significantly influences the provision of school resources among private schools. The study also found that school owners' financial literacy mediates the relationship between access to finance and the provision of school finance among private schools in south-west Nigeria. The study recommends that financial literacy courses be included in the university's curriculum for undergraduates and postgraduate students in the departments and faculties of education of various universities in Nigeria.

**Keywords:** access to finance, financial literacy, private schools, school resources

**JEL Classification:** A12, A21, I21, I26

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## 1. Introduction

Approximately 50% of Nigeria's children attend private schools, whose ownership is dominated by edupreneurs (National Bureau of Statistics, 2020a). In Nigeria, these private schools are officially classified as small and medium enterprises (Adekunle, 2021). Private schools contribute to the educational development of Nigeria by absorbing children who cannot be absorbed in the public schools. Apart from this, they also serve as providers of quality education, which Oloba and Smith (2022) found to be scarce among most public schools in Nigeria. Private schools have also been found to contribute to economic development by employing graduates as teachers and supporting staff (Caingcoy et al.,2021). In Nigeria, private schools also pay taxes (Nwonyuku, 2020). These educational and economic contributions of private schools made the Nigerian government invite individuals like edupreneurs to establish private schools in Nigeria (Federal Ministry of Education, 2014).

Despite the contributions of private schools, Andrabi et al. (2023) state that private schools face several obstacles. In Nigeria, Potokri and Onakoya (2024) found that these obstacles include classifying private schools as business entities, exposing them to harsh tax policies and a lack of access to finance from government and private lending organisations. Ikemba-Efughi and Raj (2020) also state that the absence of regulatory standards for operations is one of the challenges affecting the development of private schools in Nigeria. All these challenges have made private schools susceptible to quackery and vilification by critics (Inglis, 2023). Amongst these problems, Onakoya (2024) states that financing is the major issue affecting the provision of school resources, which has led to poor performance among private schools in Nigeria.

Despite these challenges, private schools are expected to contribute to national development through teaching and learning (Sulaiman, 2021). This expectation stems from the belief that private schools, like public schools, shape the future workforce by encouraging critical thinking, creativity, and problem-solving skills among students. Teaching requires the delivery of curriculum content and the ability to engage students through a multifaceted pedagogical method that streamlines instruction to meet students' learning needs. For learning to be successful, schools must provide an atmosphere conducive to

academic activities, including school resources and a safe, inclusive environment (Darling-Hammond et al.,2024).

School resources are the physical and human materials needed for teaching and learning (Mestry & Bodalina, 2015). While physical resources encompass school facilities such as classrooms, libraries, laboratories, and sports equipment required to create a conducive academic environment, human resources include qualified teachers, administrative staff, and support personnel needed for the utilisation of physical resources to deliver quality education. Darling-Hammond et al. (2024) claim school resources play a role in enhancing the quality of education. School resources such as textbooks, computers, and well-equipped classrooms provide the foundation for delivering the curriculum content and educational objectives. For instance, access to modern teaching aids like computers, projectors, and interactive whiteboards can support the delivery of different instructional content, allowing teachers to adopt varied teaching styles.

Lavy (2020) found that schools with better resources produce higher learning outcomes, as teachers and students are empowered to work in an environment that supports learning. Inversely, Singh (2024) found that resource-poor schools face numerous challenges, such as overcrowded classrooms, outdated materials, and insufficient teacher support, which can hinder effective teaching and student performance. As such, private schools need adequate school resources to deliver quality education and contribute to national development, which is a situation that requires financial resources. This view is also supported by Robert et al. (2021), who express that financial resources are needed to procure instructional materials, maintain school infrastructure, and invest in teacher professional development.

Acquiring financial resources involves careful planning, budgeting, and resource management (Sanghera, 2019). As such, private schools must identify the needs of their student populations to ensure that financial and school resources are effectively allocated. Acquiring financial resources begins with financial investments from various sources, including private organisations and parental contributions (Gamsu, 2022), as private schools require adequate funds to procure textbooks, technology, and learning materials. In some cases, partnerships with external organisations or public-private collaborations can facilitate access to specialised resources such as laboratory equipment, computers, or infrastructural upgrades. Additionally, recruiting and retaining qualified teachers and support

staff are critical components of resource acquisition, as human resources are as vital as physical and material resources in promoting effective teaching and learning (Molaudzi,2020). For instance, schools that invest in continuous professional development for teachers are more likely to encourage a dynamic and responsive school environment. Without a strategic approach to acquiring needed school resources, private schools may struggle to meet the educational needs of their students, and this situation may lead to disparities in educational outcomes.

Adebayo (2024) also confirms that the provision of needed school resources is financially demanding. As such, private school owners must navigate the financial burden of acquiring resources such as textbooks, technological devices, infrastructure upgrades, and qualified staff. A large amount of financing is required to equip private schools with the necessary resources for effective teaching and learning. This amount can be challenging for small or newly established schools with limited financial reserves (Mansor et al., 2022). As such, there is a need for sustainable access to finance. Accessing finance is the process through which individuals and institutions obtain the necessary funds to support their activities, projects, or operational needs (Rajamani et al., 2022). This process includes various financial mechanisms, including loans, grants, equity financing, and other funding sources for start-ups and established organisations.

Accessing finance is vital for private schools that rely on external funding to acquire school resources like teaching materials, technology, and infrastructure improvements. For instance, a private school may seek a bank loan to finance the construction of additional classrooms to accommodate growing student enrolment. Accessing finance also requires navigating complex financial systems and regulations, necessitating financial literacy and strategic planning to ensure successful outcomes (Addo & Asante, 2023). Accessing finance can influence private schools' capacity and sustainability, as private schools with limited access may struggle to maintain quality education or meet regulatory standards.

In order to access finance, private school owners often turn to varied financing options, including bank loans, educational grants, and investments from private stakeholders, to bridge the gap between their available funds and the actual resource acquisition cost (Onakoya,2024). For example, private schools may apply for loans to

fund the construction of additional classrooms or to purchase modern teaching aids, which would otherwise be unaffordable. Therefore, private school owners must be financially literate and well-informed about the various financing sources available to them, as access to finance is vital to ensuring that schools are well-resourced and capable of meeting the educational needs of their students.

Private schools have been found to face challenges in accessing finance (Potokri & Onakoya,2024), which can hinder their operational capabilities and growth potential. These challenges often arose from the lack of collateral, insufficient credit histories, or the perceived risks associated with investing in non-public entities. Adebayo (2024) states that the issue of access to finance is problematic for private organisations, including private schools, which rely on external funding to support their initiatives and resource needs. Private schools may struggle to secure loans due to stringent lending criteria, which require detailed financial statements and a proven track record of revenue generation. Additionally, a fluctuating economic environment can worsen these challenges, as financial institutions may become more risk-averse during periods of economic uncertainty, a situation that further limits the funding options available to private schools. This situation creates a cycle in which the inability to access finance negatively affects the growth and development of private schools and the quality of education they provide.

Access to finance has also been identified as an important factor in the categorisation of private schools. Access to finance assists in distinguishing between low-fee-paying schools and elite private schools. In Nigeria, low-fee-paying schools, often called "mushroom schools", operate with minimal financial resources, which limits their ability to provide quality education for their students (Ikemba-Efughi & Raj, 2020). Low-fee-paying schools charge lower tuition fees to cater to less affluent families, but the trade-off is seen in the lack of basic school resources, such as well-equipped classrooms, qualified teachers, and modern educational materials. Without access to sufficient finance, low-fee-paying schools struggle to invest in needed infrastructure, technology, and teacher training, all of which are necessary for delivering a high-quality education.

In contrast, elite private schools, with better access to finance, can invest in superior facilities, hire more experienced staff, and offer a broader curriculum (James et al.,2022). These financing levels create a disparity in educational outcomes between the two types of private

schools. As a result, pupils in low fee-paying schools may not receive the same quality of education, which can affect their academic performance and prospects. This financial divide shows the importance of private schools' access to finance to provide an education that meets acceptable quality standards. In order to have access to finance, owners and organisational characteristics like school size, financial literacy, and social status may be needed, amongst other factors.

Bire et al. (2019) have demonstrated that financial training enhances owner's financial literacy, leading to improved financial decision-making and more effective acquisition of organisational resources. Financial literacy equips business owners and managers with essential skills to understand financial statements, manage cash flow, and evaluate funding options, all of which are critical for the sustainable growth of an organisation. For instance, an owner with financial training is better positioned to assess the risks and benefits of a loan, ensuring that the loan terms align with the organisation's long-term financial strategy. In the context of private schools, improved financial literacy can enable school owners to make informed decisions about budget allocation, investments in educational technology, and staff recruitment, thereby directly influencing the quality of teaching and learning. Namreen Asif (2023) has shown that financially literate individuals are more likely to manage their resources, reduce unnecessary expenses, and maximise returns on investments. Consequently, financial training is not merely an academic exercise but a strategic tool that directly contributes to achieving personal and organisational goals by empowering owners to navigate complex financial landscapes with confidence and precision.

Studies have been conducted on private schools in Nigeria, this includes Olubor's (2009) study on cost analysis of private schools, Ugwulashi's (2012) study on funding of private school administration, Rose and Adelabu's (2009) study on contributions of private schools in education for all, Egbebi & Wakili (2020) findings on the management of private schools, Baum et al. (2018) study on affordability and quality, Okeke et al. (2024) study on funding sources, Härmä and Adefisayo, (2013.) study on challenges facing private schools, World Bank (2022) literature on private school administration, Potokri and Onakoya(2024) study on private school financing challenges amongst others. Even though few of the studies focused on financing private schools, which could lead to access to finance, they all overlooked the significance of owners' financial literacy, which could hypothetically lead to an

increase in private school access to finance. We believe this hinders a holistic approach to solving issues relating to financing private schools in Nigeria.

The current economic situation has changed financial literacy from a preserve of the core economist to an essential skill that everyone must acquire and utilise (Gezmen & Eken,2021). This has encouraged African universities like the University of Johannesburg to make the acquisition of financial literacy a must for all its students. This is to have a crop of financially literate graduates who can apply financial literacy in their personal lives, day-to-day activities, and businesses, irrespective of their academic field. As university graduates, private school owners should also acknowledge the importance of financial literacy, which studies and universities encourage. This may be a missing jigsaw in accessing finance to provide school resources and improve educational quality in Nigeria.

The theoretical foundation for this study is rooted in the resource-based theory, as outlined by Wernerfelt (1984). Wernerfelt argued that an organisation's resources play an important role in enhancing its activities and achieving its goals whilst maintaining competitiveness (Barney,1991). The resources can be tangible and intangible, including financial, human and physical assets (Zhang et al., 2021; Cooper et al. (2023). The effective combination of the organisation's tangible and intangible resources assists the organisation in achieving its strategic goals. According to this theory, resources should be in high demand, scarce, and have limited replicability (Varadarajan, 2023). Financial literacy, often viewed as a valuable asset for business owners, is also considered an important organisational resource. In the context of this study, resource-based theory can be applied to understand how private schools use their resources to improve their performance and remain competitive with existing public schools. These resources include intangible ones like finance, owners' characteristics such as financial literacy, owners' reputation, staff expertise, and tangible resources like school building, teaching materials and technology. With the effective utilisation of these resources, private schools may be able to achieve their objectives. This purported theoretical scenario is lacking in the administration of private schools in Nigeria, as the National Bureau of Statistics (2020b) have found that private schools don't have access to financial resources. This means they would struggle to provide school resources—a situation where owner characteristics may contribute.

Hussain et al. (2018), Buchdada et al. (2020), Fatoki (2021) and numerous studies have been conducted on financial literacy and access to finance in different sectors of the economy, but we are confident to say that none has been conducted on financial literacy on accessing finance among private schools in Nigeria. A country that has a financing ecosystem that classifies private schools as a small and medium-sized business. Hence, this study aims to determine the role of financial literacy in accessing finance to provide school resources among private schools in Nigeria. To achieve the aim of this study, the following hypotheses were formulated:

H1: Access to finance significantly influence the provision of school resources among private schools in South-West Nigeria.

H2: Financial literacy significantly mediates the relationship between access to finance and the provision of school resources among private schools in South-West Nigeria.

## 2. Methodology

The research design for this study is a correlational survey design. It is non-experimental and can only be measured as they are; as such, it is not susceptible to researchers' manipulation.

### 2.1. Population

This study's population comprises 5,838 (see Table 1) registered private schools in the six states of south-west Nigeria (Lagos State, Ogun State, Oyo State, Osun State, Ondo State and Ekiti State).

**Table 1**

**Population of registered private schools in South-West, Nigeria**

| S/n | State | Number of | |
|---|---|---|---|
| | | Private Secondary Schools | Edupreneurs |
| 1 | Ekiti | 518 | 518 |
| 2 | Lagos | 2 437 | 2 437 |
| 3 | Ogun | 687 | 687 |
| 4 | Ondo | 610 | 610 |
| 5 | Osun | 425 | 425 |
| 6 | Oyo | 1 161 | 1 161 |
| | **Total** | **5 838** | **5 838** |

*Source: Researchers field study, 2023*

### 2.2. Sampling

One hundred and fifty (150) private school owners participated in this study. These participants were selected using a multistage sampling technique. The multistage sampling techniques are as follows: Stage 1: a cluster sampling technique was adopted to cluster the six states into coastal and inland states. Coastal states (Lagos, Ogun and Ondo states) and Inland states (Oyo, Osun and Ekiti states). Stage 2: A simple random sampling technique was adopted to choose a state from each clustered state, and Lagos and Oyo states were selected to represent each cluster. Stage 3: a proportionate sampling technique was adopted to select thirty (30) local government areas in each state. Stage 4: A purposive sampling technique was adopted to choose five(5) schools in each state's local government area. One (1) school owner represents each school. This distribution is shown in Table 2.

**Table 2**

**Sampling frame according to the local government, number of schools in each state and school owners involved**

| States | Number of | | | |
|---|---|---|---|---|
| | L.G.A. | L.G.A. (Selected) | Private Schools (Selected) | Edupreneurs (Selected) |
| Lagos | 20 | 11 | 55 | 55 |
| Oyo | 33 | 19 | 95 | 95 |
| **Total** | **53** | **30** | **150** | **150** |

*Source: Researchers field study, 2023*

### 2.3. Instruments

Data was collected using the following research instruments: Private School Access to Finance Questionnaire (P.S.A.F.Q), Financial Literacy Questionnaire (F.L.Q), and School Resources Checklist (S.R.C). The P.S.A.F.Q is an instrument that was self-designed by the researchers. It has two sections: the biographical details of the respondents and a 5-point Likert scale section, which comprises 15 items to measure access to finance of the respondent's schools. The second instrument is the F.L.Q., which was adapted from Trombetta (2023). It was used to measure the financial literacy of the respondents. The third instrument is the S.R.C., which was self-developed by the researchers; the checklist was used to determine the availability of school resources amongst the schools owned by the respondents.

### 2.4. Validity and reliability of instrument

In terms of validity, the instruments were administered amongst private school owners in Edo state to confirm the instrument's face and content validity. The feedback gathered from the pilot stage was used to amend the instruments to ensure the achievement of its intended purpose. For the reliability of the instruments, the Cronbach Alpha formula was adopted to confirm the P.S.A.F.Q. and the coefficient of 0.76 was achieved. The reliability of the F.L.Q. was confirmed using Kuder-Richardson 20, and the reliability was measured at 0.83. The S.R.C. reliability was confirmed with a weighted kappa (Kw). And the inter-reliability was 0,79. All these outcomes show that the instruments were highly reliable for this study.

### 2.5. Data analysis

Data collected were analysed using inferential statistics methods, including multiple regression and mediation analysis, at 0.05 significance level. The analysis was conducted using Statistical Package for Social Sciences (SPSS) version 29.

## 3. Results

H1: Access to finance significantly influence the provision of school resources among private schools in South-West Nigeria.

**Table 3**

**Regression analysis of the access to finance on the provision of school resources**

| R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|
| .922[a] | .850 | .844 | 1.837 |

| ANOVA Model | Sum of Squares | Df | Mean Square | F | Sig. | Remark |
|---|---|---|---|---|---|---|
| **Regression** | 2734.751 | 6 | 455.792 | 134.994 | <.001[b] | Sig. |
| **Residual** | 482.822 | 143 | 3.376 | | | |
| **Total** | 3217.573 | 149 | | | | |

*a.* ***Dependent Variable****: School Resources*

*b.* ***Predictors****: (Constant), Access to finance (School fees, loans, grants, business, savings, family and friends).*

Table 3 shows a multiple regression model indicating the joint influence of access to finance on the provision of school resources among private schools in South-West Nigeria. The regression model

summary indicated that access to finance is significant to the provision of school resources among private schools in Nigeria. The adjusted $R^2$ indicated that 84.4% of the variance in the provision of school resources among private schools in South-West Nigeria was a result of prompt access to finance. Therefore, access to finance significantly influences the provision of school resources among private schools in south-west Nigeria.

**Table 4**

**Relative influence of access to finance on the provision of school resources**

| Model | Unstandardised Coefficients | | Standardised Coefficients | T | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| **(Constant)** | .932 | .517 | | 1.801 | .074 |
| **School Fees** | .248 | .049 | .250 | 5.101 | <.001 |
| **Loan** | .883 | .095 | .875 | 9.292 | <.001 |
| **Grants** | -1.761 | .636 | -1.831 | -2.767 | .006 |
| **Business** | -1.911 | .694 | 1.994 | 2.752 | .007 |
| **Family and Friend** | -0.096 | .257 | -0.101 | -0.374 | .709 |
| **Savings** | -0.215 | .130 | -0.230 | -1.655 | .100 |

***Dependent Variable**: School Resources*

Results in Table 4 show the relative influence of access to finance on the provision of school resources among private schools in South-West Nigeria. Data revealed that the relative influence of loans on the provision of school resources among private schools in Nigeria was significant. The relative influence of grants on the provision of private school resources was insignificant. The relative influence of school fees on the provision of school resources among private schools in Nigeria is significant. The relative influence of business on the provision of school resources was insignificant. The relative influence of family and friends on the provision of school resources was insignificant, while the relative influence of savings on the provision of private school resources in Nigeria is significant. In terms of the potency of predictive power, business, loan, and school fees showed positive strength compared to the negative values of grants, family and friends, and savings. The above results indicate a significant influence of regression weight of school fees and loans on the provision of school resources among private schools in South-West Nigeria.

H2: Financial literacy significantly mediates the relationship between access to finance and the provision of school resources among private schools in South-West Nigeria.

**Table 5**

**Mediation Analysis Summary**

| Relationship | Total Effect | Direct Effect | Indirect Effect | Confidence Interval | | t-statistics | Conclusion |
|---|---|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound | | |
| Access to finance > Financial Literacy > School Resources | 0.042 | 0.005 | 0.038 | 0.0092 | 0.0751 | 2.531 | Partial Mediation |

***Relationship:*** *Access to finance (X) > with Mediators FINScore > Resource (Y)*

Table 5 presents the assessment of the mediating role of Edupreneur financial literacy on the relationship between access to finance and the provision of school resources. The results revealed a significant indirect effect of access to finance on the provision of school resources (b = 0.038, t = 2.531), supporting hypothesis two. Furthermore, the direct effect of access to finance on the provision of school resources in the presence of financial literacy was found to be significant (b = 0.005, p < 0.001). Hence, financial literacy partially plays a crucial role in access to finance and the provision of school resources among private schools in Nigeria.

## 4. Discussion

The analysis of hypothesis one revealed a significant relationship between access to finance and the provision of school resources among private schools in South-West Nigeria. This finding is also corroborated by Addo and Asante (2023) and Potokri and Onakoya (2024), that an organisation's access to needed external sources of finance is crucial in the provision of the organisation's resources like teaching materials, technology, and infrastructure improvements. These findings also align with the arguments of the resource-based theory as explained by Wernerfelt (1984), which advocates for the provision of resources like finance for the provision of organisational resources**.**

The findings of the study also revealed that among the various sources of accessing finance for the provision of school resources, school fees and loans have the most influence on the provision of school resources in South-West Nigeria. These findings align with

Ikemba-Efughi and Raj (2020) and James et al. (2022), which show that private schools depend mostly on school fees to administer their school and also confirm the findings of Onakoya (2024) that private organisations rely on loans from external organisations in other to provide the needed resources for growth.

The variation exists in how access to different sources of finance influences the provision of school resources, with school fees and loans being the most common sources of finance influencing the provision of school resources. Ikemba-Efughi and Raj (2020) and James et al. (2022) show the reliance of private schools on school fees for operational needs, while Onakoya (2024) emphasises the role of loans from external organisations in supporting resource provisions for private schools. The reliance on internal (school fees) versus external (loans) financing reveals a disparity in how private schools access finance for the provision of school resources.

Addo and Asante (2023) also show the importance of external financing for organisational growth. However, the financing system often imposes high interest rates and complex loan application processes (Potokri & Onakoya,2024). The findings by Potokri and Onakoya (2024) indicate that external financing plays a crucial role in private schools' resource provision. However, reliance on school fees and loans, as identified in this study and also supported by Ikemba-Efughi and Raj (2020) and Onakoya (2024), shows systemic inadequacies in educational financing.

The analysis of hypothesis two also confirms that there is a relationship between access to finance and the provision of school resources amongst private schools in South-West Nigeria. It further shows that for this relationship to be effective, there is a need for financial literacy; as Bire et al. (2019) and Sanghera (2019) state, effective planning, management and utilisation of financing are crucial for personal and organisational goals like the provision of needed resources.

The above shows that financial literacy mediates the influence of access to finance on the provision of school finance amongst private schools in Nigeria. This aligns with the study of Adebayo(2024) that owners with higher financial literacy are better positioned to allocate finance effectively, ensuring resource adequacy. On the other hand, inadequate financial literacy can lead to mismanagement of available finance, which can further amplify the existing resource shortages.

Addressing these disparities requires capacity building and systematic reforms in the financing of private schools in Nigeria. Bire et al. (2019) and Sanghera (2019) show that financial literacy is integral to the effective planning, management, and utilisation of finance.

As such, these findings show that the availability of finance alone cannot automatically translate to the provision of school resources, but there is a need for private school owners to possess financial literacy in order to maximise finance for the provision of school resources. These findings are also supported by studies conducted by Adebayo (2024), which found that owner characteristics like financial literacy are needed for the effective utilisation of finance for the provision of school resources. This, inter alia, shows that private schools, which have been officially categorised as small business organisations, need owners' financial literacy to make effective use of available finance for the provision of school resources.

In our opinion, these findings show that there is a need for a comprehensive strategy to address the financial challenges faced by private schools in South-West Nigeria. While financial literacy is an important factor in solving these challenges, systemic barriers such as high interest rates and restrictive loan conditions also remain obstacles.

## 5. Conclusion

The study concludes that accessing finance has an influence on the provision of school resources among private schools in Nigeria, but it further shows that access to finance cannot have the desired influence without the presence of financial literacy. As such, financial literacy is crucial for finance to effectively provide school resources among private schools in South-West Nigeria.

Based on the findings of the study, the following recommendations were made:

- Financial literacy should be incorporated into Edupreneurship workshops and teacher training programmes. This should be combined with structural reforms, such as offering subsidised loans and creating advisory services for private school owners in order to alleviate barriers to access to finance by private schools.
- The government could introduce grants and subsidies for private schools, particularly those in underserved areas.

This can be combined with a specialised credit scheme tailored to the needs of private schools to alleviate any financial burdens they may be encountering in the provision of school resources. Public-private partnership (PPP) financing, such as co-financed infrastructure projects or shared resources schemes, could also be adopted to offer innovative solutions to the provision of school resources.

- School administration is expected to be the exclusive preserve of graduates of educational leadership and management; as such, financial literacy should be made a compulsory module in the undergraduate and postgraduate programmes of students in the Department of Educational Leadership and Management at Nigerian universities. This would assist in producing graduates with the financial knowledge to give the effective leadership needed for school administration.
- Financial literacy courses should be included in the university's curriculum for undergraduates and postgraduate students in the departments and faculties of education of various universities in Nigeria.
- The university system should introduce programmes on the sustainable administration of private schools. This can be promoted by the Department of Educational Leadership and Management of various universities through the introduction of a professional master's in educational administration in the same way conventional businesses introduced a professional master's in business administration; this would assist in equipping school leaders with practical solutions for the financial management of the school. Thereby improving the quality of private school education in Nigeria.

By adopting these recommendations, government and stakeholders can solve the private school financing problem and enable private schools to focus on their primary mission: delivering quality education to future generations.

## 5. Limitations and future research

The researchers did not receive funding from any sources, and this study is self-funded, which restricts our desire to conduct this

research in Nigeria's six geopolitical zones. Although due to the homogenous educational and economic situation in Nigeria, this does not take away the insights of this study from being adopted by private school owners, irrespective of their geographical location. Thus, we recommend conducting a comparative study among sub-Saharan African countries.

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## Appendix I

### Edupreneur Access to Finance Questionnaire (EFAQ)

Kindly fill out or tick (√) the boxes provided against the most appropriate response

**Section A: Demographic data**

**Name of the School (Optional)** …….
**Local Government**: …….

| | | | |
|---|---|---|---|
| **1** | **State** | Lagos | Oyo |
| **2** | **Gender** | Male | Female |
| **3** | **Highest Educational Qualification** | Diploma<br>First Degree<br>PGDE | Masters Degree<br>Doctoral Degree<br>Others (specify) ……..... |
| **4** | **Current financial value of your school (in Naira)** …….. | | |

**Section B: Access to finance**

*SA=Strongly Agreed; A=Agreed; U=Undecided; D=Disagree; SD=Strongly Disagree*

| S/n | Item | SA | A | U | D | SD |
|---|---|---|---|---|---|---|
| 1 | School fees are enough to finance private schools. | | | | | |
| 2 | Parents are prompt when paying their children's school fees. | | | | | |
| 3 | Private schools have access to loans. | | | | | |
| 4 | Collateral is compulsory to access a loan. | | | | | |
| 5 | High interest is charged on loans to private schools. | | | | | |
| 6 | Private schools have access to grants. | | | | | |
| 7 | Cash transfer for school financing is ideal for government financing of pupils in private schools. | | | | | |
| 8 | Private organisations give grants to private schools. | | | | | |
| 9 | Private schools can survive solely on their business investment and entrepreneurial activities. | | | | | |
| 10 | Selling school merchandise and stationery is profitable. | | | | | |
| 11 | My school building is rented for public civic occasions. | | | | | |
| 12 | My friends have been financially supportive of my school. | | | | | |
| 13 | My family assists the school financially. | | | | | |
| 14 | I use my savings as my startup capital. | | | | | |
| 15 | Personal savings are always used whenever I need to finance my school. | | | | | |

Thank you for your cooperation.

## Appendix II

### Financial Literacy Test

### EDUPRENEUR FINANCIAL LITERACY TEST

**Name of the School**:……

1. "Suppose a school owner had ₦1000 in a savings account and the interest rate was 2% per year. After five years, how much do you think she would have in the account if she left the money to grow?"
*a) More than ₦1002 b) Exactly ₦1002 c) Less than ₦1002 d) Do not know/Refuse to answer*

2. "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?"
*a) More than today b) Exactly the same c) Less than today d) Do not know/Refuse to answer*

3. Please tell me whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund."
*a) True b) False c) Do not know/Refuse to answer*

4. To have no debt is always desirable for a private school.
*a) True b) False c) I don't know /Refuse to answer*

5. If school enrolment is increasing, this means that the school is financially healthy.
*a) True b) False c) I don't know /Refuse to answer*

6. If at the end of a certain period (day, month, year), a school has more cash than at the beginning of the period, this means that the school has made a profit.
*a) True b) False c) I don't know/Refuse to answer*

7. A school has just bought a piece of equipment that has cost ₦200. This equipment is going to be used for five years. The profit of the current year will be reduced by:"
*a) More than ₦200 b) Less than ₦200 c) Exactly ₦200 d) I don't know/Refuse to answer*

8. "The return on school assets is called ROSA, and the return on equity invested into the school business by shareholders is called ROE. In general, the level of debt is more sustainable if:"
*a) ROSA > ROE b) ROSA < ROE c) ROSA = ROE d) I don't know/Refuse to answer*

**Appendix III**

## Private School Resource Checklist

Name of School:……

| S/n | Items | AV | NAV |
|---|---|---|---|
| 1 | Health Bay | | |
| 2 | Library | | |
| 3 | Conducive classroom (40 pupils to 1 teacher) | | |
| 4 | Sanitary (Clean Toilet) | | |
| 5 | Generator | | |
| 6 | Portable water source | | |
| 7 | Computers | | |
| 8 | Play/sport ground | | |

AV-Available, NAV=Not Available

# PREDICTING STOCK PRICE DIRECTION OF EUROZONE BANKS: CAN DEEP LEARNING TECHNIQUES OUTPERFORM TRADITIONAL MODELS?

**Bogdan Ionuț ANGHEL, PhD Candidate***

**Abstract**

Due to market volatility and complex regulations, forecasting stock price movements within the European banking sector is highly challenging. This study compares the predictive performance of Bidirectional Long Short-Term Memory (BiLSTM) and Long Short-Term Memory (LSTM) with traditional models - Extreme Gradient Boosting (XGBoost) and Logistic Regression - in predicting the daily stock price direction of the ten largest Eurozone banks by market capitalization. Utilizing a dataset from January 1, 2000, to May 31, 2024, comprising eight financial and macroeconomic indicators, a comparative analysis of these models was conducted. The findings suggest that traditional machine learning models are more effective than advanced deep learning models for predicting stock price direction in the Eurozone banking sector. The underperformance of LSTM and BiLSTM may be attributed to dataset limitations relative to deep learning requirements.

**Keywords:** Financial Market, European Banking Sector, Time Series, Prediction

**JEL Classification**: C53, G17, G12, G21

## 1. Introduction

Predicting stock price movements within the European banking sector is a complex and challenging task, influenced by market volatility and the intricate regulatory landscape of the Eurozone. Recent advancements in machine learning and deep learning have introduced sophisticated models aimed at capturing the nonlinear and temporal

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dynamics inherent in the financial markets. This study seeks to evaluate whether Bidirectional Long Short-Term Memory (BiLSTM) and Long Short-Term Memory (LSTM) networks can outperform traditional models: Extreme Gradient Boosting (XGBoost), and Logistic Regression in predicting the direction of stock prices for the 10 largest Eurozone banks by market capitalization.

Financial forecasting necessitates robust models capable of handling complex data patterns and temporal dependencies. Traditional machine learning models, such as Logistic Regression and ensemble methods like XGBoost, have been extensively used due to their interpretability and effectiveness with structured data in classification problems. Deep learning models, particularly recurrent neural networks like LSTM and BiLSTM, offer the potential to model sequential data and capture long-term dependencies, which are essential in time-series forecasting.

The literature reflects a growing interest in applying these advanced models to financial prediction tasks. Despite these advancements, there is a gap in the literature regarding the comparative performance of BiLSTM networks against traditional models like Logistic Regression and XGBoost in the context of the Eurozone banking sector. Moreover, the specific dynamics of European banks, influenced by regional economic policies and market conditions, necessitate a tailored approach to forecasting that accounts for sector-specific characteristics and macroeconomic indicators.

The main contributions of this paper are threefold. First, the study conducts a comprehensive evaluation of BiLSTM, LSTM, XGBoost, and Logistic Regression models in predicting the daily stock price direction of the ten largest Eurozone banks included in the STOXX600 index. Second, the paper enhances the predictive models by incorporating eight carefully selected financial and macroeconomic indicators, following extensive data preprocessing steps. Third, the study assesses the models using key performance metrics, including Area Under the Curve (AUC) and accuracy, to provide a nuanced understanding of each model's strengths and limitations in this specific financial context.

The paper is organized as follows: Section 2 - provides a detailed review of the relevant literature, highlighting previous studies on financial forecasting using machine learning and deep learning models. Section 3 outlines the methodology, including data collection, preprocessing, and the implementation of the predictive

models. Section 4 presents the results of the analysis, comparing the performance of each model and discussing the implications. Finally, Section 5 concludes the paper by summarizing the key findings and suggesting directions for future research.

## 2. Literature review

Forecasting stock movements within the European banking sector is a challenging endeavour, driven by both the high volatility of financial markets and the distinct regulatory dynamics within the Eurozone. The recent literature highlights the application of advanced machine learning methods, deep learning techniques, and hybrid models that aim to capture the nuanced economic and structural dependencies within this sector.

Traditional machine learning models have been widely employed for stock movement prediction. Qiu and Song (2016) demonstrated the efficacy of optimized ANN models, particularly when combined with genetic algorithms, in improving prediction accuracy for stock indices. Zhong and Enke (2019) extended this approach by deploying hybrid machine learning techniques to classify the daily return direction of the S&P 500, using Deep Neural Networks enhanced with Feature Engineering Techniques. More advanced recurrent models, specifically LSTM and BiLSTM, have also proven effective for time-series data with temporal dependencies. BiLSTM models, which capture dependencies from both forward and backward sequences, have shown success in various domains, including stock prediction and agriculture classification problems. For instance, Kwak et al. (2020) explored BiLSTM for classification, indicating the model's capability to utilize multi temporal dependencies effectively. This bidirectional aspect provides a broader context that can be particularly beneficial in financial forecasting, where both historical and forward-looking trends matter.

The BiLSTM model, due to its dual-directional memory capabilities, has emerged as a preferred approach for sequential data in complex environments. Hamayel and Owda (2021) demonstrated that BiLSTM models, in comparison to standard LSTM, deliver superior results in predicting volatile asset prices, such as cryptocurrency, by leveraging both past and future dependencies within the time series. In contexts like stock movement prediction in the European banking system, BiLSTM's ability to consider comprehensive temporal trends

may offer an edge, capturing bidirectional dependencies that unidirectional models often overlook. This capability is further supported by Suebsombut et al. (2021), who highlighted the BiLSTM's advantages in time-series data predictions due to its bidirectional structure, showing notable improvements in predictive accuracy for datasets that require modelling of both past and future information.

The cyclic nature of financial stability within the Eurozone significantly affects stock movement predictions for European banks. Bouheni and Hasnaoui (2017) observed that Eurozone banks exhibit procyclical stability behaviours, taking on more risk during economic expansions and tightening during downturns, which impacts the overall volatility in the banking sector. The impact of financial crises on bank stock returns further complicates forecasting within the Eurozone. Allegret et al. (2016) analyzed the Eurozone sovereign debt crisis and demonstrated that this event led to significant contagion among European banks, heavily affecting stock returns across the region. Such economic stressors underscore the importance of incorporating economic indicators related to sovereign risk and macroeconomic stability into forecasting models.

The European banking sector has pursued greater integration, though barriers remain due to legal and economic differences among countries. Kolia and Papadopoulos (2022) examined efficiency convergence within the EU and the Eurozone, noting that while there are signs of convergence, significant disparities persist across countries, affecting banking efficiency and stock volatility. In addition, Apergis et al. (2015) explored the bank lending channel as a function of the European Central Bank's monetary policy, revealing that bank characteristics like stability and size influence how banks respond to monetary policy changes.

The effectiveness of predictive models such as Logistic Regression, XGBoost, LSTM, and BiLSTM is significantly influenced by the size of the training dataset. For Logistic Regression, a minimum of 10 events per predictor variable is recommended to ensure reliable estimates (Peduzzi et al., 1996). XGBoost, a gradient boosting algorithm, can handle smaller datasets but benefits from larger datasets to capture complex patterns effectively (Chen & Guestrin, 2016). Deep learning models like LSTM and BiLSTM require substantial amounts of data due to their numerous parameters and capacity to model intricate temporal dependencies; insufficient data can lead to overfitting and poor generalization (Goodfellow et al.,

2016). Therefore, while traditional models like Logistic Regression may perform adequately with smaller datasets, advanced models such as LSTM and BiLSTM necessitate larger datasets to achieve optimal performance**.**

## 3. Methodology

The objective of this study is to evaluate whether BiLSTM and LSTM can outperform XGBoost and Logistic Regression in predicting the direction of stock prices within the Eurozone banking sector. The task involves predicting the daily stock price movement (up: 1 or down: 0) of the ten largest Eurozone banks by market capitalization. These banks are included in the STOXX600 index, and their importance to the regional financial system makes them an ideal focus for this research.

The dataset used in this study was extracted from Datastream by Refinitiv. Daily closing prices for the ten largest Eurozone banks, as determined by market capitalization, were retrieved alongside twelve independent variables representing financial and macroeconomic indicators. The dataset spans a time frame from January 1, 2000, to May 31, 2024, offering a rich, multi-decade perspective on stock price movements. Predictions were performed on the final 20% of the dataset, corresponding to the most recent observations, allowing for robust out-of-sample evaluation.

In Table 1, the descriptive statistics of the selected bank are presented.

**Table 1**

**Descriptive statistics of selected banks**

| Bank name | Count | Mean | Std. | Min | 25% | 50% | 75% | Max |
|---|---|---|---|---|---|---|---|---|
| BNP PARIBAS | 6370 | 51.79 | 11.8 | 20.78 | 44.48 | 51.19 | 57.61 | 91.6 |
| BANCO SANTANDER | 6370 | 4.82 | 1.43 | 1.47 | 3.7 | 4.8 | 5.88 | 8.4 |
| UNICREDIT | 6370 | 60.58 | 52.99 | 6.21 | 15.1 | 29.94 | 108.09 | 198.41 |
| INTESA SANPAOLO | 6370 | 2.71 | 1.01 | 0.87 | 2.04 | 2.46 | 3.2 | 5.83 |
| BBV ARGENTARIA | 6370 | 7.78 | 2.74 | 2.16 | 5.62 | 7.31 | 9.57 | 15.26 |

| Bank name | Count | Mean | Std. | Min | 25% | 50% | 75% | Max |
|---|---|---|---|---|---|---|---|---|
| ING GROEP | 6370 | 13.66 | 6.51 | 1.92 | 8.98 | 12.24 | 16.59 | 33.76 |
| CREDIT AGRICOLE | 6370 | 13.63 | 5.7 | 2.88 | 10.18 | 12.37 | 15.16 | 32.72 |
| ERSTE GROUP BANK | 6370 | 28.2 | 10.75 | 6.56 | 19.54 | 28.31 | 35.26 | 57.63 |
| KBC GROUP | 6370 | 51.57 | 20.58 | 5.5 | 35.67 | 50.96 | 65.5 | 106.24 |
| SOCIETE GENERALE | 6370 | 46.3 | 24.68 | 10.9 | 27.43 | 42.56 | 56.75 | 140.55 |

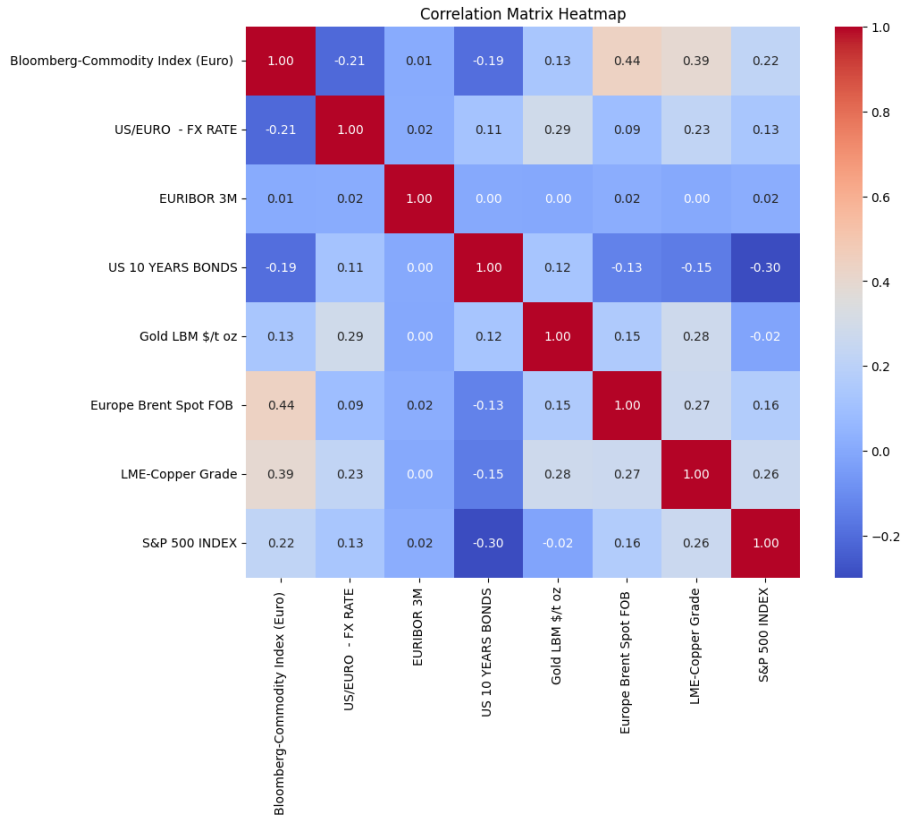
*Source: Author's contribution*

Extensive data preprocessing was undertaken to ensure the quality and usability of the dataset. Missing values were identified and imputed using the K-Nearest Neighbors (KNN) algorithm, a technique known for its effectiveness in maintaining statistical relationships within the data. Outlier detection was also performed, but no significant anomalies required removal. The twelve initial independent variables underwent a correlation analysis using Pearson's correlation coefficient to identify potential multicollinearity. Variables with a correlation greater than 0.5 were deemed redundant and removed, resulting in a final set of eight independent variables. The variables included in the dataset are: Bloomberg-Commodity Index (Euro), US/EURO - FX Rate, EURIBOR 3M, US 10 Years Bonds, Gold LBM $/t oz, Europe Brent Spot FOB, LME-Copper Grade, and S&P 500 Index.

The Correlation matrix of the independent variables is presented in Figure 1.

**Figure 1**

**Correlation Matrix Heatmap**




*Source: Author's contribution*

To enhance the performance of the models, all features (both dependent and independent variables) were transformed by calculating logarithmic returns. The dataset, comprising 6370 daily observations, was divided into training and testing subsets using stratified sampling. The training set consisted of 80% of the data, while the remaining 20% was reserved for testing. This stratification preserved the class proportions and ensured reliable performance comparisons across models. The dependent variable, representing the banks' stock prices, was derived from the calculated logarithmic returns.

A binary classification framework was adopted, where the target variable was assigned a value of 1 if the logarithmic return was

positive, indicating an increase in the stock price. Conversely, a value of 0 was assigned if the logarithmic return was negative, signifying a decrease in the stock price. This approach facilitates a clear distinction between upward and downward price movements, enabling the development of predictive models for directional price changes.

Figure 2 presents the distribution of the target variable.

**Figure 2**

**Distribution of the target variable**


*Source: Author's contribution*

Four different models were implemented to classify stock price direction: Logistic Regression, BiLSTM, LSTM, and XGBoost. Logistic Regression was chosen as the baseline model due to its simplicity and

interpretability, offering a benchmark against which the performance of more complex models could be measured. BiLSTM was selected as a state-of-the-art neural network model capable of processing sequential data bidirectionally, enabling it to capture temporal dependencies in both forward and backward directions. LSTM, a foundational recurrent neural network, was included to provide a counterpart to BiLSTM by focusing solely on forward dependencies. Finally, XGBoost, a robust ensemble learning method, was selected for its established performance in classification tasks, particularly with structured datasets.

Logistic Regression was formally introduced by Cox (1958) as a method for regression analysis of binary outcomes and has since become a foundational tool in statistical modeling. Logistic Regression served as the baseline method for the binary classification task. The model was trained using the liblinear solver, which is well-suited for small to medium-sized datasets. The features were scaled using MinMaxScaler to normalize the data and ensure the stability of the logistic model coefficients. The binary cross-entropy loss function was minimized, and accuracy was evaluated as the performance metric. The model was trained on 80% of the data and validated on the remaining 20%, with predictions binarized using a 0.5 threshold.

The BiLSTM methodology was initially introduced by Schuster and Paliwal (1997), who demonstrated its ability to capture bidirectional dependencies in sequential data, and further developed by Graves and Schmidhuber (2005) to improve its application in time-series tasks. The BiLSTM model was designed to leverage the sequential nature of financial data by analysing dependencies in both forward and backward directions. The architecture consisted of two Bidirectional LSTM layers with 64 and 32 units, respectively, followed by dropout layers (20%) to mitigate overfitting. A dense layer with 10 units and a ReLU activation function provided intermediate processing, and a final dense layer with a sigmoid activation function generated the binary output. The model was compiled with the Adam optimizer (learning rate: 0.001), binary cross-entropy as the loss function, and accuracy as the evaluation metric. The training was conducted over 20 epochs with a batch size of 32, incorporating early stopping to prevent overfitting and reduce computational cost. A learning rate scheduler adjusted the learning rate dynamically if the validation loss plateaued for three consecutive epochs.

The LSTM architecture was originally proposed by Hochreiter and Schmidhuber (1997), who addressed the vanishing gradient problem inherent in recurrent neural networks, and was later refined by Gers et al. (2000) to include mechanisms for learning to forget irrelevant information.The LSTM model was configured similarly to the BiLSTM, but it focused solely on forward sequential dependencies. The architecture included two LSTM layers with 64 and 32 units, accompanied by dropout layers to prevent overfitting. The output layer utilized a sigmoid activation function to handle the binary classification problem. The Adam optimizer with an initial learning rate of 0.001 was employed, and binary cross entropy was used as the loss function. Training was performed over 20 epochs with a batch size of 32. Early stopping and learning rate scheduling were employed to enhance training efficiency and avoid overfitting.

XGBoost was introduced by Chen and Guestrin (2016) as a scalable tree-boosting system, building on the gradient-boosting machine framework originally proposed by Friedman (2001). The XGBoost model was employed to evaluate the performance of gradient-boosted decision trees in predicting stock price direction. The model was calibrated with 100 estimators, a maximum tree depth of 6, a learning rate of 0.1, and subsampling and column sampling rates of 0.8 to balance model complexity and generalizability. The binary logistic loss was used as the objective function and the log loss metric guided model optimization. The model was trained on the 80% training data split and tested on the remaining 20%. The predictions were thresholded at 0.5 to assign binary labels.

The evaluation of model performance was conducted using several key metrics. The confusion matrix provided a detailed breakdown of true positives, false positives, true negatives, and false negatives, offering a granular view of classification performance. Area Under the Curve (AUC) was calculated to assess the model's ability to distinguish between binary classes, providing a robust measure of classification quality. Additionally, accuracy was computed as a straightforward indicator of overall predictive performance. These metrics enabled a comprehensive comparison of the models, highlighting the strengths and weaknesses of each approach.

All analyses were implemented in Python, utilizing libraries such as TensorFlow/Keras for neural network models, Scikit-learn for Logistic Regression and evaluation metrics, and XGBoost for gradient-boosted decision trees.

## 4. Results

Based on the results presented in Table 2, the Logistic Regression model demonstrated the highest average performance among the four models, with a mean AUC of 0.679 and accuracy of 0.634. This indicates that Logistic Regression achieved the best balance between true positive rates and false positive rates across the banks. XGBoost followed closely, with an average AUC of 0.669 and accuracy of 0.617, showing competitive performance but slightly lower predictive ability compared to Logistic Regression.

**Table 2**

**Comparative Analysis of Models**

| No. | Variable | Logistic Regression | | XGBoost | | LSTM | | BiLSTM | |
|---|---|---|---|---|---|---|---|---|---|
| | | AUC | Accuracy | AUC | Accuracy | AUC | Accuracy | AUC | Accuracy |
| 1 | BNP PARIBAS | 0.708 | 0.652 | 0.693 | 0.625 | 0.709 | 0.474 | 0.708 | 0.474 |
| 2 | BANCO SANTANDER | 0.709 | 0.657 | 0.690 | 0.633 | 0.707 | 0.482 | 0.707 | 0.482 |
| 3 | UNICREDIT | 0.684 | 0.641 | 0.661 | 0.622 | 0.684 | 0.469 | 0.683 | 0.469 |
| 4 | INTESA SANPAOLO | 0.674 | 0.634 | 0.656 | 0.602 | 0.673 | 0.483 | 0.674 | 0.483 |
| 5 | BBV.ARGENTARIA | 0.690 | 0.644 | 0.675 | 0.618 | 0.689 | 0.488 | 0.688 | 0.488 |
| 6 | ING GROEP | 0.697 | 0.651 | 0.691 | 0.633 | 0.695 | 0.469 | 0.695 | 0.469 |
| 7 | CREDIT AGRICOLE | 0.655 | 0.619 | 0.674 | 0.625 | 0.653 | 0.432 | 0.649 | 0.432 |
| 8 | ERSTE GROUP BANK | 0.616 | 0.591 | 0.606 | 0.569 | 0.614 | 0.465 | 0.616 | 0.465 |
| 9 | KBC GROUP | 0.659 | 0.606 | 0.644 | 0.597 | 0.657 | 0.493 | 0.657 | 0.493 |
| 10 | SOCIETE GENERALE | 0.692 | 0.644 | 0.702 | 0.644 | 0.690 | 0.481 | 0.692 | 0.481 |
| **Mean** | | **0.679** | **0.634** | **0.669** | **0.617** | **0.677** | **0.474** | **0.677** | **0.474** |

*Source: Author's contribution*

The LSTM and BiLSTM models exhibited similar mean AUC values (0.677 each) but significantly lower accuracy (0.474 for both). This suggests that while these models performed comparably in distinguishing between positive and negative returns, their overall predictive accuracy was less reliable. Notably, the deep learning models (LSTM and BiLSTM) showed consistent underperformance in accuracy, indicating potential challenges in learning from the dataset or issues with overfitting.

Across individual banks, BNP Paribas, Banco Santander, and ING Groep consistently showed higher AUC and accuracy scores across all models, indicating better predictability for these stocks. Conversely, Erste Group Bank and Credit Agricole showed the lowest AUC and accuracy values, reflecting comparatively weaker model performance for these banks. These results highlight the varying effectiveness of different models depending on the bank and suggest that traditional machine learning methods, such as Logistic Regression and XGBoost, may be better suited for this particular dataset compared to deep learning approaches.

## 5. Conclusion

This study investigated the predictive capabilities of four models—Logistic Regression, XGBoost, LSTM, and BiLSTM—in forecasting the directional movement of stock prices for the ten largest Eurozone banks by market capitalization. Utilizing a comprehensive dataset spanning from January 1, 2000, to May 31, 2024, the paper incorporated eight financial and macroeconomic indicators to enhance the robustness of the predictions. By focusing on the final 20% of the dataset for out-of-sample evaluation, the study aimed to simulate real-world predictive scenarios and assess the models' practical applicability.

The findings indicate that Logistic Regression outperformed the other models, achieving the highest average AUC of 0.679 and an accuracy of 63.4%. XGBoost followed closely with an average AUC of 0.669 and an accuracy of 61.7%. These results suggest that traditional machine learning models are more effective in this context than advanced deep learning models like LSTM and BiLSTM, which both recorded lower accuracies of 47.4% despite comparable AUC values.

The superior performance of Logistic Regression may be attributed to its simplicity and ability to generalize well with the available data, capturing the essential relationships without overfitting. XGBoost's competitive performance underscores its strength in handling structured data and its robustness against overfitting through regularization techniques. On the other hand, the deep learning models may have underperformed due to the limited dataset size relative to the requirements of such models, leading to challenges in learning complex temporal patterns inherent in financial time series data.

Future research could explore several avenues to enhance predictive accuracy. Incorporating additional data sources such as real-time news feeds, sentiment analysis from social media, or alternative financial indicators might provide deeper insights into market movements. Employing advanced feature engineering techniques and dimensionality reduction methods could help in extracting more relevant features from the existing data. Furthermore, experimenting with hybrid models that combine the strengths of traditional machine learning and deep learning approaches might yield better performance. Adjusting the architectures of LSTM and BiLSTM models, perhaps by integrating attention mechanisms or using transfer learning with larger datasets, could also address the underperformance observed in this study.

In conclusion, while deep learning models hold theoretical appeal for capturing intricate patterns in sequential data, traditional models like Logistic Regression and XGBoost demonstrated more reliable performance in predicting stock price direction in the Eurozone banking sector.

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# THE NEXUS BETWEEN EMPLOYEE HAPPINESS AND COMPANY PERFORMANCE

**Maria-Teodora PAPAINOG***

**Abstract**

This article examines the relationship between worker satisfaction and business profitability, particularly emphasizing the pandemic era. It offers a fresh viewpoint on how a person's happiness may be critical in developing a business. The empirical study focuses on approximately 12,343 companies operating in various sectors, for which financial data for the reference period 2013-2022 were collected from the ORBIS platform. Quantile regression and panel smooth transition regression models were used as estimation methodologies. The findings have shown that employee satisfaction generally has a detrimental impact on a company's profitability, with a significantly more evident effect on companies with very low ROA and ROE indicators. Furthermore, it has been demonstrated that, although the influence is less pronounced in absolute terms, the relationship between happiness and profitability within successful enterprises becomes increasingly positive. Additionally, the COVID-19 pandemic has brought about notable changes in the dynamics between these two variables, revealing that a rise in employee happiness during the pandemic contributed to increased profitability in companies with lower productivity. Conversely, it resulted in a decline in profitability for firms exhibiting exceptionally high ROA or ROE indicators.

**Keywords:** happiness index, profitability, quantile regression, panel smooth transition regression

**JEL Classification:** C31, C33, I310, O16

## 1. Introduction

Recent global changes, such as the COVID-19 pandemic, have highlighted that transitioning to more flexible work arrangements can increase productivity and affect employees' emotional well-being.

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Many workers have reported feeling alone and isolated because of the low number of face-to-face connections. Put differently, a lack of socializing has resulted in a lower level of work satisfaction, which in turn has affected productivity. This research will help us understand the potential effects of employee happiness on overall business performance and develop and implement human resource management strategies that advance the company's goals and the welfare of its stakeholders. As a time when employee well-being and satisfaction rank among companies' top priorities, it is imperative to investigate how happiness indices impact company performance to understand and improve the balance between individual prosperity and organizational success.

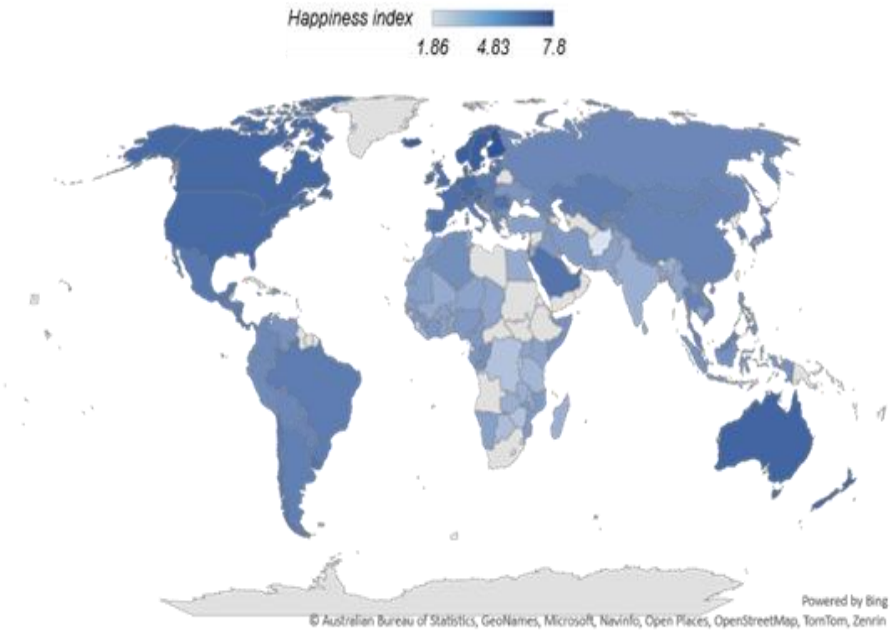
The happiness index may assess the level of happiness and well-being in a given country. Scholars such as Ram (2017), Helliwell (2018), Sachs (2018), Greco (2019), and Trofallis (2019) contend that this index is based on a wide range of factors, including GDP, social assistance, energy, productivity, economics, technology, environment, energy, health, social issues, education, real estate, transportation, politics, law, government, low levels of corruption, and the freedom to make decisions in daily life.

*The happiness index* is included in a more thorough happiness assessment as part of *the global happiness report.* These national rankings were developed using data from a survey in which participants were asked to rate the quality of their current life on a scale of 0 to 10. While happiness is perceived and experienced uniquely by each individual, the happiness index aims to provide an overview of community well-being, helping companies and organizations develop policies and programs to improve citizens' quality of life. Based on data collected from Gallup surveys, the **World Happiness Report (2023)** ranked the happiest countries in the world using six critical criteria: GDP per capita, social support, life expectancy, freedom of choice, generosity, and perception of corruption.

Figure 1 highlights the global happiness index levels for 2022, which can be correlated with the data from Figure 2. At the top of the rankings are Finland (7.82), Denmark (7.64), Iceland (7.56), Switzerland (7.51), and the Netherlands (7.42). Factors such as social support, trust among citizens, a strong sense of decision-making freedom, and the absence of government corruption are some primary reasons Finland is a clear leader. Afghanistan (2.40), Lebanon (2.96), and Zimbabwe (3.00) are at the opposite extreme of the range.

**Figure 1**

**Global Happiness Index Level in 2022**

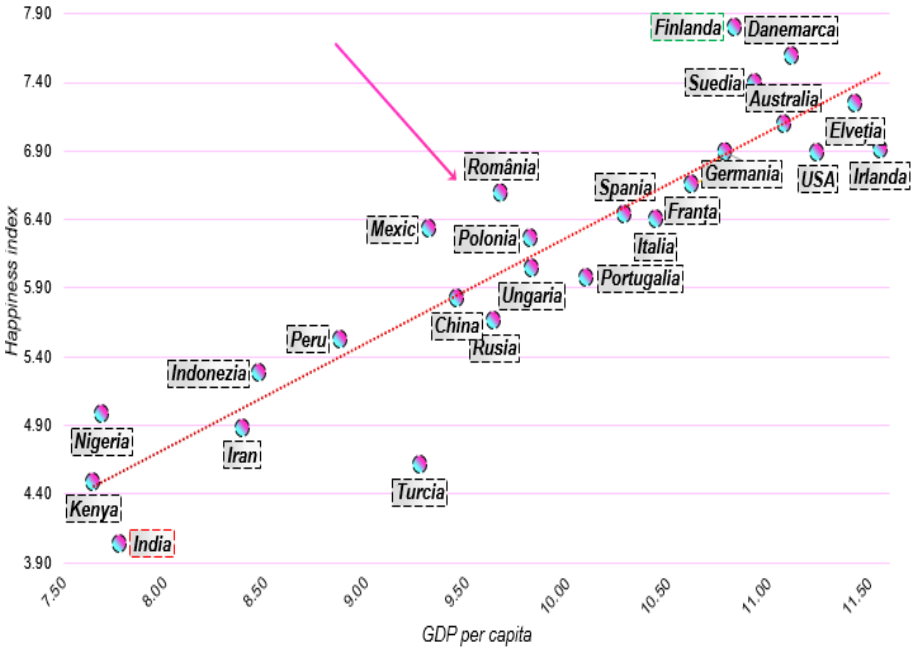



*Source: own processing*

Policies that optimize corporate performance may also be implemented by identifying and analysing various criteria. Furthermore, by examining the connection between economic circumstances, well-being, financial security, mental health, and workers' capacity to satisfy their fundamental wants and aspirations, the relationship between financial success and the happiness index may also be measured. Having a lot of money makes it possible for people to participate in leisure and travel activities, contemporary healthcare facilities, and high-quality education programs, all of which contribute to happiness.

**Figure 2**

**Happiness Index Ranking in 2022 – Top 25 countries**

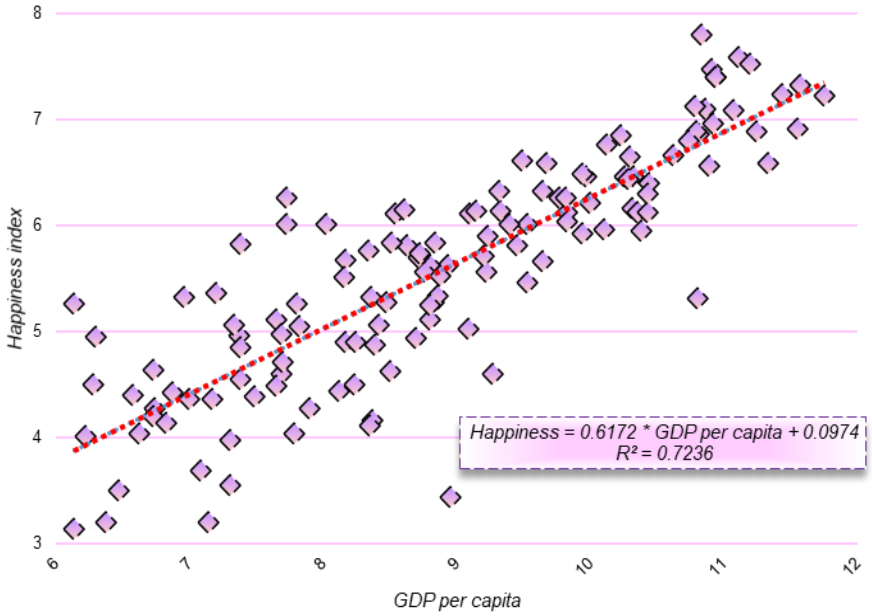



*Source: own processing in excel*

As seen in Figure 3, it seems that there may not always be a significant association between GDP per capita and the happiness index - a phenomenon connected to *the Easterlin Paradox.* Once a certain income level and material comfort have been achieved, the boost in happiness becomes increasingly marginal. However, it can still be influenced by various factors: political, environmental, social equity, job satisfaction, easy access to healthcare and education, and community cohesion. For the regression model presented in *Figure 3,* we used 2022 as the reference period, based on a sample of 131 countries, which were divided into three categories: countries with *high, medium, and low* GDP per capita. The coefficient of determination ($R^2$) is 0.7236, indicating that the model explains 72.36% of the variation in the happiness index.

**Figure 3**

**The Happiness-Wealth Relationship Worldwide in 2022**




*Source: own processing*

## 2. Current state of knowledge and research hypotheses

This paper is among the first to address such a topic. Unfortunately, the absence of studies that specifically identify the impact of the happiness index on company performance makes it difficult to establish a clear economic theory on this subject. However, this gap allows the research to bring a high degree of originality. Moreover, the present work can make a significant and contemporary contribution to the corporate finance literature, mainly due to its novel approach. In 2006, Ovaska and Takashima observed that governments primarily use GDP as the leading indicator to quantify the happiness index based on national welfare and growth.

The paradox stems from the disparity between gross domestic product (GDP) and individual income, resulting in a divergence between personal earnings and the degree of happiness attained. Lyard (2015) posits an inverse link: GDP might rise, but per capita income decreases. Diener, Tay, and Oishi (2013) contend that

personal wealth is a crucial determinant of happiness and well-being. This study expands on these divergent viewpoints, seeking to investigate the relationship between happiness, money, and business performance while enhancing the discussion on the broader ramifications of well-being in the corporate context.

Graham and Ruiz (2017) used quantile regressions to demonstrate that persons experiencing happiness are more likely to reside in advantageous and supportive situations, correlating with elevated levels of well-being.

The absence of well-being is often associated with various adverse factors, including poor healthcare systems, high poverty rates, a lack of security, and inadequate compensation for work, both at the individual and aggregate levels. Grimes and Wesselbaum (2019) reinforced two years later that income is almost vital to happiness. They underlined that people might migrate to nations with thriving economies to live a better level of life. This enhances their general well-being and pleasure by enabling them to satisfy their particular aspirations and necessities.

These findings demonstrate the complex link between economic situations, income, and happiness, emphasizing the need to consider systemic and individual factors when evaluating well-being and company success.

Ovaska and Takashima (2006) state that interpersonal connections, economic and political freedom, health, education, and wealth distribution are also reflected in the happiness index's components. Ten years later, Musikanski and Polley (2016) confirmed that various factors, including social relationships, political and economic freedom, health, and education, affect how well a company operates in other countries. Oswald, Proto, and Sgroi (2015) further demonstrate that work productivity is significantly impacted by enjoyment using a step-by-step experimental design with two samples of 270 and 180 unique individuals. Both groups' levels of happiness and productivity at work were shown to be directly and favorably associated, indicating that growing financial resources raise living standards, which in turn reflect financial success. These findings demonstrate the intricate connection between happiness and both organizational performance and individual well-being, showing how productivity and well-being are related and ultimately affect financial outcomes.

In his research, Popa (2018) demonstrates that a happy and creative employee adds significant value to the company they work for. Moreover, if the company provides a supportive environment for personal development, increased productivity is both guaranteed and achieved. This relationship directly stimulates the company's performance. Zhu et al. (2023) contend that a greater intensity of employee happiness correlates with increased stability of the executive team, as a company's worth, assessed via financial success, mediates the link between happiness and executive team stability.

Another perspective comes from Kaplanski et al. (2015), who, in their study, suggest that happier employees have higher expectations for the company's future returns.

Based on the reviewed literature, the following hypotheses regarding the impact of happiness on company profitability are proposed:

**$H_1$:** Employee happiness, measured through the happiness index, has a statistically significant influence on company profitability;

**$H_2$:** The COVID-19 pandemic has altered the way employee happiness contributes to the financial performance of companies;

**$H_3$:** The impact of employee happiness (quantified using the happiness index) on company profitability varies depending on the profitability level of the companies.

## 3. Methodology

### 3.1. Description of the database and variables

In this paper, we aim to study the impact of the happiness index on company performance. Furthermore, economic profitability (ROA) and financial profitability (ROE) are the ratios that will be used to *„monitor"* the financial performance dimension. Vintilă (2010) asserts that profitability ratios are derived from comparing components linked by a *„cause-and-effect relationship."*

To accomplish this objective, we have chosen a sample of 12,343 enterprises from 58 countries engaged in diverse industries, with the reference period from 2013 to 2022. All companies are publicly traded, which was critical for picking the sample during the examined

period. The geographical reach of these companies transcends a single continent. The data was obtained using the ORBIS platform.

Table 1 outlines the variables used in the research, along with their classifications and computation methodologies. The winsorizing technique was implemented on all variables at the 99% level due to detecting abnormalities within each variable. The firms' sizes were logarithmically transformed (LN_TA) to eliminate scale discrepancies. Logarithmization mitigates the skewness and unpredictability of these variables, aligning them more closely with a normal distribution. Conversely, it mitigates the impact of outliers, which may otherwise skew the analytical findings and their interpretation.

**Table 1**

**Data description**

| Abbreviation | Variable name | Calculation method | Period |
|---|---|---|---|
| | | ***Dependent variables*** | |
| ***Profitability variables*** | | | |
| ***ROA*** | Economic profitability rate | Net profit / Total assets<br>The economic profitability rate measures the efficiency of capital allocation in fixed and current assets, showing the percentage of profit a company earns in relation to its total resources. | 2013-2022 |
| ***ROE*** | Financial profitability rate | Net profit / Total equity<br>The financial profitability rate is defined as the rate by which investors can assess whether their investment is profitable. The company generates additional value for shareholders if the ROE is higher than the cost of equity. | 2013-2022 |
| | | ***Explanatory variables regarding the characteristics of the company*** | |
| ***Control variable at the company level*** | | | |
| ***LN_TA*** | Company size | Natural logarithm of total assets<br>Assets reflect the sum of resources controlled by the enterprise as a result of past events, expected to generate future economic benefits. | 2013-2022 |
| ***TA*** | Tangible assets | Tangible fixed assets / Total assets<br>It provides insight into the structure of a company's assets and indicates how much of the total assets consist of fixed tangible assets. | 2013-2022 |
| ***CASH_STI*** | Cash and short-term investments | Cash and short-term investments / Total assets<br>It measures a company's ability to meet short-term obligations using its liquid resources, such as cash and short-term investments. | 2013-2022 |
| ***Debt Variables*** | | | |
| ***TL*** | Total liabilities | Total liabilities / Total assets<br>This indicator provides information about a company's debt level and can be used to assess financial risk. | 2013-2022 |
| ***LTL_TA*** | Ratio of long-term liabilities to total assets | Long-term liabilities / Total assets<br>This ratio assesses whether a business has enough funding to meet its debt obligations or the amount of money it can use to finance new products or services and secure new loans or other financial assets. | 2013-2022 |
| ***ITE_TA*** | Ratio of income tax expenses to total assets | Income tax expenses / Total assets<br>This indicator provides insight into a company's fiscal efficiency and can highlight its tax level in relation to the size of its total assets. | 2013-2022 |

| Abbreviation | Variable name | Calculation method | Period |
|---|---|---|---|
| ***Variables related to research and development expenses*** | | | |
| ***RD*** | Research and development expenses | Research and development expenses<br>Expenses are associated with activities undertaken by a company to discover new ideas or technologies and to develop or improve existing products, processes, or services. These expenses include both financial and human resources allocated to innovation and maintaining or improving a company's competitiveness in the market. | 2013-2022 |
| ***Macroeconomic variables*** | | | |
| ***EC_GROWTH*** | Economic growth | Economic growth<br>Refers to the long-term increase in the production of goods and services within an economy. It is a measure of a country's expanding economic capacity and generally reflects an improvement in living standards, employment opportunities, and infrastructure development. | 2013-2022 |
| ***INFL*** | Inflation rate | Inflation rate<br>The ratio between excess or surplus money (or demand) and the real supply of goods and services in the economy, which corresponds to a certain rise in prices. | 2013-2022 |
| ***Happiness index variable*** | | | |
| ***HAPPINESS*** | Happiness index | Country scores are based on a survey in which respondents evaluate their current quality of life on a scale from 0 to 10.<br>This index is designed to reflect subjective aspects of life and well-being, in contrast to traditional development measures such as gross domestic product (GDP), which focuses on economic aspects. | 2013-2022 |
| ***Interaction Variable*** | | | |
| ***HAPPINESS*COVID*** | Interaction between the happiness index and COVID 19 | COVID 19*HAPPINESS | 2013-2022 |
| ***Dummy variable*** | | | |
| ***COVID*** | COVID 19 | COVID: 1 if the year analysed is 2020/2021, otherwise 0 | 2013-2022 |

*Source: own processing*

## 3.2. Presentation of empirical methods

The empirical analysis model will take the following form:

$$Profitability = \alpha + \beta_k \cdot X_{it} + \delta_1 \cdot COVID + \delta_2 \cdot HI + \delta_3 \cdot COVID \cdot HI + \varepsilon_{it} \quad (1)$$

Where:

$X =$ matrix of order k containing the control variables;

$k =$ number of control variables, with $k = 1, 2, \ldots, 10$;

$i =$ the number of companies;

$t =$ the moment in time expressed in years (period 2013-2022);

$\alpha =$ the intercept term;

$\beta_k =$ the coefficients of the control variables;

$\varepsilon =$ the error term, which captures the effect of other factors not considered in the model.

### 3.3. Descriptive statistics and correlation matrix analysis

Descriptive statistics are presented in Table 2. The 12,343 companies are analysed over the period 2013-2022, resulting in 123,430 observations for each variable included in Table 1. *The economic profitability ratio (ROA)* fluctuates between -2.7829 and 0.4157, with an average value of -0.0126, meaning that, on average, companies experience a loss of 1.26% relative to all their resources. Meanwhile, the financial profitability ratio (ROE) ranges from -3.3375 to 2.1257, with an average of 1.51%, indicating that companies generate a 1.51% profit relative to their resources. *The happiness index (HAPPINESS)* has a mean value of 6.1688, reflecting the average score of the current quality of life of the population. The standard deviation indicates, on average, how much values deviate from the central trend. For ROA, according to the first quartile, 25% of observations are less than or equal to 0.0030. In contrast, the second quartile (median) shows that 50% of observations are less than or equal to 0.0316. Similarly, the third quartile ($Q_{75}$) indicates that 75% of observations are less than or equal to 0.0650.

**Table 2**

**Descriptive statistics**

| *Variables* | *Mean* | *Median* | *Max* | *Min* | *Standard deviation* | *Q25* | *Q50* | *Q75* |
|---|---|---|---|---|---|---|---|---|
| ROA | -0.0126 | 0.0316 | 0.4157 | -2.7829 | 0.2774 | 0.0030 | 0.0316 | 0.0650 |
| ROE | 0.0151 | 0.0666 | 2.1257 | -3.3375 | 0.4944 | 0.0092 | 0.0666 | 0.1309 |
| LN_TA | 12.7694 | 12.8504 | 20.3025 | 4.7137 | 2.3785 | 11.2478 | 12.8504 | 14.3632 |
| TA | 0.2575 | 0.2075 | 0.9109 | 0.0000 | 0.2242 | 0.0693 | 0.2075 | 0.3884 |
| CASH_STI | 0.1819 | 0.1289 | 0.9088 | 0.0006 | 0.1790 | 0.0550 | 0.1289 | 0.2462 |
| TL | 0.4784 | 0.4679 | 2.5805 | 0.0000 | 0.2857 | 0.2918 | 0.4679 | 0.6286 |
| LTL_TA | 0.1269 | 0.0794 | 0.6682 | 0.0000 | 0.1478 | 0.0028 | 0.0794 | 0.1929 |
| ITE_TA | 0.1850 | 0.2054 | 1.5868 | -1.3810 | 0.3169 | 0.0340 | 0.2054 | 0.3110 |
| RD | 0.0151 | 0.0000 | 0.2722 | 0.0000 | 0.0403 | 0.0000 | 0.0000 | 0.0120 |
| EC_GROWTH | 2.5545 | 2.2400 | 24.3700 | -14.6000 | 3.0848 | 1.1100 | 2.2400 | 4.4000 |
| INFL | 2.4634 | 1.6000 | 72.3000 | -2.3000 | 4.3337 | 0.5000 | 1,6000 | 2.6000 |
| COVID | 0.2000 | 0.0000 | 1.0000 | 0.0000 | 0.4000 | 0.0000 | 0.0000 | 0.0000 |
| HAPPINESS | 6.1688 | 6.0250 | 2.5385 | 4.4986 | 0.8074 | 5.5000 | 6.0250 | 3.4851 |

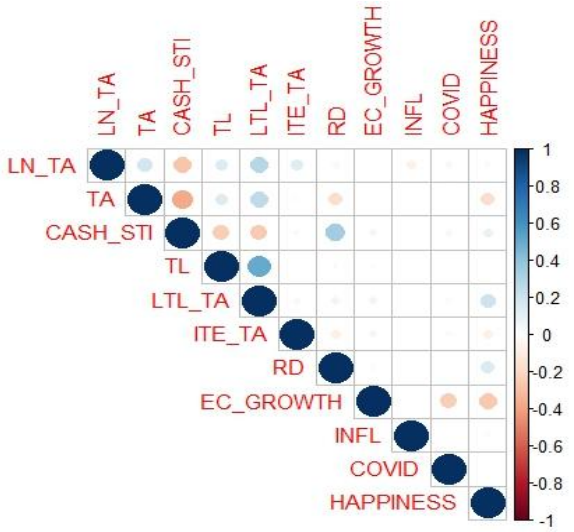
*Source: own processing based on data obtained from the ORBIS platform. The description of the variables is presented in Table 1*

Prior to estimating the regression model, we generated the correlation matrix for the explanatory variables using *RStudio* program to examine the correlation coefficients among the variables. The correlation matrix serves a twofold function: it assesses the presence of multicollinearity and enables the examination of the correlation levels among the variables in the investigation.

Figure 4 illustrates the correlation coefficients among the variables used in the model. A robust link exists between the Long-term Debt to Total Assets Ratio (LTL_TA) and Total Debt (TL). A comparable scenario is seen between the variables CASH_STI and TA, which exhibit a negative correlation coefficient. In other words, given the high level of correlation between the variables mentioned earlier, distinct regressions will be created to avoid including highly correlated variables in the same equation. This method mitigates the impact of multicollinearity on the efficiency and reliability of the estimators.

**Figure 4**

**Correlation matrix**

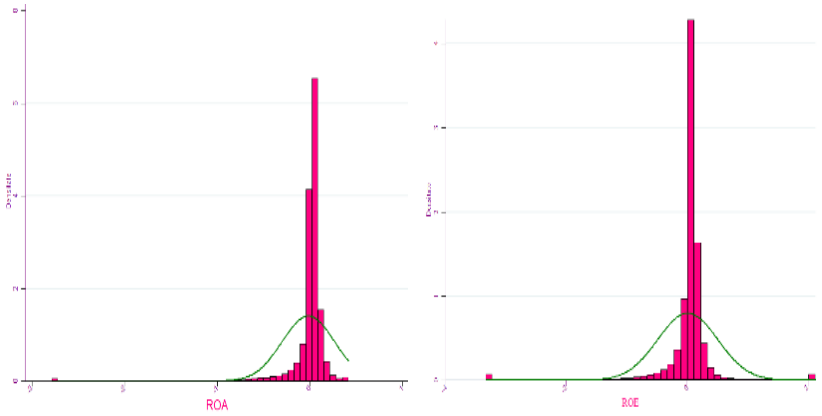



*Source: own processing in RStudio based on data obtained from the ORBIS platform. The description of the variables is presented in Table 1*

Figure 5 contains histograms of the two profitability measures, ROA and ROE. The histograms are shown independently according to many factors: the characteristics of the assets used by the enterprises in the sample, their level of indebtedness, operational efficiency, capital structure, financing strategy, and dividend distribution policy. In both instances, the data exhibit non-normal distribution, thereby compromising the precision of estimates produced by fixed-effect and random-effect models. Consequently, quantile regression is used.

**Figure 5**

**Histograms of the ROA and ROE variables**




*Source: own processing in Stata$_{14}$, based on data retrieved from the ORBIS platform*

### 4. Results of the quantitative study

In this section, the results obtained from data analysis using the software $Stata_{14}$ and MATLAB are presented.

### 4.1. Results of the quantile regression models

Table 3 summarizes the quantile regression estimates concerning the effect of the Happiness Index on economic profitability. At $Q_{10}$, the value is -0.1062, whereas the other quantiles exhibit positive values: $Q_{25}$ is 0.0030, $Q_{50}$ is 0.0316, $Q_{75}$ is 0.0650, and $Q_{90}$ is 0.1130. The variables COVID, HAPPINESS, and the interaction term HAPPINESS*COVID were included concurrently. Notably, the variables COVID, HAPPINESS, and HAPPINESS*COVID were included simultaneously. On one hand, $Q_{10}$ and $Q_{50}$ recorded the largest impact coefficients, explaining 26.69% and 13.98% of the variation in financial profitability, respectively. On the other hand, $Q_{90}$ shows the lowest determination coefficient at 0.0576.

According to $Q_{10}$, $Q_{25}$, $Q_{50}$, and $Q_{75}$, the $COVID_{19}$ pandemic has had negative effects on ROA, which can be correlated with the fact that the epidemiological shock caused significant disruptions in global economic activity, particularly in vulnerable companies. Given the extensive sample, the HoReCa sector was particularly affected by the drastically reduced or almost non-existent demand, leading to a decrease in the economic profitability rate. Additional costs related to

safety, health, and security measures to prevent the spread of the virus and ensure optimal business operations must also be considered. In the long term, the severity of this phenomenon created difficulties in recovery and re-establishing a pre-$COVID_{19}$ profitability equilibrium. However, in terms of economic profitability, happiness has a positive impact in $Q_{75}$ and $Q_{90}$. People who experience a sense of happiness may be more motivated and productive at work; in other words, well-being can influence the level of commitment and performance in professional activities. Moreover, positive social relationships, both in personal life and at the workplace, can be correlated with the happiness index. A team that fosters positive social relations is likely to generate better financial performance. A happier individual is more likely to be creative, innovative, and less inclined to miss work or leave their job, thereby reducing training costs for new employees. Additionally, the interaction variable HAPPINESS_COVID positively influences ROA in $Q_{10}$, $Q_{25}$, and $Q_{75}$. Companies that capitalized on market conditions during the health crisis became key points for investors due to their high performance. This is particularly important as efficient risk management and strategic handling of impacts experienced less volatility and enjoyed stable internal performance.

**Table 3**

**Results of quantile regression models on the impact of the happiness index on ROA**

| Variables | Q10 | Q25 | Q50 | Q75 | Q90 |
|---|---|---|---|---|---|
| ***Constant*** | -0.0267** | -0.0320** | -0.0484*** | -0.0525** | -0.0652* |
| | [0.0086] | [0.0041] | [0.0026] | [0.0031] | [0.0027] |
| ***LN_TA*** | 0.0428*** | 0.0216*** | 0.0097*** | 0.0050*** | 0.0020*** |
| | [0.0008] | [0.0003] | [0.0001] | [0.0001] | [0.0002] |
| ***TA*** | 0.0058*** | 0.0047*** | -0.0015** | -0.0047*** | -0.0009*** |
| | [0.0030] | [0.0011] | [0.0010] | [0.0010] | [0.0023] |
| ***CASH_STI*** | -0.5216* | -0.1753** | -0.0193 | 0.0392** | 0.1120* |
| | [0.0211] | [0.0075] | [0.0023] | [0.0019] | [0.0041] |
| ***TL*** | -0.3097* | -0.1186* | -0.0584* | -0.0612* | -0.0529** |
| | [0.0119] | [0.0037] | [0.0015] | [0.0023] | [0.0032] |
| ***LTL_TA*** | -0.3092*** | -0.0606*** | -0.0382*** | -0.0304*** | -0.0399*** |
| | [0.0107] | [0.0050] | [0.0015] | [0.0018] | [0.0030] |
| ***ITE_TA*** | 0.0751*** | 0.0426*** | 0.0197*** | 0.0058*** | -0.0242*** |
| | [0.0029] | [0.0018] | [0.0009] | [0.0015] | [0.0027] |
| ***RD*** | -1.8044 | -1.4991** | -1.7170* | -1.4978* | -1.4990* |
| | [0.0478] | [0.0361] | [0.0658] | [0.0600] | [0.0590] |

| Variables | Q10 | Q25 | Q50 | Q75 | Q90 |
|---|---|---|---|---|---|
| ***EC_GROWTH*** | -0.0025*** | -0.0012*** | 0.0001*** | 0.0012*** | 0.0024*** |
| | [0.0003] | [0.0001] | [0.0008] | [0.0008] | [0.0001] |
| ***INFL*** | -0.0016*** | -0.0220*** | 0.1364*** | 0.3743*** | 0.7595*** |
| | [0.0329] | [0.0182] | [0.0121] | [0.0183] | [0.0390] |
| ***COVID*** | -0.1194*** | -0.0256*** | -0.0063*** | -0.0035*** | 0.0109*** |
| | [0.0183] | [0.0071] | [0.0050] | [0.0005] | [0.0089] |
| ***HAPPINESS*** | -0.0734** | -0.0305** | -0.0030** | 0.0101** | 0.0222** |
| | [0.0015] | [0.0007] | [0.0005] | [0.0004] | [0.0006] |
| ***HAPPINESS_COVID*** | 0.0198** | 0.0031** | -0.0484** | 0.0004** | -0.0012** |
| | [0.0086] | [0.0041] | [0.0026] | [0.0031] | [0.0014] |
| ***Pseudo R-square*** | 0.2669 | 0.1140 | 0.1398 | 0.1381 | 0.0576 |

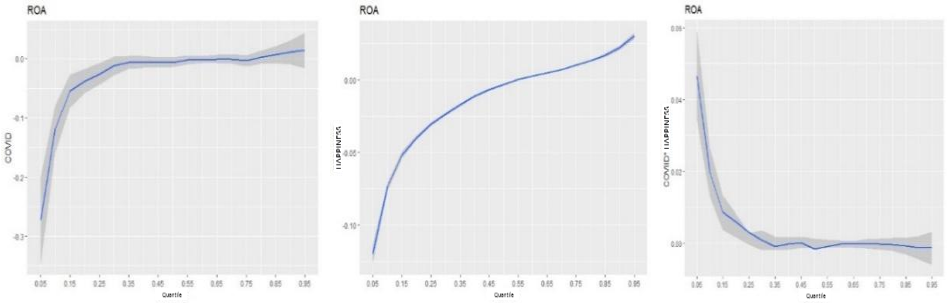
*Source: own calculations based on data from the ORBIS platform. The description of the variables is presented in Table 1. Standard errors are shown in parentheses; *, **, *** denote statistical significance at 10%, 5% and 1% level, respectively.*

Figure 6 illustrates a positive and stable trend regarding the two models with explanatory variables COVID and HAPPINESS. However, the interaction variable shows a sharp decline in $Q_{15}$, after which it maintains a stable trend. During the pandemic, consumer behaviour and market expectations underwent significant changes. Strategies that effectively responded to these developments saw an improvement in financial performance. The political reaction and economic policies significantly influenced profitability. Government measures, including fiscal stimulus or corporate assistance, may sustain ROA or aid in the return to a pre-$COVID_{19}$ equilibrium level.

At the same time, the *„corona-crisis"* accelerated the adoption of digital technologies and transformed the way many companies conduct business. Companies that successfully adopted and adapted to these changes, invested in innovation, and optimized their operations for the digital environment benefited from increased efficiency and financial performance. Conversely, the INTERACTION variable saw a notable loss in economic activity as a result of lockdowns and limitations, which caused a deterioration in firm financial performance, presumably seen by a decrease in ROA. As the immediate impacts of the shock are absorbed or alleviated, it is probable that ROA will somewhat rebound. This could explain why, after the initial decline, ROA remains stable.

**Figure 6**

**Results of the quantile regression models – extended model, with ROA as the dependent variable**




*Source: own calculations in RStudio based on data from the ORBIS platform. The description of the variables is presented in Table 1*

Table 4 summarizes the key estimates of the quantile regression models regarding the impact of the happiness index on financial profitability. At $Q_{10}$, the value is negative, -0.1893, while the remaining quantiles have positive values: $Q_{25}$ is 0.0092, $Q_{50}$ is 0.0666, $Q_{75}$ records a value of 0.1309, and $Q_{90}$ is 0.2347. Naturally, the variables COVID, HAPPINESS, and HAPPINESS*COVID were incorporated simultaneously. Furthermore, $Q_{10}$ and $Q_{50}$ explain 18.85% and 12.87% of the variation in financial profitability, respectively. On the other hand, $Q_{75}$ records the lowest coefficient of determination at 0.0436.

**Table 4**

**Results of quantile regression models on the impact of the happiness index on ROE**

| Variables | $Q_{10}$ | $Q_{25}$ | $Q_{50}$ | $Q_{75}$ | $Q_{90}$ |
|---|---|---|---|---|---|
| ***Constant*** | -0.1305** | -0.1041** | -0.1678*** | -0.2156** | -0.2144* |
| | [0.0230] | [0.0079] | [0.0051] | [0.0068] | [0.0096] |
| ***LN_TA*** | 0.0689*** | 0.0303*** | 0.0146*** | 0.0065*** | -0.0055*** |
| | [0.0010] | [0.0004] | [0.0001] | [0.0002] | [0.0005] |
| ***TA*** | -0.0064* | -0.0011** | -0.0044** | -0.0070* | 0.0024** |
| | [0.0085] | [0.0031] | [0.0017] | [0.0024] | [0.0035] |
| ***CASH_STI*** | -0.6339 | -0.1969* | 0.0029 | 0.1039* | 0.2313 |
| | [0.0186] | [0.0080] | [0.0043] | [0.0053] | [0.0080] |
| ***TL*** | -0.4491* | -0.0605* | 0.0819* | 0.2116* | 0.4750** |
| | [0.0143] | [0.0054] | [0.0018] | [0.0055] | [0.0136] |
| ***LTL_TA*** | -0.3005*** | -0.1839*** | -0.1154** | -0.1228*** | -0.1993* |

| Variables | $Q_{10}$ | $Q_{25}$ | $Q_{50}$ | $Q_{75}$ | $Q_{90}$ |
|---|---|---|---|---|---|
| | [0.0288] | [0.0091] | [0.0049] | [0.0088] | [0.0189] |
| ***ITE_TA*** | 0.1496** | 0.0657** | 0.0297** | -0.0214* | -0.1058** |
| | [0.0055] | [0.0030] | [0.0021] | [0.0055] | [0.0063] |
| ***RD*** | -1.7039 | -1.4391** | -1.7123* | -1.4228* | -1.4310* |
| | [0.0348] | [0.0349] | [0.0238] | [0.0590] | [0.0601] |
| ***EC_GROWTH*** | -0.0021*** | -0.0011*** | 0.0008*** | 0.0027*** | 0.0046*** |
| | [0.0006] | [0.0002] | [0.0001] | [0.0002] | [0.0003] |
| ***INFL*** | -0.3241*** | -0.0937*** | 0.3165*** | 0.8292*** | 0.5156*** |
| | [0.0763] | [0.0330] | [0.0298] | [0.0370] | [0.0562] |
| ***COVID*** | -0.1481*** | -0.0197*** | 0.0037*** | 0.0032*** | 0.0306*** |
| | [0.0432] | [0.0151] | [0.0099] | [0.0108] | [0.0191] |
| ***HAPPINESS*** | -0.1072** | -0.0385** | 0.0008*** | 0.0239* | 0.0438* |
| | [0.0036] | [0.0012] | [0.0006] | [0.0007] | [0.0012] |
| ***HAPPINESS_COVID*** | 0.02261*** | 0.0011** | -0.0016*** | -0.0003*** | -0.0035** |
| | [0.0074] | [0.0026] | [0.0016] | [0.0018] | [0.0033] |
| ***Pseudo R-square*** | 0.1885 | 0.0754 | 0.1287 | 0.0436 | 0.1130 |

*Source: own calculations based on data from the ORBIS platform. The description of the variables is presented in Table 1. Standard errors are shown in parentheses; *, **, *** denote statistical significance at 10%, 5% and 1% level, respectively.*

Companies that adopted digitalization via investments in technical advances to enhance their online presence, establish e-commerce, and streamline digital operations demonstrate the favorable effect of $COVID_{19}$ on ROE in $Q_{50}$, $Q_{75}$, and $Q_{90}$. Moreover, firms that promptly recognized and addressed customer preferences succeeded in sustaining or enhancing profitability, especially those that catered to health-related needs. Certain industries, including technology, healthcare, and consumer products, were inherently favored by the alterations resulting from the pandemic shock. Consequently, firms in these sectors might be recognized in the higher quantiles of ROE owing to heightened demand and effective adaptability to the novel market circumstances.

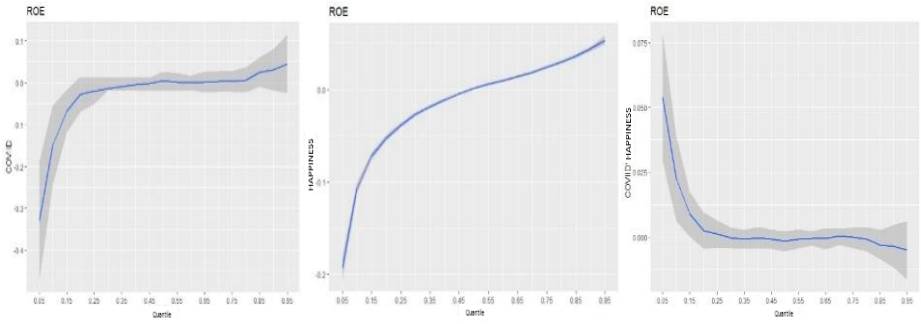
Financial profitability has a negative effect only in $Q_{10}$ and $Q_{25}$, indicating that the happiness index has a negative influence on ROE. It is highly likely that individuals in these quantiles experience financial pressure, translating into a feeling of financial stress. The absence of happiness may lead to a sense of insecurity and financial uncertainty, which can impact decision-making processes and financial strategies, ultimately affecting performance. Moreover, employees in the lower quantiles may suffer from low motivation and self-esteem, hindering the growth of financial profitability.

Additionally, the interaction variable, HAPPINESS_COVID, negatively influences ROE in $Q_{50}$, $Q_{75}$, and $Q_{90}$. Companies that were heavily dependent on exports and global supply chains felt the impact of disruptions in international trade more acutely. At the macroeconomic level, exchange rate fluctuations, inflation rates, and monetary policy could all affect business performance. Changes in the business environment exacerbate the effects of economic dynamics, and the adverse opinion of investors about firms' prospects during the pandemic resulted in a decline in ROE.

Figure 7 reflects a situation similar to the one observed with ROA.

**Figure 7**

**Results of the quantile regression models – extended model, with ROE as the dependent variable**




*Source: own calculations in RStudio based on data from the ORBIS platform. The description of the variables is presented in Table 1*

In the extended model, where the dependent variable is the return on equity, there is a positive trend in the two models that have COVID and HAPPINESS as explanatory variables. However, on the opposite side, the interaction variable shows a sharp decline in Q20, followed by a stable trend thereafter. The explanation relates to the initial period of COVID19, where the drop in happiness levels among the population was exacerbated by the negative impact on quality of life. This led to an initial decline in ROE, as consumers and investors became more cautious or reduced spending and investments in the face of widespread uncertainty. As the pandemic progressed, company management adapted to the new conditions, setting a stable course. This allowed companies to develop strategies to cope with environmental changes and adjust their businesses to the new

economic demands, since during crises and significant shifts, companies can demonstrate resilience, innovate, or thrive under the new circumstances. This could potentially offset the initial negative effects and contribute to stabilizing or even improving performance despite the pandemic's initial adverse impact. Moreover, some effects of the epidemiological crisis, as well as those related to happiness levels, might not be immediately visible. These could also have delayed effects on profitability.

### 4.2. Results of the panel smooth transition regression models

This section seeks to experimentally examine the impact of the happiness index on corporate performance within the framework of the shadow economy. To accomplish this objective, I identified companies from the ORBIS platform representing the 27 nations (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden), spanning the years 2013 to 2022.

Compared to the previous sections, the data regarding the shadow economy were estimated by **Schneider (2022)**. Therefore, we aim to examine the existence of threshold effects between happiness levels and performance variables. Additionally, since the relationship between these variables indicated the presence of nonlinearities, we will employ the panel smooth transition regression (PSTR) model to evaluate the short-term impact.

#### *4.2.1. The examination of linearity*

An essential step in estimating panel smooth transition regression models is to test for the presence of a possible nonlinear link within the empirical models. I performed three linearity tests using MATLAB software to examine the presence of a regime-switching effect.

Table 5 summarizes the results and p-values. We thus reject the null hypothesis at a 10% significance level ($H_0$: r = 0), accepting the alternative ($H_1$: r = 1). Furthermore, it is observed that a transition function is much more suitable for highlighting the nonlinear effect of the performance generated by the shadow economy, compared to other specifications (r ≥ 2).

**Table 5**

**Linearity and no remaining heterogeneity tests**

| Test | H0: r=0 vs. H1: r=1 | H0: r=0 vs. r=2 |
|---|---|---|
| *Lagrange Multiplier – Wald (LMW)* | 19.1010<br>(0.0590) | 8.9150<br>(0.6300) |
| *Lagrange Multiplier – Fischer (LMF)* | 1.6160<br>(0.0970) | 0.6340<br>(0.7980) |
| *Likelihood Ratio* | 19.9810<br>(0.0460) | 9.1010<br>(0.6130) |

*p-values are shown in parentheses*
*Source: own calculations based on data from the ORBIS platform.*

### *4.2.2. The estimation of parameters in the PSTR model*

Starting from the premise that the shadow economy could impact profitability levels, we expect our companies to be more profitable in countries where the shadow economy is lower. Thus, if I identify a transition variable, I add the function F, which is a logistic function (taking a maximum value of 1) that depends on the transition variable and identifies a threshold (from which the shape of the transition function shifts from convex to concave). In other words, the shadow economy intersects with the transition function exactly at the threshold of 11.72%.

The shadow economy acts as a threshold variable because in certain countries, the level of the shadow economy can be closely tied to regulations or fiscal policies. When the level of fiscal regulation reaches a certain point, a significant portion of economic activities may shift to the underground sector to avoid taxes and other fiscal obligations. Additionally, in regime 1, the value of F is equal to 0, while in regime 2, the value of F is equal to 1. Naturally, between regime 1 and regime 2, the value of F ranges between 0 and 1.

In Table 6, the parameter estimates from the PSTR model, with economic profitability as the dependent variable, are presented. It is worth noting that the shadow economy does not directly impact profitability. Instead, it moderates the relationship between HAPPINESS and PROFITABILITY in a differentiated manner, with two regimes being identified. In regime 1, which includes countries with a high level of tax collection and, consequently, a low shadow economy, we observe a positive relationship between HAPPINESS and PERFORMANCE. This implies that when the shadow economy is more

excellent than 11.72%, a one-percentage-point increase in HAPPINESS leads to average profitability during the pandemic. The relationship changes in the second regime, comprised of countries with a low level of tax collection and a high shadow economy. In regime 2, a one-percentage-point increase in HAPPINESS negatively impacts PERFORMANCE during the pandemic, reducing it by 0.0044 percentage points.

Furthermore, the probability of the F-Statistic test (Prob(F-statistic) = 0.0000 < 0,01) is significant at a 1% statistical significance level, confirming the econometric validity of the model presented in Table 6. Regarding the coefficient of determination, the model explains 13.14% of the variation in economic profitability.

**Table 6**

**Results of panel smooth transition regression (PSTR) models with ROA as the dependent variable**

| Variables | Regime 1: $\beta_0$ | Nonlinear part: $\beta_1$ | Regime 2: $\beta_0 + \beta_1$ | Change in Regime 2 vs. Regime 1 |
|---|---|---|---|---|
| ***LN_TA*** | 0.0687*** (0.0000) | 0.0020 (0.3487) | 0.0708** | ↑ |
| ***TA*** | -0.1960*** (0.0000) | -0.1689** (0.0015) | -0.3650** | ↑ |
| ***CASH_STI*** | 0.0507 (0.3860) | 0.0696 (0.2269) | 0.1204 | - |
| ***TL*** | -0.0491 (0.2499) | 0.1235* (0.0062) | 0.0743* | ↑ |
| ***LTL_TA*** | -0.7982*** (0.0000) | 0.1267 (0.3823) | -0.6715*** | ↑ |
| ***ITE_TA*** | 0.0074 (0.1325) | 0.0028 (0.6810) | 0.0102 | - |
| ***RD*** | -0.0520* (0.1320) | 0.0148* (0.4905) | -0.0372* | - |
| ***COVID*** | 0.0040 (0.7270) | 0.0036 (0.4422) | 0.0077 | - |
| ***HAPPINESS*** | -0.9123** (0.0018) | 0.8822** (0.0137) | -0.0301** | ↑ |
| ***HAPPINESS*COVID*** | 0.1457** (0.0020) | -0.1413** (0.0145) | 0.0044** | ↑ |
| ***Threshold*** | | 11.72 | | |
| ***Slope(y)*** | | 16.3619 | | |
| ***Prob>F-statistic*** | | 0.0000 | | |
| ***R-Square*** | | 0.1314 | | |
| ***Observations*** | | 11,160 | | |

*Source: own calculations based on data from the ORBIS platform. The description of the variables is presented in Table 1. Standard errors are shown in parentheses; *, **, *** denote statistical significance at 10%, 5% and 1% level, respectively.*

In the case of the second PSTR model, the shadow economy intersects with the transition function at a threshold of 14.30%. The shadow economy acts as a threshold variable because, in some countries, the level of the shadow economy can be closely linked to fiscal regulations and policies. When the level of fiscal regulation reaches a certain threshold, a significant portion of economic activities may shift to the informal sector to avoid taxes or other fiscal obligations.

It is worth noting that Table 7 presents the parameter estimates of the panel smooth transition regression model, which has financial profitability as the dependent variable.

**Table 7**

**Results of panel smooth transition regression (PSTR) models with ROE as the dependent variable**

| Variables | Regime 1: $\beta_0$ | Nonlinear part: $\beta_1$ | Regime 2: $\beta_0 + \beta_1$ | Change in Regime 2 vs. Regime 1 |
|---|---|---|---|---|
| ***LN_TA*** | 0.1012*** | -0.0549* | 0.0463** | ↑ |
| | (0.0000) | (0.0500) | | |
| ***TA*** | -0.2473* | 0.4017** | 0.1544** | ↑ |
| | (0.0600) | (0.0200) | | |
| ***CASH_STI*** | 0.0806 | 0.3246 | 0.4053 | - |
| | (0.4100) | (0.1500) | | |
| ***TL*** | -0.0620 | -0.2705* | -0.3325* | - |
| | (0.6800) | (0.3300) | | |
| ***LTL_TA*** | -1.6146*** | 3.0618* | 1.4472** | ↑ |
| | (0.0000) | (0.0700) | | |
| ***ITE_TA*** | 0.0554** | -0.0055 | 0.0499 | - |
| | (0.0499) | (0.8600) | | |
| ***RD*** | -0.2469* | 0.0538* | -0.1931* | - |
| | (0.0100) | (0.7600) | | |
| ***COVID*** | -0.0288 | 0.0395 | 0.0107 | - |
| | (0.3600) | (0.4300) | | |
| ***HAPPINESS*** | -2.6143*** | 2.2324* | -0.3819** | ↑ |
| | (0.0100) | (0.0600) | | |
| ***HAPPINESS*COVID*** | 0.4199*** | -0.3548* | 0.0651** | ↑ |
| | (0.0100) | (0.0700) | | |
| ***Threshold*** | | | 14.3099 | |
| ***Slope(y)*** | | | 1.7842 | |
| ***Prob>F-statistic*** | | | 0.0000 | |
| ***R-Square*** | | | 0.1356 | |
| ***Observations*** | | | 11,160 | |

*Source: own calculations based on data from the ORBIS platform. The description of the variables is presented in Table 1. Standard errors are shown in parentheses; *, **, *** denote statistical significance at 10%, 5% and 1% level, respectively.*

There is no doubt that the shadow economy does not directly impact but rather moderates the relationship between HAPPINESS and PROFITABILITY in a differentiated way, with two regimes being identified. In *regime 1*, countries with a high tax collection rate tend to have a lower shadow economy. Here, we observe a positive relationship between HAPPINESS and PERFORMANCE, meaning that when the shadow economy is greater than 14.3099%, a 1 percentage point increase in HAPPINESS leads to an average profitability during the pandemic period. In *regime 2*, countries with a low tax collection rate have a high shadow economy. Thus, in regime 2, a 1 percentage point increase in HAPPINESS negatively affects PERFORMANCE during the pandemic period by 0.0651 percentage points.

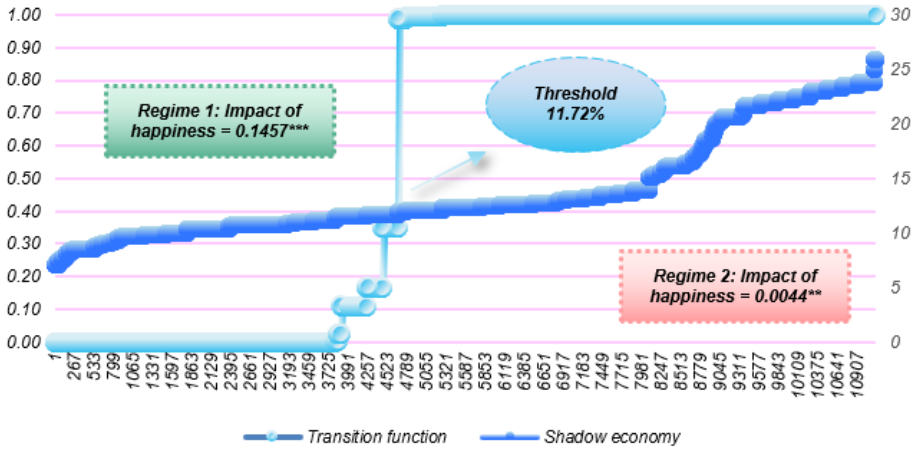
Additionally, the probability of the F-Statistic test is significant at a 1% confidence level, confirming the econometric validity of the model. As for the coefficient of determination, the model explains 13.56% of the variation in financial profitability.

#### *4.2.3. The estimated transition function at the level of the shadow economy*

Figure 8 demonstrates that an increase in the underground economy correlates with a reduction in the happiness index impact, which falls from 0.1457 to 0.0044. The observation is associated with the acknowledgment of values. Throughout the pandemic, organizations that re-evaluated their values and priorities to improve employee satisfaction experienced notable employee engagement, which in turn led to enhanced profitability. Organizations that prioritized employee and community welfare and implemented suitable actions typically observed enhanced reputations and improved relationships with business partners and customers. Strong relationships can enhance revenue and contribute to long-term profitability.

The transition function's slope in the case of ROA exhibits a significant steepness and abruptness, attaining a value of 16.3619. A smooth transition is not observed due to the large value and the angle approaching 90°. This indicates significant and rapid changes in the relationship between the underground economy, happiness levels, and economic profitability. Additionally, ROA may demonstrate increased sensitivity to risks associated with the underground economy and happiness levels, as it includes all assets of a company, encompassing those that are risky or volatile.

**Figure 8**
**Estimated transition function for the shadow economy with ROA as the dependent variable**



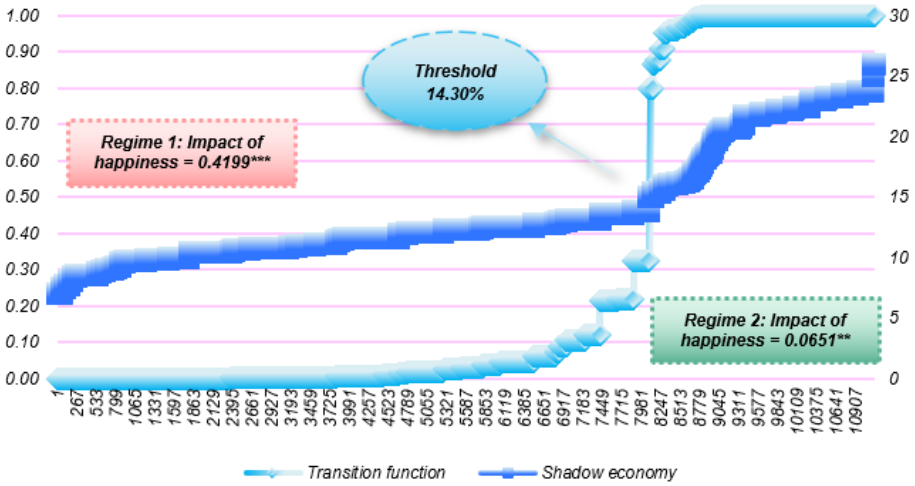

*Source: own calculations based on data from the ORBIS platform*

The influence of the happiness index on the dependent variable ROE during the $COVID_{19}$ pandemic is significant only in countries with a low underground economy. Figure 9 indicates that as the underground economy rises, the effect on happiness diminishes from 0.4199 to 0.0651. This finding may be attributed to the correlation with economic stability, as nations exhibiting a diminished underground economy generally demonstrate enhanced economic stability. Additionally, public and private institutions in these countries may be viewed as exhibiting greater transparency and efficiency.

In nations with a diminished underground economy, the regulation and oversight of illicit economic activities are generally more effective. This promotes a stable and secure business environment, thereby encouraging greater consumer engagement and investment in legally recognized enterprises.

Given that the slope equals 1.7842, a smoother transition occurs when the dependent variable is ROE. This indicates that the relationship between the underground economy, happiness levels, and financial profitability is more gradual and less abrupt. As a result, the factors influencing return on equity are less sensitive to sudden changes in the underground economy or happiness levels, and their effects on ROE unfold over a longer period and in a more subtle manner.

**Figure 9**
**Estimated transition function for the shadow economy with ROE as the dependent variable**




*Source: own calculations based on data from the ORBIS platform*

Based on the results of the smooth transition regression models applied to panel data, this research could highlight the significance of a healthy and resilient economic environment that supports corporate performance. Internally, policies and measures aimed at facilitating investments in mental health and employee well-being, as well as promoting a stable and predictable climate, could be considered. This is why understanding the impact of happiness on company performance may have implications for both the analysis and evaluation of fiscal policies.

### 4.3. From employee happiness to company profitability? A new perspective on the literature

The research makes a significant contribution to the corporate finance literature by validating three fundamental hypotheses:

$\mathbf{H_1}$: Employee happiness, as measured by the happiness index, has a statistically significant impact on company profitability;

$\mathbf{H_2}$: The COVID-19 pandemic has altered the way employee happiness contributes to the financial performance of companies;

**$H_3$:** The impact of employee happiness (quantified using the happiness index) on company profitability varies based on the profitability levels of the companies.

Additionally, the research highlights the relationship between employee happiness and company performance, illustrating how individual well-being impacts organizational success in both stable economic conditions and during crises.

## 5. Conclusions

Recent global changes, including the $COVID_{19}$ pandemic, have underscored the transition to more flexible work models. While these models can improve workforce productivity, they may also adversely affect employees' emotional well-being. This paper analyzes the relationship between employee happiness and corporate performance, particularly during the pandemic period, highlighting the significant impact of individual happiness on a company's development. The pandemic demonstrated a positive correlation between population happiness and financial performance. Low employee happiness can result in reduced engagement and productivity. Employees experiencing a lack of support, feelings of overwhelm, or anxiety stemming from pandemic-related stress may exhibit decreased efficiency in task completion. The recent **Deloitte Global Human Capital Trends (2024)** study indicates that 54% of employees worldwide express concern regarding increasing workplace stress levels.

The asymmetric effects on the distribution of company profitability would not have been discovered without performing a quantile analysis. The impact of happiness on profitability is negative at the $Q_{50}$. However, we observe that happiness has a positive effect on profitability for companies reporting losses. This can be explained by the fact that happy employees are more likely to provide creative and innovative solutions to the challenges faced by the company. Regarding the results obtained through linear regression on panel data, we highlight the existence of a smoother transition for ROE compared to ROA. Additionally, the threshold for regime change concerning the share of the shadow economy in GDP is 11.72% for ROA and 14.30% for ROE. Below this threshold, countries with low tax collection rates tend to have a higher shadow economy, while those above the threshold confirm the existence of a lower shadow economy

along with higher collection rates. Notably, we identified the countries in *regime 1:* Austria, Germany, Denmark, Finland, France, the Netherlands, Estonia, Latvia, Lithuania, Ireland, and Luxembourg. Similarly, we identified those in *regime 2:* Bulgaria, Belgium, Croatia, Cyprus, Czechia, Greece, Malta, Romania, Slovakia, Slovenia, Spain, Hungary, Italy, Poland, Portugal, and Sweden.

The results obtained have significant implications for company management, and therefore, policies and practices related to employee well-being should be reconsidered. Future research should concentrate on a particular industry, develop happiness measurement techniques to provide a more accurate picture of business profitability, and investigate other pertinent variables. Putting these suggestions into practice may help advance the field of study and provide managers of businesses with useful advice on how to maximize organizational well-being and profitability. Additionally, analyzing these aspects introduces a novel element in the economic field. Thus, this research makes a significant contribution to the corporate finance literature, paying particular attention to the impact of the happiness index on company profitability and the presence or absence of asymmetry in the distribution of their profitability.

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# TREND AND CHARACTERISTICS OF THE EXTERNAL DEFICIT IN ROMANIA IN THE POST-PANDEMIC PERIOD

**Camelia MILEA, PhD***

**Abstract**

The external disequilibrium has been a constant of the Romanian economy since 1990, and it represents one of the main vulnerabilities of the national economy. In the article[1], the author analyses the evolution of Romania's foreign deficit during the recent years, highlighting some of its characteristics. The research shows that the external deficit is generated by the negative balances of goods and of primary income, and it is partly offset by the surplus of the balances of secondary income and services. It is also shown that the structure of Romanian exports is dominated by goods with low added value and a low degree of processing, which do not help to obtain high prices in foreign markets. The economic slowdown of the European Union countries (the main trade partners of Romania) in recent years is a cause of the slower growth of Romanian exports. The methodology used joins the descriptive analysis with the empirical analysis and data interpretation, as well as the identification of correlations.

**Keywords**: foreign disequilibrium, structure, causes, evolution, European Union

**JEL Classification:** F14**,** F24, F32

## 1. Introduction

The external disequilibrium has been a characteristic of the Romanian economy since 1990 up to present, and it represents one of the main vulnerabilities of the domestic economy.

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[1] *The article is based on "Romania's external deficit in the current domestic and international conditions", Milea C. (coord.), a research project of the "Victor Slăvescu" Centre for Financial and Monetary Research, elaborated in 2023.*

The extension of the medical crisis, the emergence of other crises (food, energy, etc.), the increase in uncertainty regarding global economic growth, and the evolution of the war between Russia and Ukraine and of the conflict in the Middle East, as well as the challenges that our country must face in the perspective of joining the euro area, represent factors of risk for the evolution of the Romanian current account balance nowadays. In addition, the level still high of the core inflation in 2023 (above that from the pre-pandemic period) had adverse implications on commodity markets and global supply chains.

The subject analysed is important as the current deficit is part of the imbalances that Romania's economy faces and is trying to mitigate in the context of joining the euro area.

The paper is structured in four parts. So, after the introduction, the data and methodology used are presented. Then, there is the section on results and discussions. In the first part of this section, the author presents the trend and the characteristics of the foreign deficit and its components in Romania in the period 2021-2023. In the second part, there is a literature review on the sustainability threshold of the current account deficit and an empirical analysis on this subject for Romania. The last section provides the conclusions of the paper.

## 2. Data and methodology

In the article, we compute data for some indicators after 2006, but the in-depth analysis covers the period 2021-2023 in order to capture the evolution of Romania's external sector after the COVID-19 pandemic.

The statistics have been taken mainly from the National Bank of Romania, and there are annual data.

The methodology used joins the descriptive analysis with the empirical analysis and data interpretation, and also the identification of correlations. In the empirical analysis, we use statistical indicators such as annual growth rate (to make comparisons in time of the trend of the current account deficit and its components), shares (to show the structural causes of the current account deficit and of the goods deficit, the structure of exports and imports in terms of production stages and from the point of view of customs classification, as well as the structure of imports, exports and goods balance deficit from a geographical perspective). We also compute the share of some indicators in GDP.

## 3. Results and discussions

### 3.1. Trend and characteristics of the foreign deficit in Romania

In Romania, the foreign deficit is represented by the negative balance of the current account, which is generated by the deficit of the goods balance.

In the years preceding the pandemic, the deficit in the balance of goods was deepening sharply, an evolution brought about by the faster increase in imports compared to exports in the context of a domestic demand not fully satisfied at the national level, especially for consumer goods. The increase in the deficit of the balance of goods moderates in 2020, but it resumes its high growth in 2021 and, especially, in 2022, showing the existence of structural problems in the Romanian economy that remain unsolved. In 2023, the deficit of the balance of goods decreases.

The uncertainty caused by the evolution of covid-19, as well as the measures adopted by the national authorities and by the trading partners in order to stop the spread of the coronavirus, has led, in 2020, to a decrease in external demand, as well as disruptions in production and supply chains at national and international level, affecting negatively the Romania's export offer, and implicitly the external balance. Thus, exports had a negative growth rate (higher than the decrease in imports). As a result, the deficit of the current account and of the trade balance have increased, but much less compared to the previous period. As it concerns the components of the current account, there is a slight increase in the surplus of services and the deficit of primary income, as a result of the small decrease in remittances from workers with work commitments of less than one year; the surplus of secondary income increases as a result of the decrease in the public administration deficit (more inflows of European funds come into the country than in the previous year).

The current account has begun to rise again sharply, in the first part of 2021, as before the outbreak of the pandemic, and before the 2008 crisis. At the European level, Romania had the third highest value of the current account deficit both in 2021 (after France and Greece) and in 2020. (NBR, 2022a).

The current account negative balance increased by 60% compared to the previous year, in 2021, mainly due to the growth in the deficit of the balance of goods, and in the deficit of the primary income sub-account (by 46%) (as a result to the increase in the outflow

of income from direct investments, the profit reinvested in direct investment companies in Romania), and to the decrease in the surplus of secondary income (by 45%) (generated by the rise in the deficit of secondary income of the general government in the context of the decrease in the inflow of non-refundable European funds used for current expenses - the European Social Fund, the European Fund for Agriculture and Rural Development, and the increase in the contribution to the EU budget). The balance of services had a surplus comparable to that of 2020, given that the rise in the deficit of tourism services, associated with the resumption of international travel, was offset by the increase in the surpluses of ITC services and transport services.

The deficit in the balance of goods increased by 22% compared to the previous year, against the background of equal growth rates of exports and imports, as a result of the relaunch of economic activity. Thus, the alert pace of domestic demand, in the context of the structural problems of the Romanian economy (deficiencies in the agri-food sector, the high share of energy-intensive sectors and low energy efficiency, increased dependence on import consumption) led to a significant increase in the imports of goods. There were also negative effects generated by the global synchronization of the recovery of economies (supply bottlenecks and generalized rises in raw material prices). Thus, the global semiconductor crisis caused a decrease in the development rate of the automotive industry, a sector that concurs with over 20% of Romania's exports.

By geographical areas, in 2021, the deficit in the balance of goods was generated by over 70% by intra-EU trade, and approximately 30% with Asian countries. The countries with which Romania had the largest trade deficits were China (3800 million euros), Austria (2700 million euros), Poland, and the Netherlands.

In 2022, the increase in the current account deficit (by 53%) was generated by the growth of the negative balances of goods and of primary income, while the sub-accounts of services and secondary income had increasing surpluses.

Thus, the deficit of the primary income balance increased by 77%, mainly due to the rise in the profit reinvested in direct investment companies in Romania, whose financial results improved, but also as a result of the increase in the volume of interest payments related to securities issued by the public administration.

The surplus of the services balance increases by approximately 38% due to the growth in receipts from telecommunications, computer and information services, road transport, construction services abroad and consulting services. The surplus of services sub-account represented 4.4% of GDP.

The surplus of the secondary income increased by 35%, in 2022, compared to the previous year, as a result of the expansion in the positive balance of other sectors (probably remittances of Romanians working abroad for periods longer than one year), and of the inflows of European funds as current transfers (European Social Fund – ESF), although Romania's contribution to the EU budget also augmented.

Table 1 shows that, in terms of the balances of the corresponding sub-accounts (Compensation of employees in Primary income; workers' remittances, recorded as Current transfers of other sectors in Secondary income, and Current transfers of General government, inflows [European funds] in Secondary income), both remittances and inflows of European funds counteracted the current account deficit, with increasing values. Also, from Table 1, it is noted that the inflows of European funds are lower than our country's contribution to the European Union budget, so, from this point of view, Romania's membership in this union of states is not advantageous.

**Table 1**

**European Funds received and remittances of Romanian working abroad (mil. Euro)**

| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| **Compensation of employees (primary income)** | Inflows | 2965 | 2946 | 3597 | 3234 | 3825 | 3931 | 4617 |
| | Outflows | 93 | 104 | 103 | 129 | 175 | 329 | 403 |
| | *Balance* | *2872* | *2842* | *3493* | *3105* | *3650* | *3602* | *4214* |
| **Workers' remittances (current transfers of other sectors)** | Inflows | 3405 | 3427 | 4067 | 3840 | 4265 | 4948 | 5204 |
| | Outflows | 1623 | 1647 | 1936 | 1824 | 2083 | 2468 | 3024 |
| | *Balance* | *1782* | *1780* | *2131* | *2016* | *2181* | *2480* | *2180* |
| **Current transfers of general government (European funds)** | Inflows | 1135 | 972 | 1484 | 1985 | 1426 | 1982 | 2466 |
| | Outflows (contrib. to the EU budget) | 1305 | 1463 | 1805 | 2014 | 2502 | 2415 | - |

*Source: NBR data*

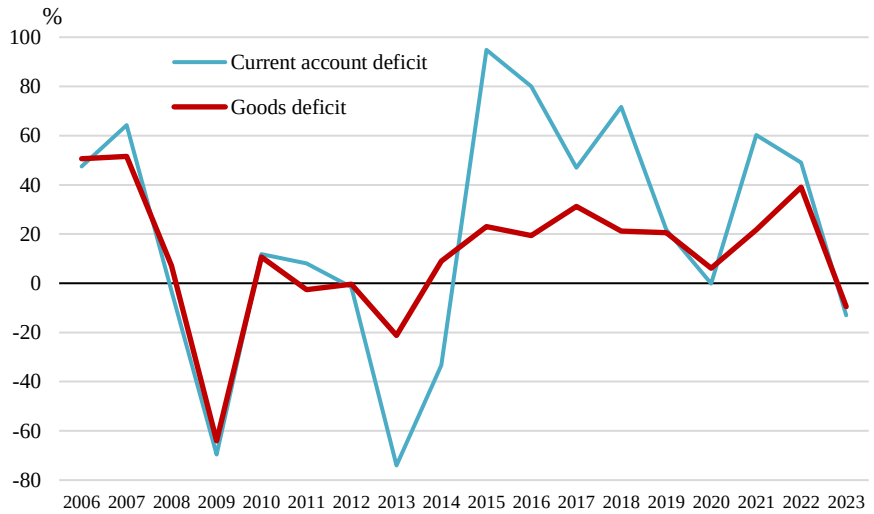
If they were spent entirely on imports, foreign capital inflows, as remittances and European funds, would have a neutral effect on the

external balance. But part of the European funds and remittances are used to purchase goods produced on the domestic market, so the effect on the balance of payments is positive, to counteract the external deficit.

The deficit of the goods balance increased by 39% in 2022 due to the higher growth in the value of imports compared to exports (see Chart 1). The explanation lies in the strong rise in prices for raw materials, gas, energy and crude oil as a result of the conflict in Ukraine, but also in the high GDP growth rate (18%), given the dependence of the Romanian economy on imports and the decrease in external demand of the European Union (in the context of low economic growth and high inflation). Slower export growth is also forecast due to the economic slowdown of Romania's main trading partners (European Union countries), thus maintaining the gap with imports and fuelling trade and current account deficits.

**Chart 1**

**The trend of the current account and of the trade balance in Romania (annual growth rate, %)**




*Source: author's calculations using NBR data*

Chart 1 shows that the current account balance/deficit is induced mainly by the balance/deficit of goods in Romania. It can also be noticed that the current account balance has more significant fluctuations compared to the balance of goods.

The deficit of the balance of goods was generated in 2022 in approximately 60% by two groups of commodities: chemical products and plastics (36% of the total deficit) and mineral products (24%). Other important deficits derived from base metals (11%), machinery, appliances, equipment and means of transportation (10%), textiles, clothing, footwear (9%), agri-food products (3%) and other goods (9%). In contrast, a surplus was recorded in wood and paper products (444 million euros). By geographical areas, the deficit of the balance of goods was generated in a proportion of 72.1% by intra-EU trade. (NBR, 2023).

The deficit in the agri-food sector is brought about by exports of raw materials from Agriculture, forestry, fishing and imports of processed food products.

In 2022, there is a significant deterioration in the balance of the groups of mineral products, machinery, appliances, equipment and means of transportation, and agri-food products.

In the structure of exports, six sections of the Combined Nomenclature account for 72.1% of total exports: Machinery and appliances, electrical equipment; appliances for recording or reproducing sound and images (28%), Means and materials of transportation (16%), Base metals and articles thereof (9%), Vegetable products (mainly cereals) (6.7%), Plastics, rubber and articles thereof (6%), Mineral products (5%).

Thus, around 70% of exports are intermediate goods, approximately 17% are consumer goods, and 12% are capital goods. We note that the structure of exports involves mainly goods with low added value and low processing degree, which do not offer the possibility of obtaining high prices on foreign markets and, therefore, high income from exports. In Romania, components and subcomponents are assembled or/and produced, many of which do not have high added value.

From a geographical perspective, it is found that intra-EU exports account for 72.1% of total exports, a value comparable to that recorded in 2021. The main ten export partner countries, accounting for 63.3% of total exports in 2022, were: Germany (20% of total exports), Italy (8.4%), Hungary (7.7%), France (6.1%), Bulgaria (4.1%), Poland (4%), the Netherlands (3.6%), Spain (3.3%), Turkey (3.2%), Czech Republic (2.9%). (NBR, 2023). We believe that Romania's high trade dependency on the economic evolution of the European Union countries does not support the sustainable development of the

Romanian economy, which is why we suggest a diversification of our country's trade relations.

In the structure of imports, six sections of the Combined Nomenclature account for 72% of total imports: Machinery and appliances, electrical equipment; appliances for recording or reproducing sound and images (26%), Chemical products (11%, of which 38% are pharmaceutical products), Base metals and articles thereof (10%), Means and materials of transportation (10%), Mineral products (9%), Plastics, rubber and articles thereof (7%).

We can say that Romania has mainly an intra-branch trade.

In terms of production stages, in 2022, imports of intermediate goods prevail (with 61.6% of total imports) (especially crude oil, well gas, motor vehicle parts and accessories, other raw materials with a low degree of processing for industry, subassemblies, parts and accessories, fuels and lubricants). Consumer goods represented 25.2% of total imports (medicines, cars, food and beverages for household consumption, household durables), and capital goods approximately 13% (telephone installations, data processing automatic machines, motor vehicles for the transport of goods, centrifuges, air or vacuum pumps, medical instruments and appliances, tractors, electric motors and generators, pumps for liquids). (NBR, 2023).

From the perspective of the degree of incorporated technology, measures are needed in Romania to stimulate the development of companies in technology-intensive sectors, given that our country's exports are dominated by goods with a medium to high degree of technology (medium high tech), (48% of the value of exports). Since high-value-added products (high tech) are poorly represented in total exports (7%), and imports for this type of products are substantially higher, a negative trade balance exists on this segment of goods of approximately 40% of the trade deficit generated by non-financial companies in foreign trade with goods. The authorities could also consider measures to adjust the deficit in the balance of agri-food products, including in order to ensure food security at an adequate level. (NBR, 2021).

Both in 2021 and 2022, the growth in imports came from price increases, especially for crude oil and petroleum products, electricity, and well-gas (by 60% and 84%, respectively). (NBR, 2022b; NBR, 2023).

The share of intra-EU imports in total imports of goods decreased by one percentage point compared to 2021, reaching 72.1%.

The top 10 import partner countries in 2022 (representing 67.1% of total imports) were: Germany (17.9%), Italy (7.3%), Bulgaria (7.2%), Hungary (6.7%), Poland (6.1%), China (5.9%), Turkey (4.7%), the Netherlands (4.3%), France (3.9%) and Austria (3.1%). (NBR, 2023).

In 2023, the current account deficit decreased (by 13% compared to the previous year) after eight years of continuous growth as a result of the decrease in the goods balance deficit (by 9.5%), of the very slight increase in the primary income deficit and of the increase in the surpluses of the secondary income (by 20%) and the services balance (by 1.8%).

More than half of the goods balance deficit (52.5%) came from two groups of goods: chemical and plastic products (36%) (most of which are pharmaceutical products) and mineral products (16%), a situation similar to that of 2022. Under these conditions, in order to reduce imports and, implicitly, the external deficit, we consider it necessary to take measures aimed at stimulating the domestic production of chemical and plastic products, especially the national pharmaceutical industry, through investments and innovations, in order to direct domestic demand towards domestic products.

Intra-EU trade generated 80.7% of the trade deficit, showing a high dependence of Romania's trade in goods on the economic and political evolution of a relatively small group of countries in the same geographical area.

Exports of goods were growing very little in 2023 (by 0.6%, a significantly lower rate compared to that from 2022, of 22.5%), their evolution being influenced by the moderation of the external demand, as a result of the slowdown in economic growth internationally (and especially in the EU, Romania's main trading partner), and of high core inflation, in the context of geopolitical factors that created uncertainty and led to an increase in inflation. In contrast, exports of services increased by 9.5%.

There were some consistent increases in exports from some sectors of the manufacturing industry with a high degree of technology (the most significant, by 3.5 percentage points, up to 45.1%, in machinery, appliances, equipment and means of transport), respectively reductions in the share of three groups of goods (the most significant in mineral products and base metals).

Imports diminished in 2023 (by 2%) as a result of the dependence of exports on imports, the reduction in the purchasing power of the population, but also due to the decrease in international

food and energy prices. Also, for these reasons, there were changes in the structure of imports, such as a decrease in the share of mineral products in total imports (by 3.9 percentage points, up to 8.6%), of chemical products and base metals.

The services sub-account had an increasing surplus until 2023 inclusive. The surplus in the services balance was due to the rise in receipts from telecommunications, computer and information services, goods processing services, technical and commercial services and other services for business. The largest surplus in the services balance is in telecommunications, computer and information services, road freight transport services, other services for business, and goods processing services.

The deficit in the primary income balance increased slightly, mainly as a result of the rise in the interest payments on securities issued by the general government as portfolio investments (by 65%), and of the growth in the deficit of other investments (by 96%), although the surplus in compensation of employees augmented (by 16%).

The surplus in the secondary income balance increased due to the rise in inflows of European funds in the form of current transfers (European Social Fund) (NBR, 2024).

**3.2. On the sustainability threshold of the current account deficit**

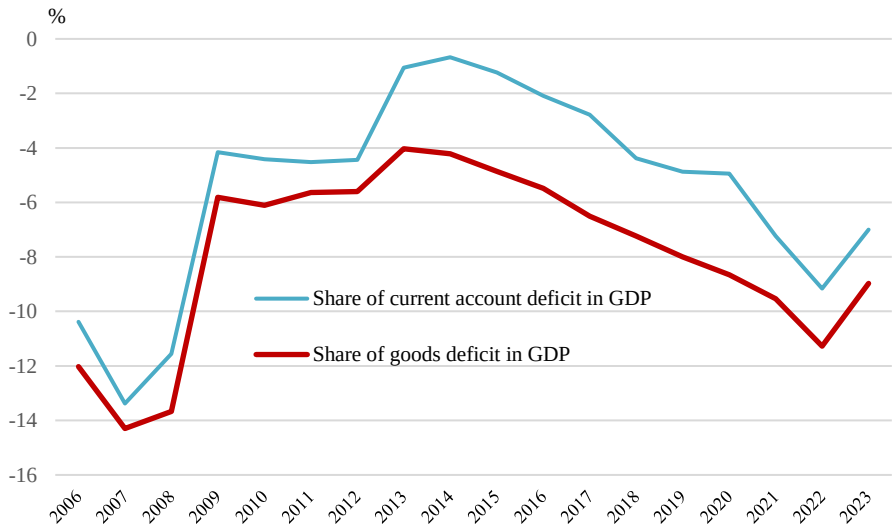
In the economic literature, there are several discussions regarding the sustainability threshold of the current account deficit. Many economists (Dornbusch (2002), Edwards (2005), Freund (2005) have concluded, based on studies conducted after economic crises, that a current account deficit of 4-5% of GDP is sustainable, although it does not represent a suitable criterion for assessing sustainability in itself, and exceeding this threshold can be considered a sign of crisis. Freund (2005) emphasized that there are large differences between countries regarding the sustainability threshold of the current account deficit.

In Romania, the conventional sustainability threshold of the current account deficit (5% of GDP) has been constantly exceeded during 2004-2008, making it necessary to adopt policies that should ensure the sustainability of the current account deficit in the medium and long term.

During the period 2009-2014, as a result of the reduction of population income and liquidity in the context of the increase in investors' risk aversion, the share of Romania's current account deficit

in GDP decreased considerably (compared to the previous period) (see Chart 2) (to values below the conventional sustainability threshold accepted internationally). This evolution represents a favourable element for the situation of the external equilibrium and for the Romanian economy as a whole, although it is caused by an exogenous factor, namely the international economic and financial crisis. Since 2015, the share of the current account balance in GDP has been on an upward trend, following the recovery of the national and international economy, with Romania's economy still having structural deficiencies. This trend can be explained by the consistent deterioration of the balance of goods as a share of GDP in the period 2015-2022 (see Chart 2) and the deficit of the investment income balance. In 2020, the share of Romania's current account deficit in GDP reached the conventional sustainability threshold (5% of GDP) again, and in the following years, it exceeded it.

**Chart 2**
**The share of the goods deficit and of the current account deficit in GDP in Romania (%)**




*Source: author's calculations using NBR data*

The unsatisfied domestic demand at the national level is the main cause of the evolution of the current account balance, and it requires the adoption of economic restructuring measures in order to manufacture in the country some of the necessary goods, which are currently imported.

## 4. Conclusions

Romania has experienced an external imbalance since 1990, which represents one of the main vulnerabilities of the national economy. The research shows that the external deficit is determined by the negative balance of the current account and, within it, by the negative balances of goods and primary income, and it is partially offset by the surpluses of the balances of secondary income and services. Both remittances and inflows of European funds offset the current account deficit during the period under review.

The evolution of the balance of goods was determined by the faster increase in imports compared to exports in the context of an unsatisfied domestic demand at the national level, especially for consumer goods, but also by the existence of structural problems in the Romanian economy, among which the most important are the increased dependence of consumption and exports on imports, the low level of development of the agri-food sector, the high share of energy-intensive sectors, the emigration of the workforce (leading to a inappropriate qualification of the workforce at the national level) and low energy efficiency. In this context, it is necessary to adopt measures to restructure the economy in order to make in the country some of the necessary goods, which are currently imported, especially by supporting the development of the agri-food sector, including in order to ensure food security at an adequate level.

The structure of exports involves mainly goods with low added value and low processing degree, which do not allow obtaining high prices on foreign markets, and implicitly high income from exports. Therefore, we consider that there are necessary measures to stimulate the development of companies in sectors intensive in technology.

Given the structure of imports, we consider it necessary to stimulate the national pharmaceutical industry through investments and innovations in order to orient domestic demand towards domestic products, with effects including the decrease of the external deficit.

The analysis shows that there is a high dependence of Romania's trade in goods on the economic and political evolution of a relatively small group of countries, located in the same geographical area, namely the European Union member states. The economic slowdown and high inflation in recent years in these economies are the cause of the slower growth of Romanian exports. In this context, we consider that Romania's high trade dependency on the economic evolution of the European Union countries does not support the sustainable development of the Romanian economy, and it is even risky for the evolution of the external equilibrium of our country, which is why we suggest diversification of our country's trade relationships.

Furthermore, it is noted that the inflows of European funds are lower than our country's contribution to the European Union budget, so, from this point of view, Romania's membership in this union of states is not advantageous. There is an almost continuous deterioration of the goods and current account balances as a share of GDP in the context of an almost continuous increase in GDP (except for 2009 and 2020, as a result of the economic and financial crisis of 2008 and the COVID-19 pandemic of 2020). The evolution in 2020, when external demand decreased, supply chain blockages occurred, and economic activity contracted, shows the significant dependence of the Romanian economy on external demand but also on imported products (finished and raw materials), which should constitute alarm signals regarding the structure of our country's economy.

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