Analysis of determinants influencing the credit ratings of European Union countries[1]

Analiza determinanti koje utječu na kreditni rejting zemalja Europske Unije

Abstract

The process of evaluating a country's risk involves numerous intricate factors that must be examined and[1] considered prior to determining the ultimate credit rating. This paper will examine the pertinent factors that are taken into account when assessing an EU member state's creditworthiness. Some of the most significant factors considered when generating a credit rating evaluation include GDP growth, GDP per capita, inflation, governmental debt, and past performance in paying financial obligations. Examining the role of credit rating agencies and their evaluations in the economy, with a particular emphasis on the EU market and regulatory structure as well as the financial crisis of 2007, is crucial for gaining a deeper comprehension of the research. The empirical part of the paper looks into the connection between factors within certain nations and the credit ratings they are given. The paper aims to ascertain the significance of these determinants in EU member states as well as any potential variations in the relative relevance of particular determinants. It will be investigated whether and to what degree determinants affect country credit ratings using the multiple regression analysis method. In the end, a determination on the significance and relationship of factors to the assignment of credit rating assessments will be made on the basis of the analysis performed. The analysis's anticipated outcomes ought to be significant from an economic standpoint. The coefficient of multiple determination will enable comparisons between each nation, enabling an evaluation of the results' representativeness.

Keywords: credit rating, rating agencies, multiple linear regression analysis, EU

JEL classification: G24, G32

Sažetak

Proces procjene rizika zemlje uključuje brojne složene čimbenike koji se moraju istražiti i uzeti u obzir prije donošenja konačne ocjene kreditnog rejtinga. Ovaj rad istražuje relevantne čimbenike koji se uzimaju u obzir prilikom procjene kreditne sposobnosti članica EU-a. Neki od najvažnijih čimbenika koji se razmatraju prilikom generiranja ocjene kreditnog rejtinga uključuju rast BDP-a, BDP po stanovniku, inflaciju, državni dug te prošlu izvedbu u ispunjavanju financijskih obveza. Proučavanje uloge agencija za ocjenjivanje kreditnog rejtinga i njihovih procjena u ekonomiji, s posebnim naglaskom na tržište EU-a, regulatornu strukturu te financijsku krizu iz 2007. ključno je za dublje razumijevanje istraživanja. Empirijski dio rada istražuje povezanost čimbenika

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NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

1

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Analysis of determinants
influencing the credit ratings of
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unutar određenih zemalja i njihovih dodijeljenih kreditnih ocjena. Cilj rada je utvrditi značajnost ovih determinanti u članicama EU-a, kao i eventualne varijacije u relativnoj važnosti određenih determinanti. Bit će istraženo da li i u kojoj mjeri determinante utječu na kreditne ocjene zemalja koristeći metodu višestruke regresijske analize. Na kraju, na temelju provedene analize bit će donesena odluka o značajnosti i odnosu čimbenika na dodjelu ocjena kreditnog rejtinga. Očekivani rezultati analize trebali bi biti značajni s ekonomske perspektive. Koeficijent višestruke determinacije omogućit će usporedbu između svake zemlje, omogućujući procjenu reprezentativnosti rezultata.

Ključne riječi: kreditni rejting, kreditne rejting agencije, višestruka regresijska analiza, EU

JEL klasifikacija: G24, G32

1. Introduction

The subject of this paper are the determinants used by credit rating agencies when assigning credit ratings to entities in the economy, specifically EU member states. Measuring, analyzing, and monitoring the creditworthiness of various economic entities by these agencies is considered an independent opinion on credit risk, often utilized in various analyses. Assessing the risk of a specific country is quite complex and involves analyzing numerous components before reaching a final credit rating. The paper will provide a clear theoretical overview of the determinants influencing credit ratings, as well as an overview of the largest rating agencies in the market. In the practical part, multiple regression analysis will be used to examine whether and to what extent determinants influence the credit ratings of countries, and conclusions will be drawn regarding the relevance and correlation of determinants in assigning credit ratings.

The aim of this paper is to provide an overview of the major credit rating agencies, analyze their operations and determinants considered when assigning credit ratings to specific entities, and provide an overview of the regulatory framework for credit rating agencies in the EU, as well as an analysis of the market. Other research in this field by authors in Croatia was made by Katavić (2015), Jošić and Mlinarić (2018). The analysis in this paper covers 15 EU countries in the years from 2010 to 2022. Based on the obtained indicators and conducted multiple regression analysis, conclusions will be drawn regarding the relevance and correlation of determinants in assigning credit ratings.

The paper is divided into five chapters, including an introduction and conclusion. The introduction outlines the research subject, objectives, and methods used. Following the introduction, there is a review of theoretical concepts related to credit rating agencies, credit ratings, their determinants, and symbols as a basis for understanding and further concept development. The subsequent section analyzes the impact of credit rating agencies on the economy, with a special focus on analyzing the 2007 financial crisis, regulatory frameworks for credit rating agencies in the EU, and the market itself. In the practical part of the paper, multiple regression analysis will be used to examine the extent to which determinants influence the credit ratings of EU countries and to draw conclusions regarding the relevance and correlation of determinants in assigning credit ratings.

2. Theoretical framework and characteristics of credit rating agencies

2.1 The operations of credit rating agencies

Credit rating agencies have been part of the financial system for many years, and their relevance in the economy is increasingly prominent. Their role is particularly important in systems with developed market financing mechanisms, where credit rating agencies, as objective bodies providing independent opinions on the creditworthiness of entities in the financial market, sell their ratings. As the economy as a whole, and consequently the financial market, has developed, the importance of credit rating agencies has grown, with them now evaluating all types of instruments in the financial market. Rating agencies are independent assessors whose advice is

2

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

accepted for the purpose of executing transactions in the financial market (Pavković, 2016). Credit rating is defined as a set of characteristics of credit seekers, such as their position, assets, business, and perspective, based on which an assessment of their creditworthiness can be made (Leko and Mates, 1993). As financial markets have evolved, so has the importance of credit rating agencies, leading to the expansion of their business domains. In addition to assessing ratings, today's credit rating agencies provide advisory services and engage in many other profitable activities such as managing significant global indices. Rating assessment is their core business, analyzing the financial position or riskiness of securities issuers.

In addition to assessing the risk of bond and stock issuers, rating agencies also evaluate countries, but now also complex structured financial instruments. The primary purpose of rating agencies is to eliminate information asymmetry between issuers of financial instruments and potential investors, thereby avoiding the problem of information asymmetry between transaction parties, as financial assessment is based on the application of standardized quality indicators. In today's world, there is a plethora of asymmetric information that can negatively impact investor decisions, so it is important to consider independent opinions supported by objective analyses from rating agencies, Kiff et al (2012). What sets credit rating agencies apart from other banking and market analysts, chief economists, consultants, and other entities responsible for evaluating the performance of a particular entity is the method and system of evaluation. Credit rating agencies take a holistic approach in assessing a bank's creditworthiness and use all types of prudential indicators (capital, asset quality, liquidity) that are an integral part of the overall assessment of a bank's or other financial institution's operations, Kuhner, 2001. In evaluating the effectiveness of credit rating agencies, emphasis is placed on equal weighting of efficiency indicators and revenue and cost structure. In addition to the asymmetric information investors face today, another problem in the detailed assessment of the creditworthiness of a particular entity for investors is cost inefficiency, which is why there is a need for rating agencies to address this problem by selling their objective analyses and assigned credit ratings to investors.

Credit rating agencies have expanded the scope of their business over time. Initially, they assessed the riskiness of issuances of railway companies, but today they evaluate instruments across the entire financial market. Ratings from credit rating agencies are also used as regulatory tools, Katz et al. (2009), for monitoring and managing entities and institutions operating in financial markets. Rating agencies operate in areas such as credit ratings, indices, investment research, risk assessment, and consulting to enable users to make more informed business decisions. Assessing the creditworthiness of financial institutions involves analyzing risk profiles, including country risk, environmental factors, company status, business and geographic diversification, management strategies, etc. Financial risk profile analysis includes risk management, capitalization, earnings, financing and liquidity, accounting, and governance. Ratings for money market funds, fixed-income funds, ETFs, and local government pools have been assigned since 1984 (Pavković and Vedriš, 2011).

2.2. Determinants influencing credit ratings formation

Determining the credit rating of a particular entity in the financial market is not straightforward, so several factors need to be considered in the analysis to provide a comprehensive credit rating assessment. Credit rating agencies evaluate the creditworthiness of countries based on several determinants of credit ratings. There are numerous studies and econometric models that statistically estimate the determinants of credit ratings and how they affect a country's rating. One of the most well-known and relevant studies is Cantor and Packer's work from 1996, Cantor and Packer (1996), which investigated the impact of selected determinants on credit ratings. The determinants analyzed include GDP growth, GDP per capita, inflation rate, external debt, fiscal balance, current account balance, economic development, and history of fulfilling obligations. The study was conducted on a sample of 49 countries, the majority of which are developed and well integrated into the global economy. The results of the study showed the following determinants to be statistically significant: GDP per capita, GDP growth rate, inflation rate, ratio of foreign reserves (excluding gold) to imports, current account balance-to-GDP

NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

3

ratio, history of fulfilling obligations, and level of economic development (Elkhoury, 2008). Table 1 below provides a systematic overview of the determinants of a country's credit rating and their explanations:

capabilities, which is a crucial component analyzed when assigning a credit rating. Additionally, the fiscal position measured as the average annual budget deficit/surplus as a percentage of GDP in the three years before the rating assignment has also shown

Table 1 Display of determinants of sovereign credit ratings

Determinant	Explanation	Expected Impact
GDP per capita	The higher the tax base of a potential debtor country, the greater the ability to repay debt. This variable can serve as an indicator of the level of political stability and other important factors. Poorer countries have less flexibility in reducing expenditure than richer ones. Countries with lower GDP per capita have limited debt repayment capabilities.	Positive
GDP Growth	Relatively high rates of economic growth indicate that servicing existing debt will become easier over time.	Positive
Inflation Rate	High inflation rates indicate structural problems in government finances. Public dissatisfaction with inflation can lead to political instability.	Negative
Fiscal Balance	A high budget deficit absorbs private domestic savings and indicates that the government lacks the ability or desire to tax citizens and increase revenue to finance existing high costs, especially debt repayment costs.	Positive
External Balance	The presence of a large external trade deficit indicates that both the private and public sectors rely on foreign sources of financing. Countries with a high export growth rate are better able to service debt repayment obligations.	Positive
External Debt	Debt burden increases with the growth of default risk.	Negative
Economic Development	Although the level of economic development is measured by the variable of income per capita, the credit rating assessment analyzes the relationship between economic development and potential risks. When a country reaches a certain level of economic development, there is a lower probability of default on contractual obligations.	Positive
History of Debt Fulfillment	Countries that have not met obligations regularly in the past are considered credit high-risk.	Positive

Source: Authors' systematization based on Bajo and Penava (2012).

According to the research results, there are seven statistically significant determinants for determining credit ratings: GDP per capita, GDP growth rate, inflation rate, ratio of foreign reserves (excluding gold) to imports, current account balance as a percentage of GDP, history of debt servicing, and level of economic development. The determinant of GDP per capita accounts for 80% of the total rating change (Cantor and Packer, 1996). GDP per capita is an indicator of a country's level of development. Observing the wealth or how rich a particular country is important because countries with higher GDP per capita have greater debt repayment

statistical significance (Bajo and Penava, 2012).

Furthermore, analyzing GDP growth, a higher growth rate indicates easier debt repayment. A high inflation rate in certain countries indicates structural problems where debts are financed by issuing money, leading to inflation. The existence of a deficit in the balance of payments indicates the country's inability to obtain the necessary financial resources. Lastly, the history of debt servicing is an important factor in the analysis. Countries that have had problems fulfilling their obligations in the past have higher risk and lower ratings compared to countries that have not had such issues.

4   Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
     Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

2.3. Credit ratings and their symbols

The three largest and most well-known credit rating agencies, Moody's, Standard & Poor's, and Fitch, among other activities, issue credit ratings. When assessing credit ratings, they use different symbols that denote credit risk. Often, rating agencies agree on the assessment of a country's rating, which is logical given that they consider the same determinants in their assessment. However, the rating scale of each agency is not uniform for all financial instruments. Agencies use different symbols when assessing the rating of different types of instruments, and it may happen that existing symbols are interpreted differently depending on the security or financial institution. Certain industries, issuers, and countries have unique characteristics, and for this reason, rating assessments cannot be reduced solely to the use of standardized formulas and methodologies; assessments must also include a subjective component reflecting the issuer's future business outlook (Moody's, 2023).

Since 2000, another indicator, called outlook, has been used for credit ratings. The outlook indicates possible trends in a country's credit rating. It can be positive, stable, or negative, reflecting the likelihood of changes in financial and other economic trends in the short term (usually one to three months). According to S&P, S&P (2023) there are four different outlooks: positive outlooks, which emphasize the possibility of an upgrade to a higher rating in the medium term (6-24 months); negative outlooks, indicating a possible downgrade in the medium term; stable outlooks, indicating that the rating is unlikely to change for six months to two years; and evolving outlooks, meaning that ratings are likely to be raised or lowered. There are two rating categories: investment-grade and speculative-grade. Long-term ratings by S&P, Fitch Ratings, Fitch (2023), and Moody's are shown in Table 2. Since agencies consider both objective and subjective assessments in determining rating scores, there is no single formula for determining rating scores, Mrvić et al. (2016). Agencies assess all factors, from business and financial risks to management and the company's position in the market. In Table 2 systematic presentation of the three most well-known credit rating agencies with corresponding symbols and

Table 2 Credit ratings and their symbols

Rating agency			Description
Fitch	Moody's		
Investment rating			
AAA	Aaa	AAA	Highest credit quality
AA+	Aa1	AA+	
AA	Aa2	AA	High credit quality
AA-	Aa3	AA-	
A+	A1	A+	
A	A2	A	Above-average credit quality
A-	A3	A-	
BBB+	Baa1	BBB+	
BBB	Baa2	BBB	Adequate credit quality
BBB-	Baa3	BBB-	
Speculative rating			
BB+	Ba1	BB+	
BB	Ba2	BB	Obligations not guaranteed
BB-	Ba3	BB-	
B+	B1	B+	
B	B2	B	Current ability to meet obligations, risk of default in the future
B-	B3	B-	
CCC+	Caa1	CCC+	
CCC	Caa2	CCC	
CCC-	Caa3	CCC-	High likelihood of default
CC	Ca	CC	
C	C	C	
DDD		D	Failure to meet obligations

Source: Croatian National Bank (2023).

NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

5

description of credit ratings is presented.

The basic classification of credit ratings is into investment-grade and speculative-grade ratings. An investment-grade rating indicates that the credit rating agency considers the investment to be solid and that the issuer is likely to meet repayment terms. Such investments usually have lower competitive prices compared to speculative-grade investments (CFI, 2023). Additionally, investment-grade ratings are assigned to countries that have historically shown greater resilience to external and internal shocks, implying that such countries have a lower probability of default, and a higher likelihood of meeting matured obligations, Reinhart, 2002. On the other hand, a speculative-grade rating signals high risk and implies a delay in meeting the issuer's financial obligations. Investments at the speculative level are highly risky and therefore offer higher interest rates reflecting the investment risk (CFI, 2023).

Speculative ratings are assigned to more risky countries, such as Serbia, Greece, Bangladesh, Morocco, etc. More risky countries are those that have historically faced difficulties in meeting financial obligations, experience political instability, have a high share of public debt in GDP, deficits in the balance of payments, low GDP growth rates, high income inequality, and similar factors. The highest speculative rating according to Moody's is Ba1, and for the other two agencies, it is BB+. The highest speculative rating indicates that meeting obligations is not secure, which immediately suggests how risky it is to invest in such countries. Each subsequent rating in the table is progressively worse.

3. The impact of credit rating agencies on the economy

The role of credit rating agencies in financial markets can be understood through their basic functions. The primary purpose of credit rating agencies is to eliminate information asymmetry between issuers of financial instruments and potential investors, as the financial assessment by rating agencies is based on the application of standardized indicators of quality. Since credit agencies are considered independent opinion and a frequently used source for assessing the creditworthiness of entities in financial markets, their influence on the economy is significant.

3.1 Credit rating agencies and the 2007 financial crisis

The following will analyze the operations and impact on the financial crisis of 2007, the regulatory framework of credit rating agencies in the EU, and the market itself. Back in 2007, problems began to arise in the market for subprime mortgages, and there is broad consensus that credit rating agencies contributed to the financial crisis, Benmelech and Dlugosz (2009). What happened was that the agencies underestimated the credit risk associated with structured credit products, and since the assignment of credit ratings is a process that takes time, they failed to adjust the credit rating assessments and respond quickly enough to worsening market conditions. After that, the reputation of credit rating agencies was tarnished, and doubts about the methodology and reliability of ratings increased. Regulation in the financial market sharply tightened thereafter, and various directives and regulations were adopted to prevent a recurrence of the 2007/2008 financial crisis, Utzig, 2010.

The growth and development of financial markets over the past two decades are largely due to credit rating agencies. The reason for this is the wide availability of clear, internationally accepted analyses and indicators of creditworthiness based on which investors were willing to invest in international securities, corporate, or government bonds whose creditworthiness individual investors would not have been able to assess. Credit rating agencies developed a simple and easily understandable system that allowed every investor to invest in international securities with which they were not previously familiar. On the other hand, in the markets of structured products, the role of credit rating agencies was much more significant than just eliminating information asymmetry. Namely, the market for structured products could not develop without ensuring a quality analysis of complex products. However, it turned out that the ratings for structured credits were much less reliable indicators of future development than they were for traditional securities (stocks or bonds). The first such analysis was published in 2008 when the Financial Stability Forum (FSF) issued a report on strengthening market and institutional resilience. In that report, it was

6   Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
     Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

concluded that credit rating agencies significantly underestimated the risk inherent in structured financial products, partly due to deficiencies in risk assessment methodology where inadequate historical data were used, significantly increasing model risk, and the fact that rating agencies did not sufficiently take into account worsening lending standards. Credit rating agencies are important for understanding the creditworthiness of entities, but also, shortcomings come from investors who often accept ratings uncritically and overestimate their significance. Insufficient attention was paid to the fact that ratings are only estimates of the relative probability of default or expected loss. They are not a detailed risk assessment and say nothing about the quality of the price or liquidity of the instrument.

3.2 Analysis of rating changes before and after the financial crisis

The 2007 financial crisis came suddenly, although there were segments that indicated the crisis was looming. Factors describing the conditions on the market at the time were unregulated financial instrument markets, overvalued real estate markets, lending without prior detailed creditworthiness analysis, and the fiscal and trade deficit of the USA leading to global economic imbalances. From 2002 to 2007, the US approved $3.2 trillion of bad loans to clients with unregistered income. Investment banks, rated AAA, "packaged" much of that debt into complex financial investment instruments. The worst financial crisis since the Great Depression resulted from ratings assigned to securities without specific arguments for those ratings, which later proved worthless. Just as top ratings spurred market growth, the sudden rating downgrade accelerated the market collapse.

Agencies rated derivatives, considered risky, with the highest ratings, as they did with traditional securities with lower returns due to their lower risk. The problem of assigning the highest ratings to derivatives is that there were no real values behind those securities. Rating agencies are important participants in the financial system; therefore, to ensure financial system stability, careful oversight and monitoring of rating agency operations are necessary. Given their direct and indirect involvement in the development of the financial crisis, credit rating agencies require

stricter and more precise regulation. From all that has been said, there is a need for stricter regulation and supervision in the credit rating agency market, not only in the US where it all started but also in other parts of the world, including the EU, Bićanić (2020).

In history, there have been a couple of major crises that left a significant mark on financial markets. As the business domain of credit rating agencies grew over time, so did their relevance in the financial market. Precisely because of the involvement of rating agencies in the development of the financial crisis, there is a need for stricter oversight and regulation of agencies. Namely, applied models for assigning credit ratings were no longer adequate enough to predict the high default rate of mortgage-backed securities in the US market, so the assigned ratings were not current. This is a consequence of new complex structured products that emerged on the market at that time, lack of knowledge of the characteristics of new products, lack of historical data used in analysis, and the like, Bach (2014).

3.3 Regulation and supervision of credit rating agencies at the global level

Regulation of credit rating agencies began in the 1970s in the US and intensified after 2003 due to several corporate scandals for which rating agencies were blamed, particularly promoting international harmonization of principles, standards, and regulations and cooperation among regulators from 2008 to today's crisis (Dittrich, 2007). Serious consideration of regulatory change began in 2003 when regulators were accused of failing to predict business failures, leading to numerous regulatory initiatives. The International Organization of Securities Commissions issued and revised the "Code of Conduct for Credit Rating Agencies" in December 2004 and in 2008, containing rules and principles for the operation of credit rating agencies.

At the international level, the International Organization of Securities Commissions revised the code in May 2008 to strengthen guidelines for the quality and integrity of ratings, the independence of credit rating agencies, and the avoidance of conflicts of interest. Regulation and oversight of credit rating agencies first appeared in 1975 in the US when the Securities and Exchange Commission introduced the

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

7

NOTITIA

concept of recognized external credit rating agencies (Securities and Exchange Commission - SEC, 2023). Credit rating agencies gained the title of financial market regulators because the ratings they assigned influenced the investment choices of financial institutions.

The US Congress passed the Credit Rating Agency Reform Act in 2006, allowing the US Securities and Exchange Commission to require all accredited rating agencies to meet certain requirements, such as mandatory registration with the Financial Reporting Commission, regulatory rules for registered rating agencies, etc. agencies, public disclosure of information related to credit rating methodologies, certain reports, including monitoring of their work, etc. When the regulation came into force, credit rating agencies were required to submit financial reports to the Commission. The primary focus of the Commission when reforming the regulatory framework was to prevent conflicts of interest, increase transparency, and ensure that the financial market did not rely too heavily on given ratings. Given the oligopolistic structure of the credit rating market, the increasing financial activities of these agencies, and their significant market power, regulators must carefully monitor their activities.

3.4 Regulation of credit rating agencies in the EU

The European Commission has built a model whereby the registration and external supervisory regime for credit rating agencies in Europe are regulated, with regulators overseeing the policies and procedures of credit rating agencies and promoting reforms in their internal operations. In the EU, credit rating agencies have been regulated since 2006 through existing financial services guidelines, combined with self-regulation based on the International Code of Conduct for Credit Rating Agencies. The institution responsible for making decisions related to the regulation of credit rating agency operations in the European Union is the European Central Bank. As in the US, recognized credit rating agencies also exist in Europe: Kroll Bond Rating Agency Europe Limited, A.M. Best (EU) Rating Services B.V., and the like.

There are numerous guidelines that credit institutions should adjust their business to, some of which are guidelines on market abuse, capital requirements, and market and financial instruments. The market abuse guidelines regulate trading with privileged information and market manipulation and are aimed at fair presentation of investment recommendations and disclosure of conflicts of interest. Furthermore, to reduce market abuse, credit ratings do not contain recommendations but refer to opinions on the creditworthiness of individual issuers or financial instruments. To ensure that credit ratings are fairly presented, credit rating agencies must adopt internal policies and procedures to confirm this. There are numerous requirements that credit rating agencies must meet to obtain supervisor approval, in this case, the European Central Bank. Supervision of credit rating agencies in the European Union is carried out directly through the Eurosystem, monetary policy operations, and asset management. According to the statute of the European System of Central Banks, the European Central Bank and national central banks can have credit operations with credit institutions and other market participants if lending is based on adequate collateral. Furthermore, for certain assets to be used as collateral in monetary policy operations, they must meet high credit standards (Bhatia, 2002). Since the cause of the 2007 financial crisis in the US was incorrectly assigned ratings to structured products, this issue had to be analyzed separately.

As for the European Union, the issue of assigning ratings to structured products has been addressed by revising the methodologies used, verifying the data used, publishing the methodologies used, and so on. In other words, all aspects of rating issuance for structured products will be reviewed. In today's world, where changes happen very quickly, financial markets are dynamic, revising methodologies used in assigning credit ratings is important in case any component during analysis needs to be added or subtracted. Also, it is important to verify the data used so that the data used is not incorrect or unsubstantiated. Using correct data is a very important factor in assigning credit ratings. Rating methodologies for structured products must differ from the methodology used for bonds, which can be ensured by using a different scale or additional symbols. Liquidity risk should also be included in the models, which has been neglected in previous applications (Pavković, 2016).

8   Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
    Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

4. Empirical analysis of determinants of credit ratings of eu countries

In economists' studies, factors influencing changes in credit rating scores are estimated using econometric models, concluding that a small number of variables can explain 90% of the rating. In 1996, Cantor and Packer's research, Cander and Packer (1996), showed that the rating could be explained by the following variables: GDP per capita, GDP growth, inflation, level of economic development, ratio of foreign reserves (excluding gold), current account balance-to-GDP ratio, and past defaults. Unemployment and unit labor cost were also recognised as significant factors in determining credit rating, along with other variables such as macroeconomic stability and the share of investments in GDP. Given the various determinants considered in research, this study will explore the following variables: GDP growth, inflation rate, current account balance, central government debt, unemployment rate, trade impact, and foreign direct investment. The study will be conducted using multiplelinear regression analysis based on credit rating gradation. Credit rating agencies employ numerous determinants when assessing ratings, with certain expectations and assumptions regarding how each affects the economy and ultimately the credit assessment.

4.1. The expected impact of explanatory variables on credit rating

In this section the expected impact of explanatory variables on credit rating will be elaborated. GDP per capita and credit rating have a positive relationship. A higher GDP per capita indicates a larger tax base for potential debtor countries, increasing their borrowing and debt repayment capacity. Poorer countries have less flexibility in reducing expenditure as their citizens spend on basic needs, resulting in lower GDP per capita and limited borrowing and debt repayment capacity. GDP growth and credit rating have a positive relationship. Similar to GDP per capita, a high economic growth rate suggests greater borrowing capacity and potentially less demanding debt repayment over time.

Inflation rate and credit rating have a negative relationship. High inflation rates lead to political instability and indicate structural issues within the country. The current account balance should positively affect a country's credit rating if it achieves a surplus. It reflects transactions between the country and abroad related to income and production within a specific period. Central government debt negatively impacts credit rating and a country's creditworthiness. Its increase implies higher interest rates and a greater risk of default. The unemployment rate indicates the size of the output gap and inadequate resources. In the case of high unemployment, economic agents receive lower income, reducing their consumption and investment. This further negatively affects aggregate demand, i.e., GDP. A decrease in GDP, poor economic conditions, and lower tax revenues from income tax collection can jeopardize the stability and credibility of the country. Consequently, it may result in a sovereign credit rating downgrade. The same applies in reverse. A country with low unemployment will have a more flexible labor market, as it is less sensitive to changes in the economic environment.

Additionally, lower unemployment reduces the fiscal burden of unemployment benefits and social welfare, and expands the base for labor taxation. Trade (as a percentage of GDP) equals the total imports and exports of a country as a share of GDP. More open countries may be more susceptible to shocks from other countries. Countries failing to meet their debt obligations may be penalized by trade exclusion. The opportunity cost increases with greater trade openness, leading to an improvement in creditworthiness. Foreign direct investment (as a % of GDP) represents net investment inflows for permanent managerial interests in firms operating in an economy different from the investor's. It refers to the sum of capital, reinvested earnings, other long-term capital, and short-term capital shown in the balance of payments. This indicator demonstrates net inflows into the economy. It is expected that FDI as a percentage of GDP will have a positive impact on the country's credit rating growth as it will lead to investment and economic growth, which can result in better fiscal and economic indicators.

4.2. Methodology and data

In this subsection, the methodological aspects of the research and descriptions of the selected country samples will be presented. Subsequently,

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

9

NOTITIA

hypotheses will be formulated based on which the obtained results will be interpreted. The last subsection relates to multiple linear regression analysis and interpretation of the results. Multiple linear regression analysis will be conducted using the R Markdown program. The analysis covers the years from 2010 to 2022. The European Union currently comprises 27 member states, but the analysis includes only 15 countries, Eurostat (2023). This selection is based on the fact that Denmark, Estonia, Finland, Latvia, Lithuania, Luxembourg, the Netherlands, Germany, Poland, Romania, and Sweden maintain the same credit rating from 2010 to 2022, with Denmark having a credit rating of Aaa, Estonia A1, Finland Aaa, Latvia A3, Lithuania A3, Luxembourg Aaa, the Netherlands Aaa, Germany Aaa, Poland A2, Romania Baa3, and Sweden Aaa. For the remaining member states, an analysis is conducted.

A multiple linear regression model is an algebraic model used to determine the statistical relationship between one numerical variable and two or more numerical variables. The general form of the regression model is as follows:

$$\hat{y} = \beta_0 + \beta_1 \cdot X_1 + \beta_2 \cdot X_2 + \ldots + \beta_k \cdot X_k + \varepsilon \,,$$

where $\hat{y}$ is dependant variable,

$X_1, X_2, \ldots, X_k$ are independent (explanatory) variables, $\beta_0, \beta_1, \beta_2, \ldots, \beta_k$ are parameters that are estimated and ε is random error.

The model is based on certain assumptions. The first assumption is that there is no multicollinearity issue among the regressor variables. Additionally, it assumes that there is no problem of autocorrelation of residuals (the random errors are uncorrelated with each other). Furthermore, it is assumed that the random error term ε is normally distributed with constant variance and zero mean. Finally, it is assumed that there is no heteroscedasticity issue with the variance of residuals. If these assumptions are met, the method of least squares provides the best linear unbiased estimates of the parameters. The issue of multicollinearity among the regressor variables is assessed using the variance inflation factor (VIF) and the corresponding tolerance indicator (TOL). Multicollinearity is considered present when VIF > 5 or TOL < 0.2. When assessing heteroscedasticity, a significance level of >0.05 indicates no heteroscedasticity, while <0.05 indicates the presence of heteroscedasticity.

As previously mentioned, the analysis is based on 15 European Union countries. The time period ranges from 2010 to 2022, and the data are secondary and

Table 3 The linear transformation of credit rating levels

Credit rating (Moody's)	Variable „Credit rating"
C	1
Ca	2
Caa3	3
Caa2	4
Caa1	5
B3	6
B2	7
B1	8
Ba3	9
Ba2	10
Ba1	11
Baa3	12
Baa2	13
Baa1	14
A3	15
A2	16
A1	17
Aa3	18
Aa2	19
Aa1	20
Aaa	21

Source: Authors' according to Afonso (2003).

10 Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

annual, sourced from the World Bank website, World Bank (2023). The large number of countries helps in identifying differences in key determinants of credit ratings. The dependent variable in the analysis is the credit rating. The credit rating scores are obtained from Moody's credit rating agency. Since credit ratings are qualitative variables assigned in letters, they will be transformed into numerical variables. Following the approach of Afonso (2003), Afonso et al. (2011), the following linear transformation is applied:

Given that the credit rating is the dependent variable, the other determinants are independent variables. The greatest impact on credit rating is expected from GDP growth, inflation rate, current account balance, central government debt, trade influence, and direct foreign investment. It will be interesting to observe the extent of the impact of the unemployment rate on the credit rating assessment.

4.3. The results of multiple regression analysis for EU countries

In the final section of the paper, the results obtained from the multiple regression analysis for the 15 mentioned countries will be analyzed. Multiple regression analysis was conducted using R Markdown program, displaying the original results from the program, while the interpretation of the results is provided below Table 4.

Table 4 The results of multiple regression analysis for EU countries

	Croatia	Austria	Belgium	Bulgaria	Cyprus	Czech Republic	France
Estimation of variables:							
GDP per capita	-2.3*[2]	0.32**	0.36*	7.64**	10.28***	4.33**	1.91**
VIF (TOL)	3.5 (0.45)	5.43 (0.18)	5.40 (0.15)	4.32 (0.23)	4.32 (0.23)	7.07 (0.14)	3.05 (0.33)
GDP growth (%)	-3.66**	0.38*	0.22**	3.548**	1.48**	-10.28	12.77**
VIF (TOL)	3.16 (0.32)	5.86 (0.17)	4.80 (0.10)	2.31 (0.43)	2.31 (0.43)	7.24 (0.14)	9.19 (0.11)
Inflation rate	-23.54**	-0.47**	/	-38.69	-19.03	-49.51	-56.29
VIF (TOL)	1.79 (0.56)	9.19 (0.11)	/	7.62 (0.13)	7.62 (0.13)	3.98 (0.25)	10.00 (0.09)
Current account balance	-18.17	-0.68	0.28	1.32**	1.65	-15.51	-21.51
VIF (TOL)	11.83 (0.08)	7.99 (0.13)	2.85 (0.41)	2.71 (0.37)	2.70 (0.37)	24.29 (0.04)	9.89 (0.10)
Trade (% GDP)	20.47**	-0.96**	/	-1.01	-5.86***	5.65*	9.22*
VIF (TOL)	24.59 (0.04)	9.28 (0.11)	/	2.29 (0.44)	2.29 (0.44)	6.23 (0.16)	3.43 (0.29)
FDI	2.65*	0.17	0.8 ***	1.89	-1.88	2.3 **	6.95 *
VIF (TOL)	1.80 (0.55)	3.02 (0.33)	4.12 (0.33)	2.24 (0.44)	6.05 (0.16)	1.24 (0.81)	5.00 (0.19)
Central government debt	-9.17	-0.03	/	-16.49 *	/	/	-24.53 *
VIF (TOL)	3.97 (0.25)	8.25 (0.12)	/	9.76 (0.10)	/	/	9.49 (0.11)
Unemployment rate	0.79	-0.27 *	-0.16 **	-6.46	-6.35 **	-15.6 **	-28.29
VIF (TOL)	5.22 (0.19)	8.19 (0.18)	2.29 (0.44)	6.05 (0.17)	9.76 (0.10)	26.06 (0.38)	15.11 (0.67)
Estimation of the variable "credit rating"	20.28	4.933	1.313	1.036	10.96	1.79	2.07
Coefficient of multiple determination	0.3963	0.000341	0.001976	0.7429	0.6864	0.7596	0.6745
The value of heteroskedasticity	0.1897	0.623	0.623	0.344	0.3097	0.3038	0.2368

2 ***,**, and * represent significance under 1%, 5% and 10% respectively

NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

11

Table 4 The results of multiple regression analysis for EU countries (continued)

	Greece	Ireland	Italy	Hungary	Portugal	Slovakia	Slovenia	Spain
Estimation of variables:								
GDP per capita	6.28 **	-2.38*	4.28**	7.86*	-3.05*	14.01 ***	-5.3*	-0.83**
VIF (TOL)	7.94 (0.26)	76.11 (0.01)	2.76 (0.36)	10.99 (0.09)	3.10 (0.32)	6.19 (0.16)	3.85 (0.26)	4.69 (0.21)
GDP growth (%)	1.39 **	3.89 *	-6.63 **	-17.24*	-2.86 *	-9.62 *	3.98 *	-3.89 **
VIF (TOL)	3.14 (0.32)	5.90 (0.17)	4.16 (0.24)	14.92 (0.07)	3.54 (0.28)	9.53 (0.10)	4.09 (0.25)	3.12 (0.32)
Inflation rate	-14.45 **	-25.17	-36.71	-30.77	-16.31	-35.36 **	-45.39	-23.58
VIF (TOL)	9.16 (0.11)	2.63 (0.38)	6.73 (0.14)	6.48 (0.16)	2.12 (0.47)	3.52 (0.28)	11.22 (0.09)	3.38 (0.29)
Current account balance	4.97**	12.32 **	-26.71 ***	-4.01 **	-14.46	-5.89 **	-23.12 **	-19.29 **
VIF (TOL)	8.90 (0.11)	38.02 (0.03)	21.11 (0.05)	6.10 (0.16)	18.15 (0.06)	20.99 (0.05)	16.61 (0.06)	19.20 (0.05)
Trade (% GDP)	-3.24**	19.05*	21.09*	10.99*	11.33**	5.5**	24.02**	21.7**
VIF (TOL)	12.81 (0.08)	113.14 (0.01)	16.49 (0.06)	10.21 (0.09)	23.26 (0.04)	12.10 (0.08)	21.86 (0.05)	26.17 (0.04)
FDI	0.69 *	-11.94	-5.13	-1.51 *	2.69 **	-1.23	-19.87 *	2.95 *
VIF (TOL)	14.41 (0.07)	15.05 (0.06)	2.61 (0.38)	2.85 (0.35)	2.24 (0.45)	14.92 (0.07)	14.49 (0.07)	1.99 (0.5)
Central government debt	-1.54 **	9.83 *	/	-15.91 **	/	-13.37	/	-9.73 ***
VIF (TOL)	11.45 (0.09)	8.04 (0.12)	/	11.16 (0.09)	/	8.26 (0.12)	/	8.56 (0.12)
Unemployment rate	-12.09 **	11.58 *	4.38 **	1.97 **	1.59 **	3.86 **	-9.75 **	0.84 **
VIF (TOL)	8.88 (0.11)	15.48 (0.06)	2.52 (0.39)	4.28 (0.23)	4.84 (0.21)	7.27 (0.14)	4.76 (0.21)	2.20 (0.45)
Estimation of the variable "credit rating"	1.726	-0.0196	4.026	18.33	24.09	1.807	25.71	25.73
Coefficient of multiple determination	0.7609	0.4538	0.6588	0.6168	0.3765	0.5493	0.8119	0.3969
The value of heteroskedasticity	0.1722	0.17627	0.8223	0.2089	0.2838	0.2518	0.2427	0.18966

Source: Authors.

4.4 Discussion of results

Considering that most of the results have corresponding VIF above 5, only the results that do not cause multicollinearity will be discussed. The level of significance shows us the significance level in the model. If the level is less than 0.1, the determinant is significant in the model, and vice versa. It can be noticed that the majority of results are significant in the model. In the case of inflation rate, we encounter large numbers, and for this determinant, the significance level is above 10%. For other results, there are isolated cases where the significance level is above 10%, except for the inflation rate where the same pattern is observed for almost every country. From the presented table, it is evident that GDP per capita has both positive and negative effects on the credit rating of countries. For Bulgaria, Cyprus, France, and Italy, a positive effect is observed, while for Croatia, Portugal, Slovenia, and Spain, a negative effect on the credit rating is seen. For other countries where the determinant causes multicollinearity, the effect is positive except for Ireland, thus it can be concluded that the determinant has a positive impact on the credit rating in the conducted research.

The percentage growth of GDP has a positive impact on 5 countries with a VIF less than 5 (Belgium, Bulgaria, Cyprus, Greece, and Slovenia). It has a negative impact on Croatia, Italy, Portugal, and Spain. For the rest of the countries, there are 3 positive and 3 negative impacts, thus it can be concluded that the positive impact of the GDP growth percentage determinant predominated. The inflation rate has a negative impact on all countries, but only 6 of them (Croatia, Czech Republic, Ireland, Portugal, Slovakia, and Spain) do not cause multicollinearity. For the inflation rate, it can be noticed that the estimation of variables has very high numbers, with 10 countries having estimates higher than -20.00. This result demonstrates how the strength of inflation rate growth has a strong negative impact on the credit rating. Similarly, the inflation rate is insignificant in most countries in the model, as the majority of countries have a significance level greater than 0.1 (10%).

The current account balance has a negative impact on 10 countries (Croatia, Austria, Czech Republic, France, Italy, Hungary, Portugal, Slovakia, Slovenia, and Spain). It has a positive impact on Belgium, Bulgaria, and Cyprus, and it only does not cause multicollinearity in these countries. It also has

12   Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

a positive impact on Greece and Ireland, but it causes multicollinearity in their cases. It can be concluded that in the given analysis, the current account balance has a negative impact on the credit rating. Trade as a percentage of GDP only does not cause multicollinearity in three countries, namely Bulgaria, Cyprus, and France (where it has a positive impact on the credit rating). However, in the case of other countries where it causes multicollinearity, it mostly has a positive impact. Only Austria and Greece show a negative impact, so it can be concluded that trade has a positive impact on the credit rating.

Foreign direct investment has a positive impact on the credit rating in 9 countries and a negative impact in 6 countries. It has a positive impact and does not cause multicollinearity in Croatia, Austria, Belgium, Bulgaria, Czech Republic, France, Portugal, and Spain. It also has a positive impact on Greece, but it causes multicollinearity. It can be concluded that foreign direct investment has a positive impact on the credit rating. The central government debt has a negative impact on all countries for which data is available, and it only does not cause multicollinearity in Croatia. The unemployment rate has a negative impact on 8 countries and a positive impact on 7 countries. It is unexpected to have a positive impact on such a large number of countries, namely Croatia, Ireland, Italy, Hungary, Portugal, Slovakia, and Spain. Austria, Bulgaria, Belgium, Cyprus, Czech Republic, France, Greece, and Slovenia are the countries where the unemployment rate has a negative impact. The determinant only does not cause multicollinearity in Belgium, Italy, and Spain.

The estimation of the variable "credit rating" is essential to formulate the general algebraic regression model. For Croatia, the general form of the regression model is as follows:

$$y_{\widehat{Credit\ ratng}} = 20{,}28 - 2{,}3X_{GDP\ per\ capita} - 3{,}66X_{GDP\ growth} - 23{,}54X_{inflation\ rate} + 2{,}65X_{FDI} - 9{,}17X_{CGD}$$

The inclusion of only determinants that do not cause multicollinearity in the equation is crucial. The determinants of the current account balance, trade, and the unemployment rate have been excluded. The coefficient of multiple determination for Croatia is 0.3963, indicating that 39.63% of the

total sum of squares of the dependent variable's deviations from its mean is explained by this model. The low value of this coefficient signifies poor model representativeness. Slovenia has the highest coefficient of multiple determination (0.8119), while Austria has the lowest (0.000341). Nine countries have a coefficient of multiple determination above 0.5, while six countries have values below 0.5. This suggests that the analysis is not very representative. In all countries, the heteroskedasticity value is greater than 0.05, indicating the absence of heteroskedasticity issues.

This is highly important as it fulfills one of the fundamental requirements of linear model hypotheses. From an economic perspective, the division between positive and negative influences on credit ratings is surprising. Expectations were that the results would be very logical and in line with theory, but the research revealed interesting findings. GDP per capita has a positive impact in 10 out of 15 countries, which aligns with theoretical interpretation. However, it is intriguing how it has a negative impact in Croatia, which I believe is not correct. The higher GDP per capita in Croatia and the higher spending seem to result in a better credit rating as assessed by credit rating agencies. Similar patterns are observed with the percentage of GDP growth. While 8 countries experience a positive impact, 7 experience a negative impact, which seems to be an excessive amount of negative influence on credit ratings. Of course, it is possible that rapid GDP growth in some places may decrease the credit rating, but theoretically, in Croatia, it should still have a positive impact.

If the GDP growth rate or any other determinant that has a positive correlation with changes in credit rating decreases, it logically follows that it will have a negative impact on the credit rating. In Croatia, this was not the case; according to the World Bank (2023), the GDP growth rate had a negative sign six times and a positive sign seven times from 2010 to 2022. Naturally, some determinants yielded entirely expected results; there is a very strong negative impact of the inflation rate, central government debt, and current account balance. Most countries

NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

13

have high government debt, and inflation is omnipresent, while the current account balance consistently incurs a deficit, so these results are entirely expected. Trade and foreign direct investment have a positive impact on credit ratings, as expected. The unemployment rate, as the last determinant examined, yielded surprising results. It has a positive impact on seven countries, likely due to a reduction in the unemployment rate. If the rate decreases, it is logical that it will have a positive impact on the credit rating.

5. Conclusion

Credit rating agencies have been part of the financial system for many years, and their relevance in the economy is increasingly prominent. Their role is particularly crucial in systems with developed market financing mechanisms, where credit rating agencies, as objective bodies issuing independent opinions on the creditworthiness of entities in the financial market, sell their ratings. Evaluating the risk of a particular country is quite complex and involves multiple components that need to be analyzed and considered before determining the final credit rating. There are numerous studies and econometric models aimed at identifying statistically significant determinants of credit ratings and how they affect country ratings. This study aimed to examine the impact of individual determinants on credit ratings, with expectations that the results would largely align with economically sensible assumptions. Based on the results of the multiple analyses conducted in this paper, the following conclusions can be drawn. The problem of multicollinearity emerged as the biggest obstacle in the analysis itself, thus many of the analysis results lack economic sense. Some of the most important determinants, such as GDP growth rate and GDP per capita, have a positive impact on at least 50% of the observed countries, indicating a positive influence on credit ratings. Limitations of the paper are related to missing dana for some countries for some years. While the expected results were observed, a significant number of countries showed illogical results for certain determinants.

Literature

Afonso, A. (2003). Understanding the determinants of sovereign debt ratings: Evidence for the two leading agencies. *Journal of Economics and Finance*, 27(1): 56-74.

Afonso, A., Gomes, P., Rother, P. (2011). Short- and long-run determinants of sovereign debt credit ratings. *International Journal of Finance and Economics,* 16(1): 1-15.

Bach, S. (2014). Financijska kriza i kreditni rejtinzi država. *Međunarodne studije,* XIV(3/4): 9-34.

Bajo, A., Penava, J. (2012). Kreditne rejting agencije i kreditni rejting države. *Riznica*, 6(1): 45-57.

Benmelech, E., Dlugosz, J. (2009). The Credit Rating Crisis. NBER Working Paper No. 15045.

Bhatia, A. (2002). Sovereign Credit Ratings Methodology: An Evaluation. IMF Working Paper WP/02/170. Available at: https://www.imf.org/external/pubs/ft/wp/2002/wp02170.pdf (8.7.2023).

Bićanić, B. (2020). Usporedba tržišta i aktivnosti kreditnih rejting agencija Sjedinjenih Američkih Država i Europske Unije, Diplomski rad, Zagreb: Ekonomski fakultet. Available at: https://repozitorij.efzg.unizg.hr/islandora/object/efzg:4772 (12.3.2023).

Cantor, R. M., Packer, F. (1996). Determinants and Impact of Sovereign Credit Ratings. *Economic Policy Review*, 2(2).

Corporate Finance Institute (2023). [Internet]. Available at: https://corporatefinanceinstitute.com/ (8.7.2023).

Croatian National Bank (2023). [Internet]. Available at: https://www.hnb.hr/ (1.6.2023).

Dittrich, F., (2007). The Credit Rating Industry:Competition and Regulation, Doctoral dissertation on Wirtschafts - und Sozialwissenschaftlichen Fakultät der Universität zu Köln. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=991821 (12.3.2023).

Elkhoury, M. (2008). Credit rating agencies and their potential impact on developing countries. United Nations conference on trade and development, Discussion papers, No.186.

Eurostat (2023). [Internet]. Available at: https://ec.europa.eu/eurostat (6.5.2023).

Fitch Ratings (2023). [Internet]. Available at: https://www.fitchratings.com/web/en/dynamic/about-us/about-us.jsp (6.5.2023).

14   Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

NOTITIA

Jošić, H., Mlinarić, D. (2018). Determinants of sovereign credit ratings: Evidence from CEE countries. *Ekonomski vjesnik,* 31(2): 319-335.

Katavić, M. (2015). Determinante kreditnog rejtinga zemalja Europske unije, Mater thesis, Faculty of Economics in Split. Available at: https://repozitorij.efst.unist.hr/islandora/object/efst:110/preview (25.3.2023).

Katz, J. G., Munoz, E. S., Stephanou, C. (2009). Credit Rating Agencies: No Easy Regulatory Solutions, The World Bank Group, Financial and Private Sector Development Vice Presidency, Crisis Response Policy Brief 8.

Kiff, J., Nowak, S., Schumacher, L. (2012). Are Rating Agencies Powerful? An Investigation into the Impact and Accuracy of Sovereign Ratings, IMF Working Paper WP/12/23.

Kuhner, C. (2001). Financial Rating Agencies: Are They Credible? - Insights into the Reporting Incentives of Rating Agencies in Times of Enhanced Risk. Available at SSRN: https://ssrn.com/abstract=262298 (6.5.2023).

Leko, V, Mates, N. (1993). *Rječnik bankarstva i financija.* Masmedia: Zagreb.

Mrvić, T., Rička, Ž., Mahmutović, H. (2016). Metodologija kreiranja rejting ocjena kreditnih rejting agencija i njhova ograničenja. Zenica: Ekonomski fakultet. Available at: https://hrcak.srce.hr/188874 (4.5.2023).

Moody's (2023). Moody's Corporation, [Internet]. Available at: https://www.moodys.com/Pages/atc.aspx (10.5.2023).

Pavković, A.,Vedriš, D. (2011). Redefiniranje uloge agencija za kreditni rejting u suvremenom financijskom sustavu. *Ekonomska misao i praksa,* 20(1): 225-250.

Pavković, A. (2016). Kreditne rejting agencije i financijsko posredovanje, Ekonomski fakultet Zagreb. Available at: http://web.efzg.hr/repec/financije/chapter1602.pdf (15.4.2023).

Reinhart, C. M. (2002). Default, Currency Crises, and Sovereign Credit Ratings. World Bank Economic Review, Oxford University Press, 16(2): 151-170.

Utzig, S. (2010). The Financial Crisis and the Regulation of Credit Rating Agencies: A European Banking Perspective, ADBI Working Paper No. 188. Available at SSRN: https://ssrn.com/abstract=1592834 (15.4.2023).

Standard&Poor's (2023). [Internet] Available at: https://www.spratings.com/about/who-we-are, (15.6.2023).

World Bank (2023). [Internet] Available at: https://www.worldbank.org/en/home (1.6.2023).

NOTITIA

Notitia - časopis za ekonomske, poslovne i društvene teme | prosinac 2023. | broj 9.
Notitia - journal for economic, business and social issues | december 2023 | number 9

15