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# EVOLUTION OF THE UKRAINIAN EUROBOND MARKET

*The Ukrainian Eurobond market will become a critically important source for raising funds in the post-war years. This requires a quantitative analytical study of the factors affecting this market, but such studies are practically non-existent today. The aim of the article is to design the periodization of the Ukrainian Eurobond market, reveal the regularities of its functioning and analyze the interrelation of the risk and return. There is an hypothesis, as: Eurobond return rate can be positively correlated with the systematic risk. Five main stages of development of the Ukrainian Eurobond market (including corporate issues) were found. The main factors were analyzed that influenced the volumes and the coupon rate at the placement of the 2001–2021 issues at each of the first four stages of market development. It is shown that the distribution of issuers of corporate Eurobonds by the total volume of issues is a classic distribution with the "fat tail" and the reason for this distribution were shown. Regression analysis methods were used to analyze the relationship between sovereign risk of Ukraine and coupon rate at the placement of the corporate Ukrainian Eurobonds. Two market "anomalous" in the Ukrainian Eurobond market were found out: periods with exceeding of average coupon rate at the placement of the government Ukrainian Eurobonds over the same rate of the*

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# ЕВОЛЮЦІЯ УКРАЇНСЬКОГО РИНКУ ЄВРОБОНДІВ

*Ринок українських євробондів стане критично важливим ресурсом для залучення коштів у повоєнні роки. Це потребує вивчення кількісними аналітичними методами факторів, які впливають на цей ринок, але такі дослідження на сьогодні практично відсутні. Мета статті – провести періодизацію ринку українських євробондів, виявити закономірності його функціонування та проаналізувати взаємозв'язок ризику і дохідності. Гіпотеза: між дохідністю євробондів і систематичним ризиком може існувати позитивна кореляційна залежність. Виявлено п'ять основних етапів розвитку ринку євробондів українських емітентів (включно з корпоративними випусками). Проаналізовано головні фактори, які впливали на обсяги та дохідність при розміщенні випусків у 2001–2021 рр. на кожному із перших чотирьох етапів розвитку ринку. Показано, що розподіл емітентів корпоративних євробондів за сумарним обсягом емісій є класичним розподілом з "довгим хвостом" і пояснено причини виникнення такого розподілу. Методами регресійного аналізу проаналізовано зв'язок суверенного ризику України і купонної дохідності при розміщенні корпоративних українських євробондів. Виявлено дві ринкових "аномалії" на ринку українських євробондів: існування періодів перевищення середньої купонної дохідності державних євробондів*

*corporate Ukrainian Eurobonds; decreesing of the sovereign risk statistically accompanied with increasing of the average coupon rate at the placement of the corporate Ukrainian Eurobonds. The first "anomaly" explained by the increased optimism of investors in the late 10s and early 20s. The second "anomaly" associated with the rapid expansion of the market and the attraction of relatively risky corporate issues. Using the example of "Vodafone Ukraine" Eurobonds, the influence was analyzed of the introduction of martial law and restructuring events on prices and yield to maturity of the Ukrainian corporate Eurobonds in 2021–2023 years*.

*Keywords*: Eurobonds, bonds, initial placement, issue volume, coupon rate, fat tail distribution, market anomalies, yield to maturity, sovereign risk, martial law.

*Україні над цим показником для корпоративних євробондів; зниження суверенного ризику в середньому супроводжувалось зростанням купонної дохідності при розміщенні корпоративних українських євробондів. Перша "аномалія" пояснена підвищеним оптимізмом інвесторів наприкінці 10-х – початку 20-х років. Друга пов'язана зі швидким розширенням ринку і залученням відносно ризикових корпоративних емісій. На прикладі євробондів "Vodafone Україна" досліджено вплив введення воєнного стану та реструктуризаційних подій на ціни і дохідність до погашення українських корпоративних єврооблігацій протягом 2021–2023 рр.*

*Ключові слова:* євробонди, єврооблігації, облігації, первинне розміщення, обсяг випуску, купонна ставка дохідності, розподіл з "довгим хвостом", ринкові аномалії, дохідність до погашення, суверенний ризик, воєнний стан.

**JEL Classification**: E44, G15, H81.

## Introduction

The insufficient capacity of the domestic borrowing market prompts Ukrainian issuers to look for opportunities to enter foreign markets. Eurobonds are one of the effective means of obtaining currency resources for both the state of Ukraine and private enterprises. The deepening of the European integration of the country will certainly lead to the expansion of the possibilities of issuing Eurobonds.

Mutual interest is evidenced, in particular, by the issue in 2019 of the first sovereign Eurobond in 15 years, which is denominated in euros (Ministry of Finance of Ukraine, 2019, June 13), after which there were several more issues of sovereign and corporate Eurobonds, but most of them were denominated in USD .

We can hope that Eurobonds will be used in increasing volumes for post-war reconstruction with the growth of Ukraine's sovereign credit rating. But, from the point of view of economic efficiency, the issuer must take into account the balance of the proposed return and the desired volume of issue. Determining this balance in emerging markets, to which Ukraine belongs, must take into account many specific local factors. However, these issues are hardly covered in the scientific literature.

The main regulatory document on the issuance of Eurobonds is Council Directive 89/2298/EEC of April 17, 1989 (Council Directive 89/298/EEC, 1989).

The history of the development and peculiarities of the Eurobond market are described in detail in the works of foreign scientists. Thus, the

books of Aquanno (2021), Bertocchi et al. (2014), Michie (2021) analyzed developed European Eurobond markets, but did not consider developing markets. The works of Motamen-Scobie et al. (1999) and O'Malley (2015) describe in detail the history of the development of Eurobond markets, which may be interesting from the point of view of comparing the early stages of the development of these markets with the relatively young Eurobond market of Ukraine. Choudhry et al. (2014) provide the theoretical foundations of Eurobond settlements and general information about the relevant markets, but little attention is paid to issues in developing countries.

Separate studies concern the peculiarities of Eurobond markets issued in developing countries. Ukraine may benefit from the experience of some African countries regarding the restructuring of Eurobonds (Bradlow, 2022; Smith, 2021). Pilbeam (2023, p. 309) in his monograph provides estimates of the average yield of Eurobonds in countries with a moderate level of risk (China, Poland, South Africa) and with a high level of risk (Brazil, Mexico), which show a direct relationship between yield and risk. In a thorough study by Fabozzi (2021), among other things, information is provided on Eurobonds issued in emerging markets (for example, in Argentina), as well as selected indicators of the Ukrainian debt market. A noteworthy book, a large part of which is devoted to the study of Russia's efforts to weaken Ukraine in 2013–2015 through pressure using government Eurobonds issued during the presidency of Yanukovych (Hess, 2023).

Therefore, the history of the Ukrainian Eurobond market is practically not reflected in foreign monographs.

The use of foreign experience requires taking into account the fact that Ukraine is a developing country – the so-called emerging market – and, therefore, an area of increased risk for investors. Starting in 2022, the main risk factor for new Eurobond issues is active hostilities, and Ukrainian risks have become too great for Eurobond investors even compared to other developing countries (OECD, 2023).

The history of the Ukrainian Eurobond market is described in articles by domestic authors (Galeshchuk, 2017; Kryvoruchko, 2009; Lyvdar & Panyush, 2017; Khayetska, 2011; Shuba, 2013). But most of these publications are descriptive in nature. Although financial markets are characterized by cyclicality, it should be noted that the possibility of using historical precedents for making financial decisions by future issuers and investors is significantly limited.

Works in which quantitative analytical methods were used to analyze the Ukrainian Eurobond market are still few, for example (Tkachuk, 2017). This paper examines the dynamics of five Ukrainian corporate Eurobonds and draws a conclusion regarding the positive relationship between the price and the sovereign rating. However, this conclusion is of a qualitative nature

and is made only on the basis of data for 2016–17. The yield dynamics of Ukrainian Eurobonds in 2022 on the eve of a full-scale invasion is considered in the work of Halapsus (2022). Fedevych and Zhukova (2023) analyzed the role of Eurobonds in the structure of the public debt of Ukraine. This publication draws an important conclusion regarding the impact of international interest rates and Ukraine's sovereign credit rating on the Ukrainian government Eurobond market. In all these works, there is no quantitative analysis of the relationship between the prices and yields of Ukrainian Eurobonds and economic and financial indicators.

A separate area of study of the Ukrainian Eurobond market is the measurement of Ukraine's debt security. Although this direction of research is beyond the scope of this work, in the relevant articles (Dakhnova, 2019; Cheberyako & Zakrushevskyi, 2023) an important indicator of the Ukrainian bond market (which includes the Eurobond market) is considered – the EMBI Index (Emerging Markets Bond Index) + Ukraine. However, the detailed dynamics of the index are not given and, accordingly, the articles do not contain a quantitative analysis of the relationship of this indicator with other financial and economic indicators.

Adjacent to these works is the article by Blishchuk (2022) – one of the few works that examines the prospects of the Ukrainian Eurobond market in the conditions of a full-scale war. The author of the article considers it possible to issue Eurobonds under the guarantee of the US government. However, the authors of this article consider such a scenario unlikely.

Therefore, the authors are not aware of any articles where quantitative analytical methods are used to investigate the relationship between the indicators of the Ukrainian Eurobond market and economic indicators. Qualitative judgments regarding the influence of the sovereign rating on the prices of Ukrainian Eurobonds have not yet been confirmed by quantitative analysis. A wider application of quantitative methods for a detailed study of Ukrainian Eurobonds and the identification of objective indicators for the analysis of this market should create the basis for returning the confidence of foreign investors in the post-war period, when Ukraine will have to borrow large funds for reconstruction.

The market of Ukrainian Eurobonds, despite its importance for the attraction of funds by both the state and corporations, has not been sufficiently studied by quantitative analytical methods. Qualitative observations, such as the positive relationship between return and sovereign risk, have not been verified by quantitative methods over long periods of time.

The aim of the article is to divide the history of the Ukrainian Eurobonds market into periods and to identify the patterns of functioning of this market; using analytical methods to reveal the influence of economic factors, including sovereign risk, on the return of Ukrainian Eurobonds. This

should provide additional means: for investors – for forecasting in this market, for issuers – for determining the optimal volumes and the proposed placement rate.

The hypothesis was put forward that for the Eurobond market of Ukraine there should be a positive correlation between risk and return ("high risk – high return " rule). The hypothesis was partially confirmed, as market "anomalies" were discovered, due to which this rule was violated in certain rather long periods.

The key research method is statistical analysis, which was used by the authors to process primary data on the issue and placement of bonds and identify statistical patterns.

The information base of the study was data from the issues of Ukrainian Eurobonds (both state and corporate), provided by the CBonds project (n. d.). Data on exchange rates of the National Bank of Ukraine (n. d.) were used for cross-currency calculations. Data on the dynamics of the S&P rating of Ukraine were also applied (Trading Economics, n. d.).

It should be noted that the lack of open sources of financial information is a significant obstacle to the quantitative analysis of Ukrainian Eurobonds. Specifically, quotations of sovereign, bank and corporate Eurobonds are available in open access on the Dragon Capital website (2023) only for the current date. However, there are no publicly available historical data on the quotations of Ukrainian Eurobonds.

In three sections of the main part of the article, a quantitative analytical study of the issuance and circulation of Ukrainian Eurobonds was conducted, on the basis of which a periodization of the development of the Ukrainian Eurobond market was developed; analysis of the dynamics of the volume and coupon rate of Ukrainian Eurobond issues and the influence of political and economic factors and sovereign risk on the coupon rate of Ukrainian Eurobonds; on the basis of this analysis, two types of long-term anomalies of the relationship between sovereign risk and coupon rate when placing Ukrainian Eurobonds on the market were identified. The influence of martial law and investment events on the dynamics of prices and yield to maturity was studied using the example of Vodafone Ukraine Eurobonds.

## 1. Market periodization of Ukrainian Eurobonds

The Eurobond market of Ukraine is, on the one hand, a source of attracting funds by issuers, and on the other, a high-yield, albeit risky asset for investors (Fabozzi, 2021, p. 378).

The legislation of Ukraine does not provide a specialized definition for Eurobonds, and therefore the general definition given in the Law of Ukraine "On Capital Markets and Organized Commodity Markets"

No. 3480-IV (2006) should be applied to government Eurobonds: "Bonds of the external state loan of Ukraine are securities, which are placed on international capital markets and confirm Ukraine's obligations to compensate the bearers of these bonds for their nominal value with the payment of income in accordance with the terms of placement of bonds". Therefore, from the point of view of this law, it is government bonds that are classic "Eurobonds", in contrast to issues of corporate issuers. It is desirable that the existing practice of issuing Eurobonds by enterprises and banks should be clearly recorded at the legislative level.

The law also enables placement of external local loan bonds. But so far we have only isolated examples of placement of Eurobonds by local authorities, represented by a single issuer – the Kyiv City Council (Smida, 2022, December 20). Although decentralization creates prerequisites for local communities to attract funds for development using Eurobonds (Synyak, 2018), this opportunity is still limited.

Since the introduction of martial law (February 24, 2022), no Ukrainian Eurobonds have been issued, which has significantly reduced the ability of enterprises to raise funds. Therefore, the quantitative analysis of the market of Ukrainian Eurobonds in this study was carried out for the issues of 2000–2021. Summary data on the issues of Ukrainian Eurobonds for this period are shown in the *Table1*.

*Table 1*

Number of Eurobond issues, 2000–2021, units

| Issue | Types by issuer | | | | | |
|---|---|---|---|---|---|---|
| | state | | corporate | | in total | |
| | Currency | | | | | |
| | *USD* | *EUR* | *USD* | *EUR* | *USD* | *EUR* |
| In total, *including:* | 42 | 5 | 124 | 4 | 166 | 9 |
| with a fixed rate | 40 | 5 | 107 | 4 | 147 | 9 |
| with a floating rate | 2 | 0 | 17 | 0 | 19 | 0 |

*Source:* compiled by the authors for CBonds (n. d.).

According to the *Table 1*, corporate issues of Eurobonds dominate in terms of number (but, as will be shown below, not in terms of volumes). Consequently, business in Ukraine actively used international financial resources. There is also a significant excess of US dollar-denominated issues. This indicates a focus primarily on global institutional investors, but may also indicate a certain underestimation of the resource of potential buyers of bonds from the European Union. This additional resource will have to be taken into account when planning future issues of Ukrainian Eurobonds.

An analysis of the number of issuers by volume of corporate Eurobond issues in 2000–2021 is shown in *Figure 1*, where the Pareto chart shows the cumulative number of corporate emitters whose total emissions exceed certain threshold values. The minimum threshold value of the volume of emissions is $V_{min}$ = USD 50 million.

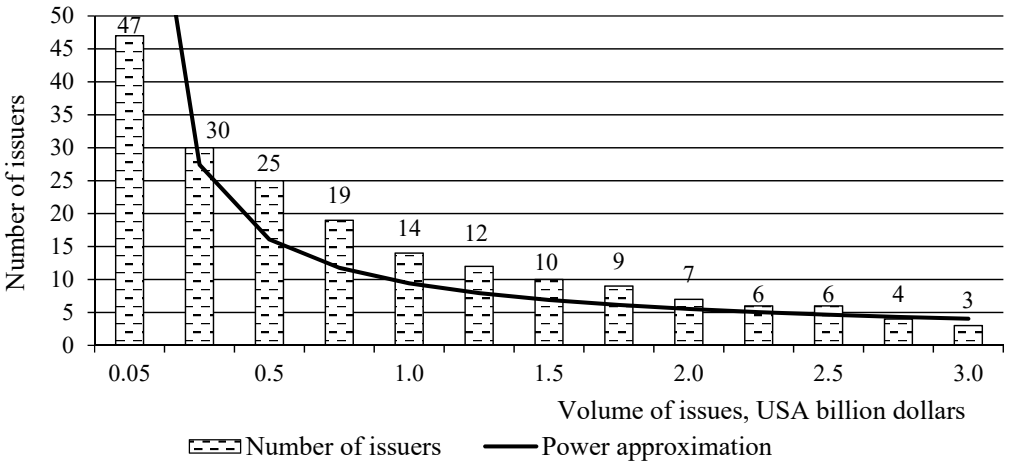


Figure 1. Pareto chart of the cumulative number of issuers of corporate Ukrainian Eurobonds with issuance dates in 2000–2021 and power correlation approximation*

* Issues denominated in EUR, converted into USD at NBU cross rates (n. d.).

*Source:* compiled by the authors for CBonds (n. d.).

Along with the actual data, the diagram also shows a power-law approximation of the cumulative number of issuers (E) depending on the threshold total volume of issues (V) (Arnold, 2015):

$$E = C \cdot (V/ V_0)^{(-A)}, \quad (1)$$

where $V \geq V_{min}$, $V_{min}$ = USD 50 million, V0 = USD 1000 million.

The optimal selection of dimensionless parameters of power approximation gives: C = 9.4, A = 0.77.

The value of the exponent in the approximating dependence turned out to be close to –1, as in the classic Zipf law (Saichev et al., 2010). That is, the distribution of issuers is a classic distribution with a "fat tail", which is often found in economics and finance (Mandelbrot, 2008). Similar to the distribution of firms by size, the distribution of issuers by the total volume of issues can be explained by the following mechanism: issuers with a successful history of servicing payments on Eurobonds get better chances to place each subsequent issue, even with an increased volume.

The success of individual issuers paves the way for successful borrowing by other numerous issuers on the Eurobond market. The evolution of this market can be traced in *Figure 2*, which shows the dynamics of Eurobond issues by year.

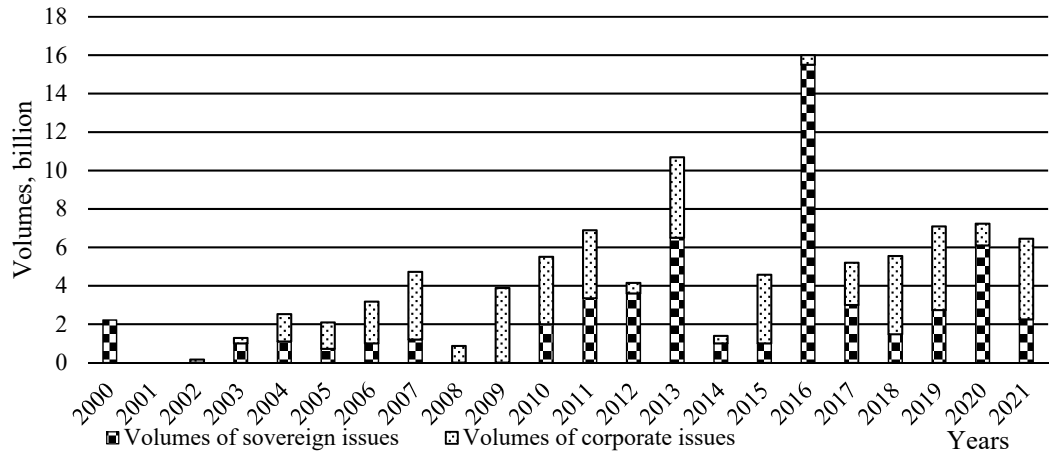


Figure 2. Dynamics of sovereign and corporate Ukrainian Eurobond issues in 2000–2021, USD*

*Source:* compiled by the authors for CBonds (n. d.).

* Issues denominated in EUS, converted into USD at NBU cross rates (n. d.).

Data analysis (see *Figure 2*) enabled us to develop a periodization of the development of the Ukrainian Eurobond market and to distinguish five characteristic periods:

1. *Starting: 2000–2001.* During this period, the first government Eurobonds were issued with relatively small volumes.

2. *Initial growth: 2002–2007.* With stable volumes of government issues, volumes of corporate issues gradually increased. For example, in 2003, the volume of corporate issues was 22% of the total, and in 2007 it grew to 75%. This trend coincided with the global trend, where in emerging markets, the volume of corporate borrowing through Eurobonds grew faster than sovereign issuance (Fabozzi, 2021, p. 357).

3. *Financial Crisis and subsequent growth: 2008–2013.* During this period, on the contrary, corporate placements were at an almost constant level. And the state steadily increased the volume of Eurobond issues. If in 2010 the volume of state issues was 36% of the total, then in 2013 it grew to 61%.

4. *Recovery after the start of Russian armed aggression: 2014–2021.* The main event of this period is the approval in 2016 of the restructuring of Ukrainian government Eurobonds into warrants that are tied to GDP (Ministry of Finance of Ukraine, 2015, October 27). After that, the volume of both government and corporate Eurobond issues fluctuated, but the total volume of borrowing slowly increased. It should be noted that in 2017–2019 volumes grew mainly due to corporate issues, which can be explained by the focus of the Ministry of Finance of Ukraine on attracting official (longer-term and "cheap") financing from the IMF, EIB and other international financial institutions.

5. *Stabilization of the secondary market after a full-scale invasion: 2022–2023.* There were no Eurobond issues during this period. But on the

secondary market, after the initial shock, transactions with Ukrainian Eurobonds resumed (CBonds, n. d.).

Further, the specified periodization will be used for a more detailed analysis.

## 2. The relation between risk and coupon rate of Ukrainian Eurobonds and market "anomalies"

In developed markets, the yield on government short-term instruments with fixed income is considered risk-free, that is, all bonds have risk and, accordingly, should have a higher yield (Fabozzi, 2021, p. 1199). However, in developing markets, this rule is not always followed. In these markets, for quite a long time, there may be "anomalies" in the returns of financial instruments, which are not characteristic of developed markets (Kang et al., 2019).

The Ukrainian Eurobond market demonstrated both compliance with the specified rule and "anomalies" during certain time intervals. These intervals can be found in *Figure 3*. Thus, during 2003–2017, the annual average coupon rate at placement of corporate Ukrainian Eurobonds exceeded the same rate of state Eurobonds, which corresponds to general trends.

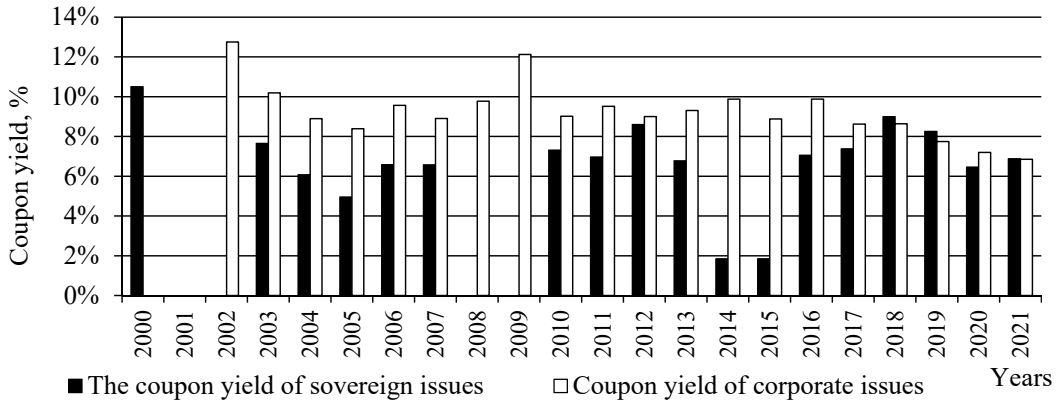


Figure 3. Dynamics of the average coupon rate at placement of sovereign and corporate Ukrainian Eurobonds in 2000–2021, %

*Source*: compiled by the authors for CBonds (n. d.).

Therefore, the expectation regarding the return of government financial instruments, the risk of which has only a systematic sovereign component, was confirmed, and therefore they should be less profitable than corporate bonds, which are characterized by additional individual risk.

The periodization of the market of Ukrainian Eurobonds developed by us based on the analysis of the volume of issues was also useful for the analysis of returns on this market.

It can be seen that the entire period of Initial Growth (2002–2007) the coupon rate of corporate Eurobonds "tracked" the coupon rate of government Eurobonds. The calculated correlation coefficient of these two indicators is

0.92. It can be assumed that investors, observing the stable growth of the financial market during this period, agreed to the issuers' proposed return of corporate Eurobonds, based on the corresponding return of state Eurobonds.

However, at the beginning of the next period of the Financial Crisis and subsequent growth (2008–2009), investors' confidence in the ability to predict the coupon rate of Ukrainian corporate Eurobonds based on the coupon rate of government Eurobonds was shaken. Investors began to approach the assessment of the proposed rate of corporate Eurobonds more meticulously and individually. However, throughout the period 2008–2013, the coupon rate of corporate Eurobonds remained higher than the coupon rate of government Eurobonds.

During the period of Recovery after the start of Russian armed aggression with the completion of the restructuring of government Eurobonds, their average coupon rate exceeded the average coupon rate of corporate issues for several years: in 2018 – by 0.36%, in 2019 – by 0.50% and in 2021 – by 0.02%. This "anomaly" of returns has its own explanation. The approximate constancy of annual volumes of government issues with their relatively high return allows us to assume that investors had certain limits for investing in Ukrainian government Eurobonds, and even an increase in their returns could not force investors to violate these limits. However, at the same time, investors had the opportunity to fill riskier portfolio quotas due to rising volumes of corporate issues, even despite the gradual decline in their returns. So, a certain "boom" took place in this segment of the borrowing market at the end of the 10s and beginning of the 20s.

Along with the noted temporary "anomalous" relation between coupon rate of government and corporate Eurobonds, the analysis revealed another – more long-term – "anomaly" regarding the relation between systematic risk and coupon rate of corporate Eurobonds.

To identify and analyze this anomaly, it is necessary to introduce a measure of the systematic risk component. Generally accepted indicators of systematic (sovereign) risk are the sovereign ratings of Ukraine, determined by the rating agencies Moody's (since 1998), S&P and Fitch (since 2001) (Trading Economics, n. d.).

In order to use quantitative methods of analysis, it was necessary to move from an ordinal scale (which is each sovereign rating with literal values) to a quantitative scale (measure). For this, the authors assigned numerical ranks to the sovereign ratings on a scale from 1 to 9 (*Table 2*). For each ordinal rating scale (Moody's, S&P, and Fitch), the best rating received by Ukraine during 2000–2023 is assigned a rank of 9, and the worst is assigned a rank of 1. Intermediate the ratings received consecutive numerical ranks with a constant step (different for different agencies). At the same time, some ratings received incomplete ranks, as the number of different rating values in the specified period depended on the rating agency.

*Table 2*

Ranks assigned by rating agencies

| S&P rating | *BB–* | *B+* | *B* | *B–* | *CCC+* | *CCC* | *CCC–* | *CC* | *SD* |
|---|---|---|---|---|---|---|---|---|---|
| S&P rank | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| *Moody's* rating | *B*1 | *B*2 | *B*3 | *Caa*1 | *Caa*2 | *Caa*3 | *Ca* | | |
| *Moody's* rank | 9 | 7.7 | 6.3 | 5 | 3.7 | 2.3 | 1 | | |
| *Fitch* rating | *BB–* | *B+* | *B* | *B–* | *CCC* | *CC* | *C* | *RD* | |
| *Fitch* rank | 9 | 7.9 | 6.7 | 5.6 | 4.4 | 3.3 | 2.1 | 1 | |

*Source:* developed by authors.

As you can see in *Figure 4*, the ranks of the ratings of different agencies correlate well enough with each other.

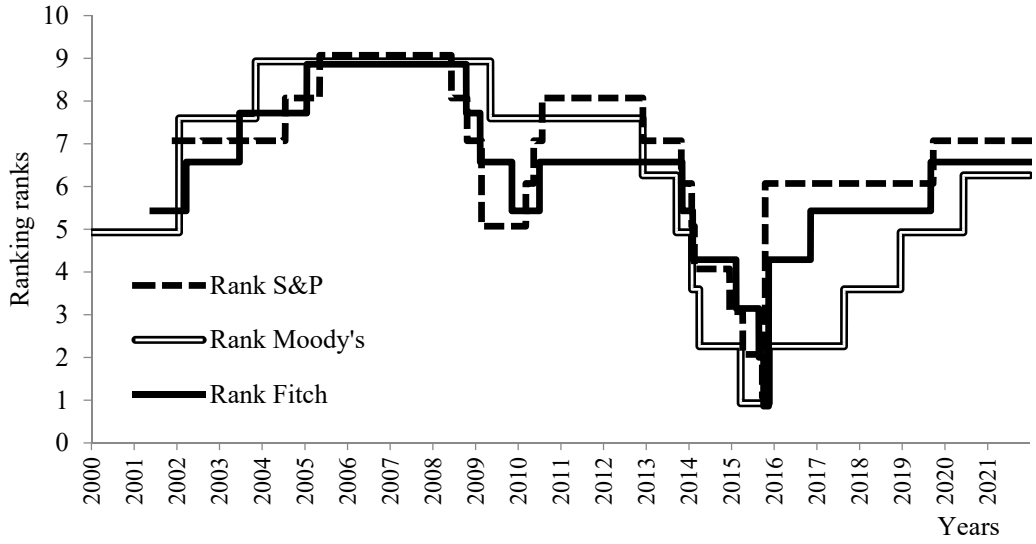


Figure 4. Dynamics of Ukraine's sovereign ratings in 2000–2021

*Source:* compiled by the authors based on Trading Economics (n. d.). Rankings of Moody's, S&P, and Fitch sovereign ratings are given in accordance with *Table 2.*

For each value of the S&P sovereign rating, stability periods are defined (horizontal links, see *Figure 4*). In total, there were 18 such periods for 2000–2021. For all issues of corporate Eurobonds that took place during any stability period for each fixed rating, the number of issues and average coupon rates at placement for all such issues were calculated. These data are shown in *Figure 5*.

Corresponding linear regressions, presented below, were also calculated.

Regression of the number of issues of corporate Eurobonds ($N_{corp}$) on the rank of the S&P sovereign rating ($Rang_{S\&P}$): $N_{corp} = -8.8 + 4.6 \cdot Rang_{S\&P}$.

Regression of average coupon rate at placement ($r_q$) on S&P sovereign rating rank ($Rang_{S\&P}$): $r_q = 8.2\% + 0.18\% \cdot Rang_{S\&P}$.


Figure 5. Dependence of the number of issues and the average coupon rate at placement of corporate Eurobonds on the rank of the S&P rating of Ukraine for the period 2000–2021

*Source:* compiled by the authors for CBonds (n. d.).

As the research results showed (see *Figure 5*), the dependence of the number of corporate Eurobond issues on Ukraine's sovereign rating turned out to be positive, which corresponds to general market trends: when the issuer's risks are reduced, investor demand grows and, accordingly, a larger number of corporate issuers initiate issues to satisfy this demand.

But the dependence of the average coupon rate at placement on the sovereign rating also turned out to be positive (that is, on average, a decrease in sovereign risks was accompanied by an increase in the coupon rate). Such a phenomenon may seem paradoxical and is hardly observed in developed markets, but it has an explanation. When new issuers of Eurobonds appear on the market, investors should take into account not only the sovereign rating of Ukraine, but also the individual risks inherent in these issuers. When issuers with relatively low risks cannot meet demand, investors agree to buy less reliable Eurobonds, but demand a higher return at placement. Therefore, the expansion of the market leads simultaneously to an increase in the number of issues and to an increase in the average placement rate. It should be noted that such dynamics are characteristic primarily of periods of optimism for both investors and issuers. These periods are typical for the post-crisis stages of the development of the Eurobond market with relatively high sovereign ratings. But such periods were also relatively long-lasting, since the crisis periods (2008–2009 and 2014–2015) constituted a smaller part of the existence of the Ukrainian Eurobond market, when issues took place on it.

### 3. The impact of political, economic and military events on the price and coupon rate of Ukrainian Eurobonds

Since the beginning of the full-scale invasion of Russian troops into Ukraine, no new issues of Eurobonds have taken place due to a significant increase in risks. However, the existing issues continued to be quoted and traded, although they had lost significantly in value at the beginning of the invasion. From the point of view of investment theory, this period can be used to study the adaptation of the security market to significant shocks.

For a more detailed review, the issue of corporate Eurobonds "Vodafone Ukraine", ISIN code XS2114201622, has been selected with the placement date of February 3, 2020, the maturity date of February 11, 2025, denominated in USD with a coupon rate at placement of 6.2%. This issue demonstrated quite typical dynamics for the Ukrainian Eurobond market, as the period of its rotation began long before the start of the full-scale invasion and ends several years after this event.

Let's consider how political and economic factors in Ukraine affected the nature of price dynamics and yield to maturity of Eurobonds of this issue (*Figure 6*).

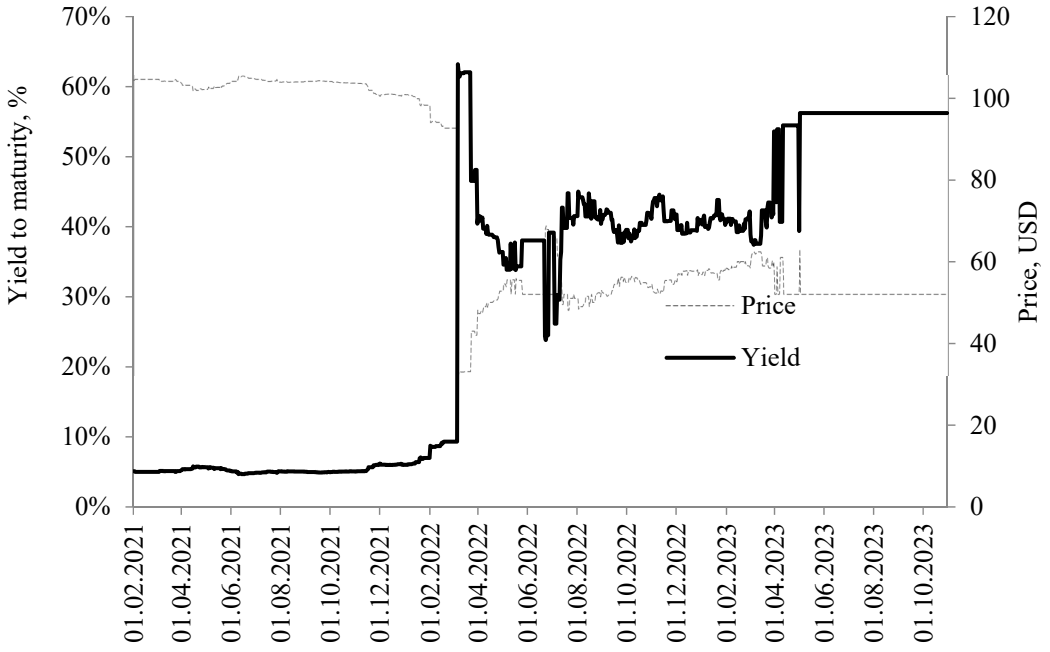


Figure 6. Bond price and yield to maturity of corporate Eurobonds "Vodafone Ukraine" (XS2114201622) for January 2021 – September 2023

*Source:* compiled by the authors for CBonds (n. d.).

In early 2022, Eurobond prices began to decline due to the risk of a full-scale Russian invasion. In February, the decline accelerated (UBN, 2022, January 20).

After the start of the full-scale invasion, the price of Vodafone Eurobonds fell only on March 7, 2022. The reason was a certain shock of investors and their hopes that a return to "business as usual" was possible.

The next period was characterized by a partial recovery of investor confidence until the end of April 2022, and then there was a period of price volatility that lasted until March 31, 2023.

Against the background of this volatility, at the end of June there were significant "excesses" in price increases and yield-to-maturity reductions, due to investors' optimism in connection with the announcement of a speech by the CEO of "Vodafone Ukraine" at the International Conference on the Reconstruction of Ukraine in 2022 (Ustinova, 2022, 26 July). It should be noted that this was a short-term event, moreover, related to Eurobonds of one issuer, which had no impact on the market in general.

Another important event at the beginning of August 2022 was the signing of an agreement with the majority of holders of sovereign Ukrainian Eurobonds on changes to the terms of issuance of all bonds of external state loans, state derivatives of Ukraine and Eurobonds guaranteed by the state (Ministry of Finance of Ukraine, 2022, August 10). Investors agreed that the term of circulation of Eurobonds has been extended for 2 years ("the grace period"), and the coupon payments must still be deferred for this period. This agreement, although it predicted a worsening of the financial result for investors, nevertheless increased their confidence in the ability of Ukraine to service its debt obligations. This indirectly reduced the risk assessments of corporate Ukrainian Eurobonds as well, including those issued by Vodafone, and slightly increased their value, which can be seen in *Figure 6*.

One of the risk factors of Ukrainian Eurobonds is the "thin market" – a situation where, in conditions of low liquidity, even a small change in the activity of both buyers and sellers can significantly affect prices in the short term. This is exactly the situation that took place at the end of March – beginning of April 2023, when the price of Eurobonds fell from 60% to 52% of the nominal value in one day, rose to 59% of the nominal value in the next three days, followed by a repeated daily drop to 52% of the nominal value and then by growth to 61% of the nominal three days later. Such a situation can serve as a typical example of the combined interaction of a low sovereign rating and low liquidity of the issue.

The obtained results can be used by issuers of Eurobonds, as well as potential investors in these financial instruments.

In the future, the authors plan to conduct a more detailed analysis of price fluctuations of Ukrainian Eurobonds on the array of all issuers in order to isolate the role of systematic (market) factors.

## Conclusions

Based on the analysis results of the issue dynamic volumes and the coupon rate upon placement, five main stages of the Ukrainian Eurobond market development for the period 2000–2023 were identified: initial (2000–2001);

initial growth (2002–2007); financial crisis and subsequent growth (2008–2013); recovery after the beginning of Russian armed aggression (2014–2021); stabilization of the secondary market after a full-scale invasion (2022–2023).

Various political and economic events in Ukraine at different stages of market development significantly affect the placement potential and coupon rate of Ukrainian Eurobonds. In particular, the financial crises led to a sharp drop in the demand of foreign investors for Ukrainian Eurobonds, and in the conditions of relative stability of the annual volumes of government issues, when investors get the opportunity to fill riskier portfolio quotas due to the growing volumes of corporate issues, even despite the gradual decrease in their profitability, there was a noticeable revitalization

An analysis of the factors that created an "abnormal" excess of the average coupon rate when placed for government Eurobonds over this indicator of corporate Eurobonds of Ukraine revealed that such an excess, which took place in 2018, 2019 and 2021, can be explained by the increase in the portfolio quotas of investment funds for corporate issues of Eurobonds in developing markets.

On the other hand, the sovereign risk factor of Ukraine also affects the coupon rate at placement of corporate Ukrainian Eurobonds. The reason for the coexistence of an "abnormally" high average coupon rate at placement of corporate Ukrainian Eurobonds and a relatively low sovereign risk is the rapid growth of demand for corporate Eurobond issues in the "thin market", which causes an increase in the number of issues along with an increase in the average coupon rate.

The introduction of martial law and restructuring events also affected the prices of Ukrainian Eurobonds, which is clearly visible on the example of Vodafone Ukraine Eurobonds: the combined interaction of a low sovereign rating and low liquidity of the issue can lead to daily price fluctuations of up to 10% of the face value.

Prospects for further research consist in quantifying the role of systematic (market) factors in the price change of Ukrainian Eurobonds using primary data on price dynamics of the entire range of issues.

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