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ANALYSIS OF FACTORS AFFECTING THE YIELD OF BONDS AS AN INVESTMENT INSTRUMENT

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Abstract:

In this state, the importance of bonds and the use of financial resources, the formation of the market price of bonds and factors, the investor's profitability and the market have been studied. A detailed scientific study of the risk associated with sovereign credit ratings, inflation, interest rates, bond repayment terms and exchange rates as basic factors, the investor's expected return on the bond. Information in the state is analyzed and analyzed on primary bonds, issued Eurobonds to Uzbekistan, Singapore and Australia and international stock markets.

Keywords: Bond, portfolio investment, securities, bond yield, coupon rate, yield to maturity, inflation, interest rates, sovereign credit ratings

INTRODUCTION

In recent years, the state and large companies have given priority to attracting financing through bonds, which are considered an alternative financial instrument to traditional bank loans.

A bond is a contract entered into for a specified period of time, under which the borrower represents a security obliging the bondholders to pay interest and principal at the end of the term. Bonds are primarily issued by sovereign governments, municipalities and companies in need of long-term debt capital to finance various investment projects, infrastructure development projects and government budget deficits. For investors, government and corporate bonds are a low-risk financial instrument for diversifying their investment portfolio. Because bonds are less risky than stocks, their expected return is also lower than the expected return of stocks. However, for investors who want stable income, bonds are more attractive than stocks. The most important aspect that investors pay attention to when investing in bonds available in the market is the return expected from them and the factors influencing it. A correct assessment of the factors influencing the yield of bonds on the market allows you to choose an investment instrument with a stable income.

LITERATURE REVIEW. Stock markets provide a wide range of investment opportunities, including stocks, bonds, hedge funds and other assets. Participation in these markets can help people understand the variety of investment instruments and choose the most suitable ones for their purposes.[7]

Because of the inverse relationship between bond price and yield and default risk, the market price of bonds changes dynamically over time.[1]

One of the main factors influencing bond yields is the credit rating. Because AAA- rated bonds are less risky than BBB- rated bonds , the expected rate of return is lower over the long term. The difference between expected yields on bonds with different ratings changes dynamically over time. Research has shown that the expected return on bonds with AAA and BBB credit ratings differed by more than 1%. During the financial crisis of 2007-2008, this difference reached 3.8%. The main reason for this is that in times of uncertainty in financial markets, investors prefer to invest in low-risk assets. This further reduced the attractiveness of low-rated bonds during the crisis.[2]

Three elements influence the market value of bonds. These are: the amount and duration of expected cash flows, cash flow risks, expected return on investment. The first two factors are the characteristics of the asset, and the third factor is the expected rate of return required to purchase or hold the security.[3]

METHODOLOGY . Once a bond is issued for sale, the market yield (R_e) of the bond is determined by direct and indirect factors such as the bond's maturity, coupon rate, issuer's credit rating and various levels of risk in the economy. This is the main element that determines whether the market value of a bond will be higher or lower than its face price.

The market value (intrinsic value) of a bond refers to the initial investment cost at which the bond could be purchased or sold on the open market.

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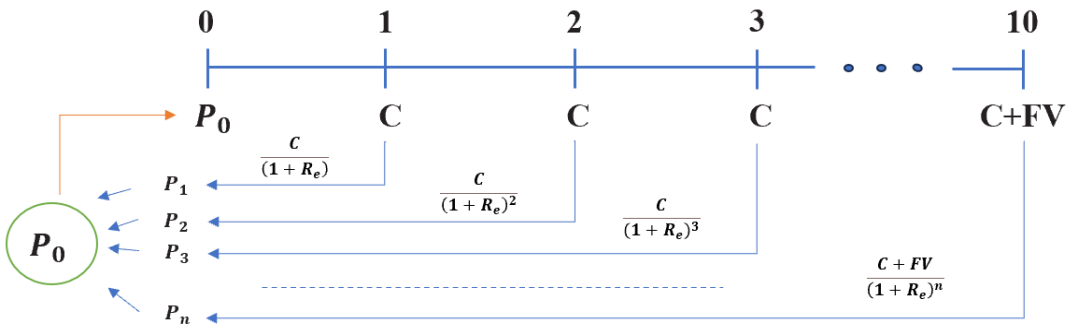

$$P_0 = P_1 + P_2 + P_3 + \cdots + P_n$$

The market value of a bond can be interpreted as the sum of the present values of the bond's future cash flows.

Given the bond's face value (**FV**), maturity (**n**), coupon rate (**C%**) and market yield (**YTM** or R_e), we can find the bond's intrinsic value (P_0), that is, the market value, we can find using the following formula :

$$P_0 = \frac{C}{R_e} * \left(1 - \frac{1}{(1+R_e)^n}\right) + \frac{FV}{(1+R_e)^n}$$

The primary goal of bond investors is naturally to earn some form of income. The current bond yield (**CY**) can be found using the following formula.[10]

$$\text{CY} = \frac{\text{Annual coupon payments}}{\text{Current value of the bond on the market}}$$

A bond's current yield varies depending on changes in the bond's current market price. If the market price of a bond exceeds its face value, the current yield will be less than the coupon rate. Conversely, if the market price falls below par, the current yield will be higher than the coupon rate. That is, the rate of return and the market price of the bond move in the opposite direction. For an investor, the current yield of a bond is the main factor that ensures its attractiveness.

For investors, a bond's yield to maturity (**YTM** or R_e) is more important than its current yield (**CY**). Because large institutional investors, having bought a bond, prefer to hold it until maturity. **YTM** orR_e represents the expected annual yield of bonds. For determiningR_e a more complex formula is used than for determining current yield (**CY**).[9]

$$R_e = \frac{C + \frac{Fv - P_0}{n * m}}{\frac{FV + P_0}{2}}$$

m in this formula is the number of annual coupon payments.

As we mentioned above, the market price of a bond can be sold below or above the nominal price under the influence of direct or indirect factors.

Based on this feature, bonds can be divided into 3 types.

- Premium bond
- Bond with par value
- Bond at a discount

A premium bond is a bond whose market value exceeds its face value. This situation occurred when the bond's yield rate on the market was less than the coupon interest. That is $P_0 > FV,\ C\% > R_e$

A par value bond is a bond whose market value is equal to its face value. This situation occurred when the bond's yield on the market was equal to the coupon interest. That is $P_0 = FV,\ C\% = R_e$

A discount bond is a bond whose market value is less than its face value. This situation occurred when the bond's yield on the market exceeded the coupon percentage. That is $P_0 < FV,\ C\% < R_e$

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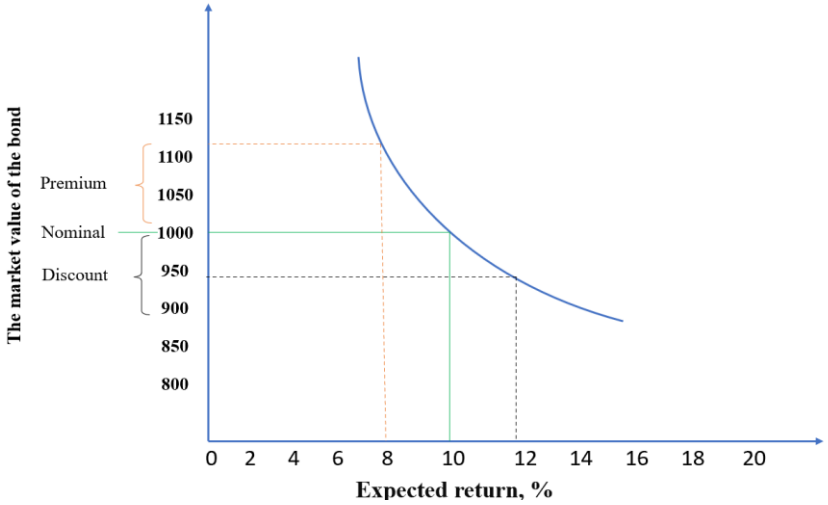

Figure 1. A graph showing the inverse relationship between the market value of a bond and its expected return.

In general, the lower the expected return on a bond, that is, the market rate of return, the higher the bond's market value, and conversely, if investors expect a higher interest rate in the market, the lower the bond's market price relative to its face value. In other words, it has an inverse relationship with the market price of the bond and its yield.

Whether a bond is sold at a premium, par, or discount, as the bond's maturity date approaches, the market value of the bond approaches its par value.

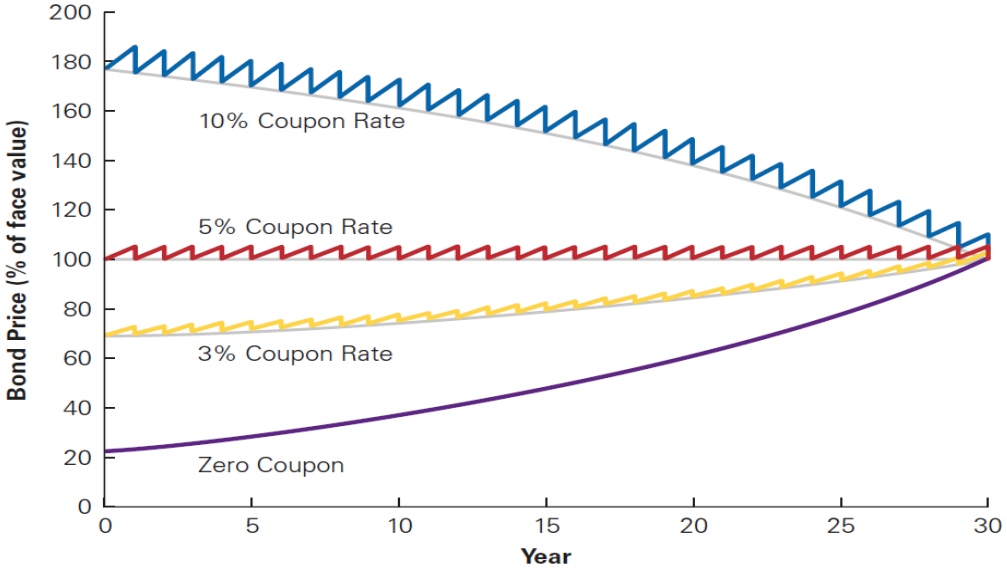

Figure 2. Dynamics of changes in the market price of bonds of premium, par and discount value until maturity.[5]

As shown in the figure above, the price of a coupon bond fluctuates in a sawtooth pattern with each coupon payment. The value of a coupon bond increases as the next coupon payment approaches and decreases after it is paid. This fluctuation occurs even if the bond's yield to maturity does not change.

ANALYSIS AND RESULTS

Investing in bonds provides a relatively stable income stream and serves as a way to diversify your investment portfolio. Bond cash flow analysis is necessary for investors to evaluate the potential return and risk of a bond and determine its attractiveness compared to other alternatives available in the market. One of the main aspects that makes a bond attractive to investors is its yield.

A bond's yield is the rate of return an investor expects to receive each year until maturity. For an investor buying a bond, the bond's yield is the total return that takes into account the price of the bond, the remaining interest payments, and the face value of the bond to maturity. For bond issuers, bond yields reflect the annual cost of borrowing by issuing new bonds. For

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example, if the market yield on 10-year Uzbekistan bonds today is 7.125%, the government of Uzbekistan decides to increase debt by issuing new 10-year bonds, then the cost of servicing the bonds over the next 10 years will average 7.125%.

When issuing a bond, investors first purchase the bonds in the "primary market." The initial price an investor pays to purchase a bond depends on a number of factors, including the coupon rate, the maturity date of the bond, the credit rating of the issuer, and the price of similar bonds issued in the market. Based on the collected data, the expected level of income from the bond is estimated. After selling a bond in the primary market, investors can sell the bond to other investors in the secondary market, and its price and yield may change depending on market conditions.

In the secondary market, the prices at which investors buy and sell bonds move in the opposite direction of expected returns.

The formation of the market price of bonds, that is, the formation of the rate of return, is influenced by many factors. Some of these factors are common to all types of bonds, while others affect only one type of bond.

Bond maturity. The maturity of bonds is an important factor affecting the rate of return and the price of a bond in the market. Investors expect higher returns from long-term bonds than from short-term bonds. In this case, the issuer must pay higher interest payments on long-term bonds than on short-term bonds. For example, in February 2019, Uzbekistan placed 5- and 10-year bonds on the London Stock Exchange. The 5-year bonds were issued with a coupon rate of 4.75%, and the 10-year bonds were issued with a coupon rate of 5.375%. In other words, they pay higher interest on long-term bonds than on short-term bonds.

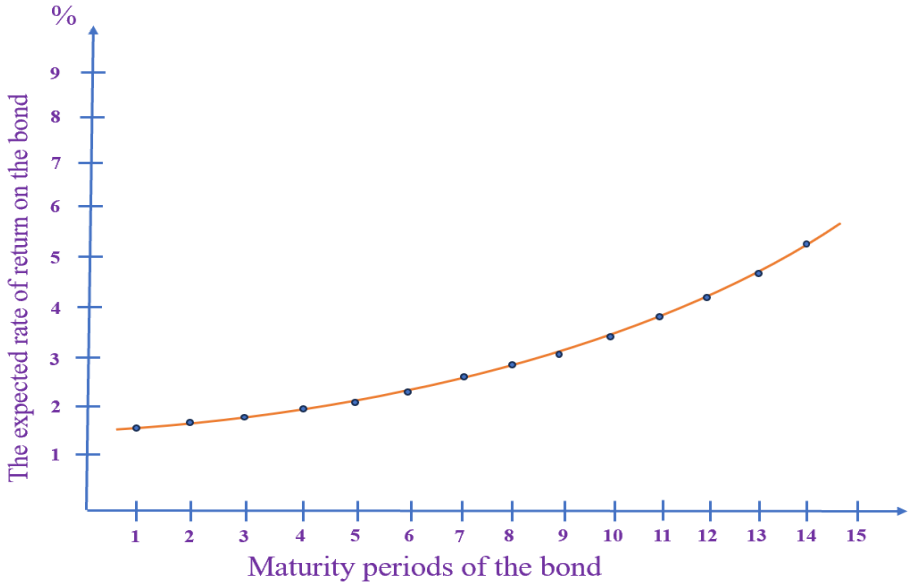

Figure 3. Yield curve representing the relationship between bond maturity and yield [9]

A yield curve is a line in graphical form that represents the yield on a bond at various time intervals until the bond matures. To create a yield curve graph, the yield rates for different periods until a bond matures are combined. That is, along the X- axis of the coordinate plane there are different time intervals until the bond is redeemed, and along the Y- axis the yield of the bond is plotted.

As you can see from the graph above, the longer the bond's maturity, the higher the yield. The shorter the depreciation period, the lower the rate of return.

Issuer Credit Rating: Credit ratings are a key factor in determining bond market returns. A bond's credit rating reflects the issuer's creditworthiness, that is, the likelihood that the issuer will not fulfill its financial obligations to creditors. Credit ratings are assigned by independent rating agencies such as Standard & Poor's (S&P), Moody's Investors Service and Fitch Ratings, based on an assessment of the issuer's financial condition, ability to meet debt obligations and a number of other factors. Rating agencies, as external audit companies, assess the likelihood of an issuer's default, in other words, its risk. The higher the risk of issuers, the higher investors' expected return on the securities they issue.

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TABLE 1. RATING SCALES OF CREDIT RATING AGENCIES[5]

	S&P		Moody's		Fitch			
Level reliability investment	long-term	short	long-term	short	long-term	short	Risk level	
100	AAA	A-1+	Aaa	P-1	AAA	F1+	Highest class	Investment level
95	AA+		Aa1		AA+		High class	
90	A.A.		Aa2		A.A.			
85	AA-		Aa3		AA-			
80	A+	A-1	A1		A+	F1	Mid-high class	
75	A		A2		A			
70	A-	A-2	A3	P-2	A-	F2		
65	BBB+		Baa1		BBB+		Middle-low class	
60	BBB	A-3	Baa2	P-3	BBB	F3		
55	BBB-		Baa3		BBB-			
50	BB+	B	Ba1	Without levels	BB+	B	Speculative class	Speculative level
45	BB		Ba2		BB			
40	BB-		Ba3		BB-			
35	B+		B1		B+		Highly speculative class	
thirty	B		B2		B			
25	B-		B3		B-			
20	CCC+	C	Caa1		CCC	C	High risk	
15	CCC		Caa2				Highest speculation	
10	CCC-		Caa3				Close to default	
5	CC		Ca					
	C							
0	D	/	C		DDD D D D	/	Default	

The highest credit rating is AAA, and the lowest is D or C. A change in rating from D to AAA indicates the creditworthiness of the issuer. This means that the higher the rating, the lower the risk that issuers will not be able to meet their obligations to creditors. A high credit rating indicates high confidence in the issuer, which allows it to issue bonds with low interest rates

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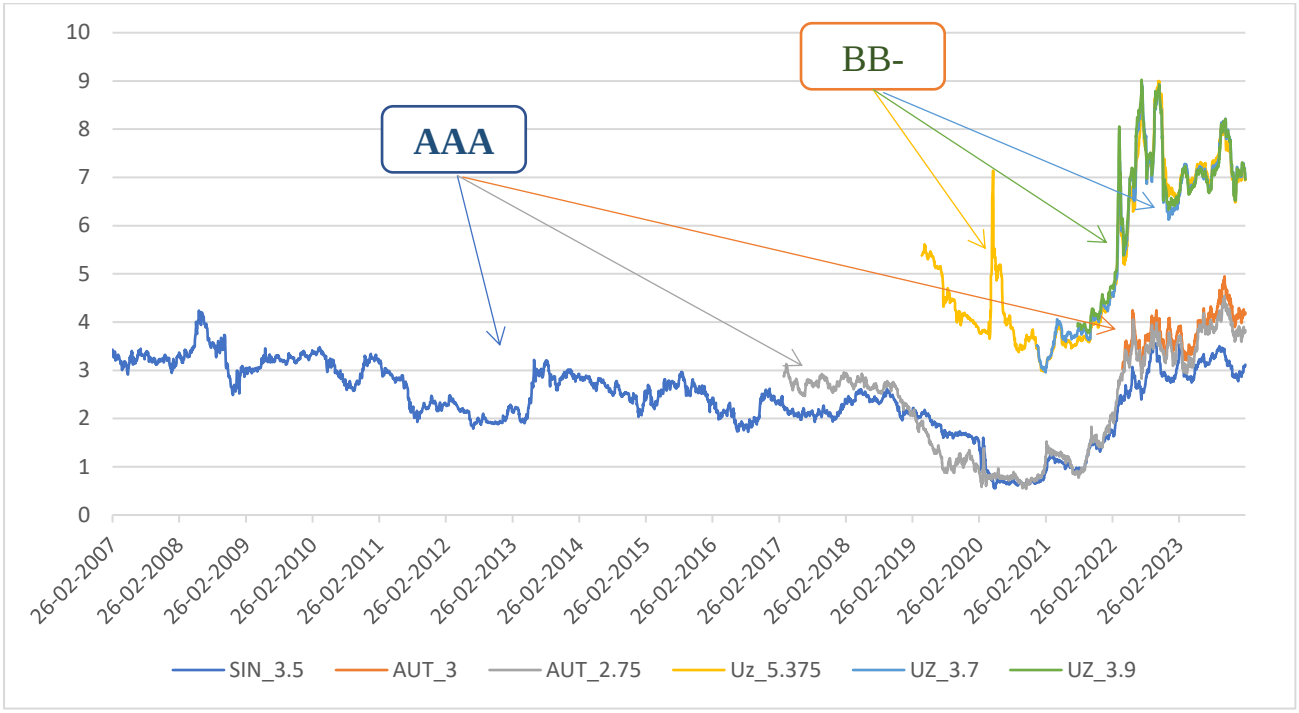

Diagram 1. Difference between market yields of AAA and BB rated bonds

The graph above shows the market yield rates for bonds of Singapore (Rating - AAA) - 3.5%, Australia (Rating - AAA) - 3% and 2.75%, and Uzbekistan (Rating - BB -) - 5.375%, 3. 7%. and 3.9%. As can be seen from the diagram, the expected yield of bonds of issuers with a AAA rating is lower than the expected yield of bonds of issuers with a BB- rating. To be more precise, the average difference between them is 3-3.5%.

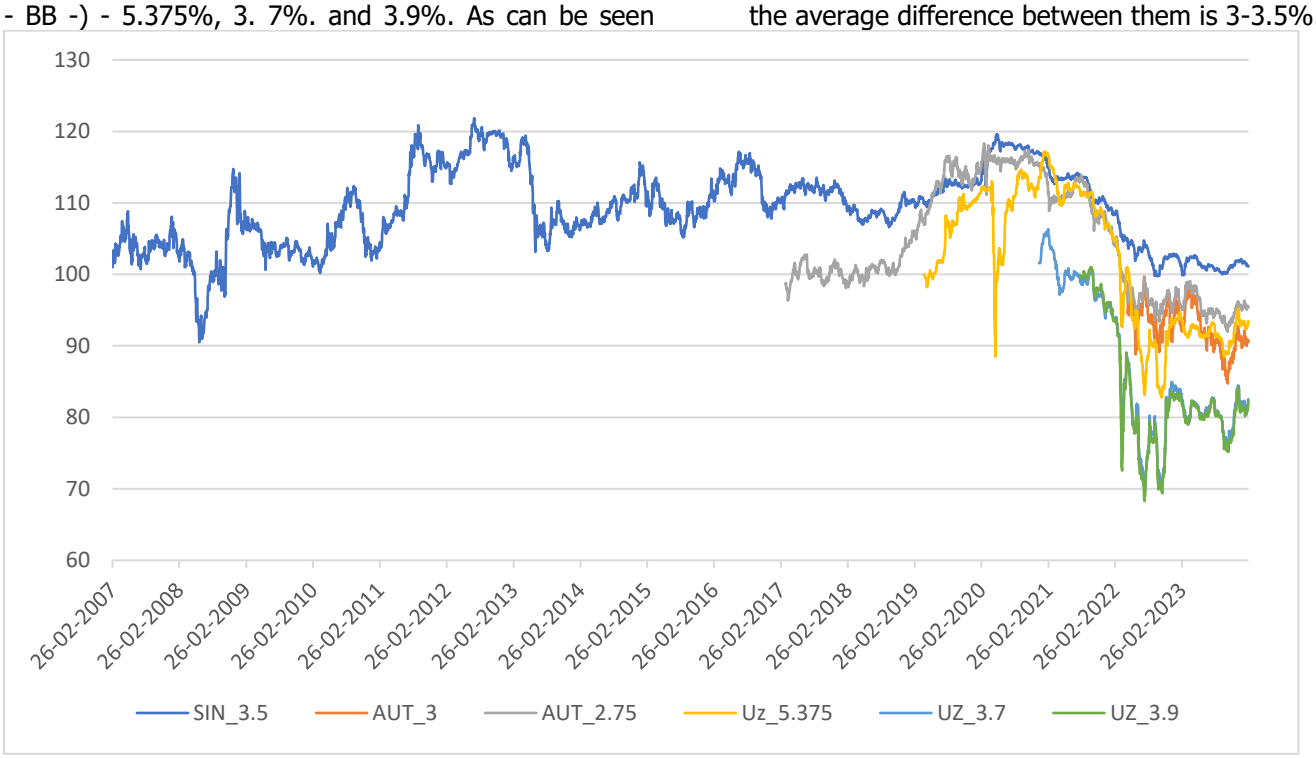

Diagram 2. The difference between the market price of bonds of issuers with AAA and BB- ratings.

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This chart shows the market price of the above bonds. A high credit rating increases the ability of a bond to be sold at a premium in the market. This is one of the main factors that leads to further reduction in the cost of debt for issuers.

If an issuer is rated D by rating agencies S&P or Fitch, it means the issuer is in default. Default risk is the risk that issuers will be unable to meet their financial obligations to their creditors and others on time or at all. Credit ratings are also indicators of the likelihood of issuers defaulting.

There are 2 types of default states: technical default, general default.

Technical Default: If the rating agencies assign a D rating to an issuer and state that it is in technical default, this means that the issuer is unable to meet its obligations to creditors in the short term due to various reasons. For example, in 2022, Western countries imposed economic sanctions against Russia due to ongoing political and military conflicts with Ukraine. Russia was disconnected from the SWIFT banking system of money transfers. As a result, the influx of foreign currency into Russia was sharply limited. This limited the ability of the Russian government to timely finance the costs of servicing external debt in foreign currency. For this reason, rating agencies assigned a D-level credit rating to Russia and declared it a technical default.

General Default: When rating agencies assign a D rating to an issuer and declare it to be in general default, this means that the issuer will be unable to meet its financial obligations to creditors and other parties for an extended period of time. If the issuing country is in general default, it means that the country is experiencing an economic or financial crisis. In such a situation, the country experiences high inflation and high unemployment, and many industrial goods remain unsold. The state will not only be unable to fulfill its financial obligations to creditors, but will also be unable to pay salaries to civil servants on time, and will also be unable to allocate resources for government procurement. For example, in early 2012, Greece was declared in default due to its failure to meet its obligations to creditors, and its rating was downgraded by the agency to D, the lowest point of speculative grade, and this crisis in Greece lasted for several years. If the issuing company is in default, it means the company is in bankruptcy or near bankruptcy. In this case, the company will not be able to fulfill its obligations not only to creditors, but also to its employees, companies supplying raw materials and providing various other services in the long term. Most companies in such a situation are not able to get out of bankruptcy and there is a high probability of closing the company.

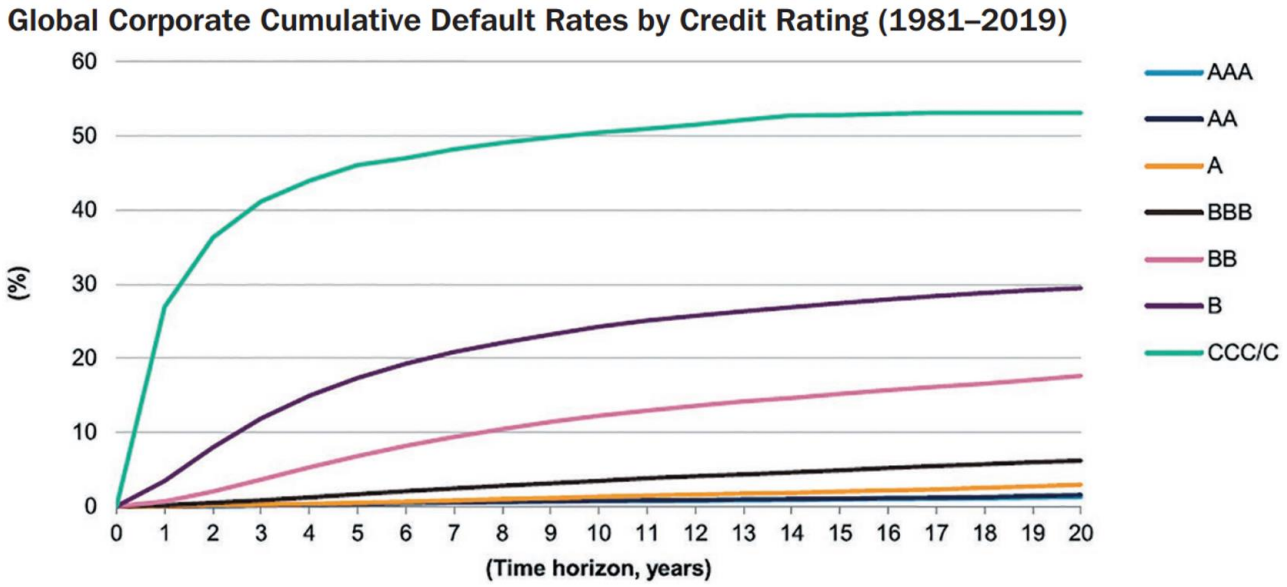

Figure 4. Possibility of default on credit ratings of large companies (S&P Global Ratings) (1981-2019) [4]

A high rating is a very important indicator. According to a recent S & P study Global Ratings , approximately 30% of CCC / C rated bonds default within one year and approximately 50% within 9 years while only 1-2% of AAA / AA rated bonds default within 20 years. default. The fact that a BB- rated bond is 2 times more likely to default in 10 years than a BBB - rated bond is likely to default indicates that it is very important to rate bonds at investment grade.

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Currency risk: Currency risk is one of the factors affecting the market value and yield of bonds. Currency risk occurs when an investor purchases a bond denominated in a foreign currency. Changes in the exchange rate between the foreign currency in which the bond was purchased and the domestic currency change the value of the bond to foreign investors.

For example, a one-year bond with a nominal value of €1,000 and a coupon rate of 3% was put up for sale on the London Stock Exchange. An American investor bought a bond for a total value of 1 million euros. At the time of purchase of the bond, the euro to US dollar exchange rate was 1.25, that is, 1 euro = 1.25 US dollars. As a result, the investor spent $1.25 million to purchase a bond in euros. A year later, at the time of the bond redemption, the euro's exchange rate against the US dollar strengthened to 1.18. Now 1030 euros per bond (face value + coupon payment), for a total of 1.03 million euros, which when converted to US dollars is 1.2154 million US dollars. Here, the investor's loss is $34.6 per 1,000 euros for a total investment of $34,600. Here, the investor's loss due to currency risk is 2.77%.

Just as a coin has two sides, any risk has two sides: the first is loss, and the second is profit. If the EUR/ USD exchange rate were 1.35 after one year, the investor's annual return would be 11.6%.

Inflation and Interest Rates: Changes in inflation and interest rates are one of the important factors in the financial market, affecting the market value of bonds and the level of expected income from them. Changes in the main interest rates (refinancing rates) in the country depend on inflation. The main purpose of changing interest rates is to keep inflation at a certain level. When there is inflation, central banks increase the refinancing rate to reduce the rate of inflation. In response, commercial banks raise interest rates on deposits and loans. As a result, the cost of obtaining a loan becomes more expensive , as a result, the volume of loans received by legal entities and individuals decreases, and the volume of deposits in banks increases. This leads to a decrease in the money supply in the economy. As a result, the inflation rate will decrease. If the inflation rate decreases, central banks will reduce the refinancing rate. Commercial banks are also reducing interest rates on deposits and loans. This lowers borrowing costs, increases lending and reduces deposits. During this period, the money supply in the economy increases. As a result, inflation will rise again. Central banks will again raise the refinancing rate to reduce inflation. This process continues down the chain.

Rising inflation requires an increase in the nominal rate of return expected from an investment so that inflation does not affect the real rate of return that investors expect from an investment.

When do investors buy bonds? Investors buy bonds only if the bond's expected return is higher than that of alternative investment instruments with the same risk as the bond in the financial market. Inflation growth leads to an increase in expected rates of return for all financial market instruments. The main feature that makes bonds attractive compared to other financial instruments is that the expected rate of return is high and liquid compared to other instruments.

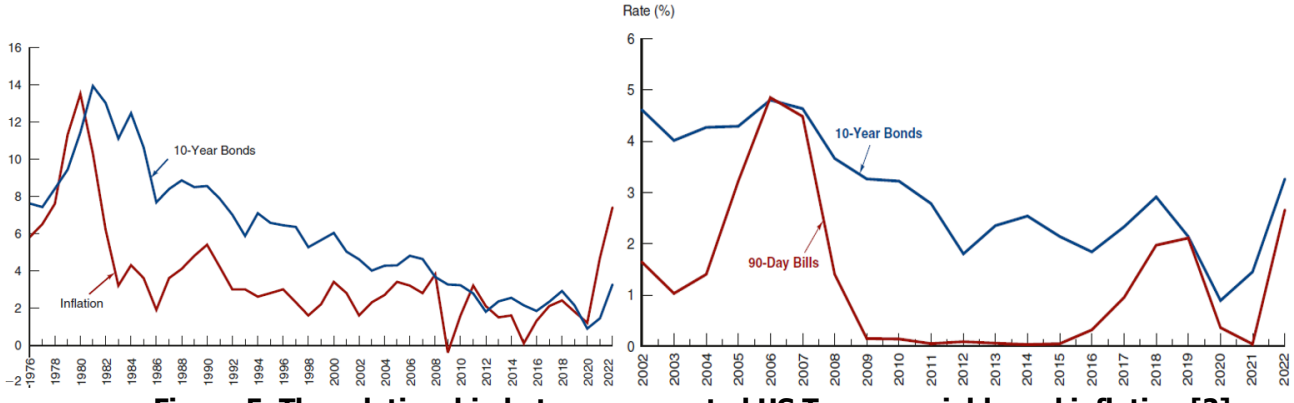

Figure 5. The relationship between expected US Treasury yields and inflation [2]

Because US government bonds are considered the most risk-free investment vehicle, they are very low-yield bonds. This figure shows the effect of inflation on interest rates on 90-day, 10-year, and 20-year U.S. Treasury bonds. In the 1970s and early 1980s, investors received below-inflation returns on 10-year Treasury bonds, and bond interest rates have been above inflation since then. The interest rate on long-term bonds is higher than the interest rate on short-term bonds. Interest rates on short-term bonds vary compared to interest rates on long-term bonds. Because inflation affects the interest rate on short-term bonds more than the interest rate on long-term bonds. This is because long-term investors do not sell bonds in their portfolios for long periods of time.

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Today, against the backdrop of political tension and sanctions in the world, interest rates on world markets are rising. We also looked at this in Figures 2 and 3 using interest rates on US Treasuries as an example. As a result of rising interest rates in global financial markets, interest rates of international financial institutions have also increased sharply. The rate (LIBOR) used in international debt markets has risen from 0.17 percent to 5.3 percent over the past two years and now stands at 5.5 percent.

As a result, over the past two years, interest rates on concessional loans from international financial institutions have increased from 1-2% to 6.3-7.0%. For this reason, many countries are hesitant to borrow money from world markets unless they are forced to do so. Rising interest rates have further increased debt payments. Because interest rates have risen since the start of 2023, other countries have also borrowed at higher interest rates than in previous years.

Table 2. Interest rates on bonds issued by some countries on international financial markets in 2023 [9]

Country	Volume	Maturity date	Interest rates
Turkey	2.75 billion	10 years	9.75%
Hungary	1.25 billion	30 years	7.1%
Romania	1.25 billion	30 years	7.67%
Mongolia	445 million	5 years	8.65%
Egypt	1.5 billion	3 years	eleven %
Bahrain	1 billion	12 years	7.75%

As can be seen from the table, as a result of rising interest rates in global financial markets, interest payments on bonds issued by many countries are also increasing.

That is why Uzbekistan and large joint-stock companies of Uzbekistan actively attracted financial resources by placing bonds on the London Stock Exchange in 2019-2021, but did not place bonds on international financial markets until October 2022 and 2023. In October 2023, Uzbekistan was the first among the CIS countries to place green bonds on the London Stock Exchange with 5-year coupon rates of 7.85% in the amount of 660 million US dollars and 3-year 16.25 % bonds in the amount of 4.25 trillion soums in national currency. Coupon rates on Uzbek bonds have also doubled compared to the 2020-2021 rate due to higher interest rates.[6]

CONCLUSIONS

In conclusion , the credit rating of the issuer, the duration of the bond, foreign exchange risk, inflation and changes in interest rates are also major factors influencing bond returns in the market. The yield of a bond is the most important indicator for an investor, and timely and correct assessment of the factors influencing its change makes it possible to manage risks in advance.

Increasing the issuer's credit rating makes it possible to attract cheap debt on international debt markets. But increasing the rating is not a short-term process. To do this, it is necessary to systematically form a healthy financial ecosystem in the state and corporations. And it takes a lot of time.

When inflation and interest rates rise, you should refrain from issuing bonds as much as possible. Because during this period, due to uncertainty in the financial market, investors expect high returns from investment instruments available on the market. This means high-interest debt for issuers putting their bonds on the market.

Also, to the extent possible, you should invest in bonds issued in currencies with low inflation. This allows you to minimize currency risk.

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