SCIENTIFIC REVIEW

RISK MANAGEMENT OF DERIVATIVE FINANCIAL INSTRUMENTS

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ABSTRACT

The subject of the study is derivative financial instruments. At the beginning of the article, the concept of a derivative financial instrument (PFI) is considered, their advantages and disadvantages are given, after which the risks of operations carried out with PFI are formulated. Further, the article discusses the main problems inherent in the PFI market and suggests a number of measures to solve these problems. In conclusion, recommendations are made that will allow for faster development of the Russian market of financial derivatives.

Keywords: derivative financial instruments, derivatives, securitization of assets, blockchain, risk management.

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INTRODUCTION

Technological development in the difficult conditions of the covid-19 pandemic and numerous lockdowns is becoming increasingly relevant. The scarcity and uncertainty of the information environment leads to the misuse of the veracity of the expression of subjects who enter an agreement, which includes a variety of technical details such as the electronic signature and others. Earlier, this problem in the context of international economic law was considered in article [1]. Lending activity after the 2008 crisis has changed and other types of risks, not previously identified, have become inherent in it [2]. Loans denominated in a stable foreign currency also do not provide the protective nature that was included in such deals [3]. Insurance activity has its own risks and illegal behavior [4]. These risks are compounded by a great lack of methods and techniques in the software development process itself, as well as the lack of the appropriate tools that would make it more efficient [5]. The market of securitization and derivative financial instruments, which are also not inherently risk-neutral, is no exception.

TYPES OF FINANCIAL INSTRUMENTS WITHIN THE FRAMEWORK OF MIFID

In most EU countries, the Directive "On Markets in Financial Instruments" (hereinafter – MiFID) [6], which entered into force on November 1, 2007, distinguishes the following financial instruments.

1. A bond is a recognition of debt by the issuer; it is a part of a loan issued by the issuer, for which the bondholder receives interest (coupons). The issuer can be (within the framework of MiFID): a Belgian or foreign public authority; a Belgian or foreign private enterprise; an international organization; a credit institution (in this case, we are not talking about bonds, but about savings certificates).

The principle of the bonds is simple: the interest rate entitles you to pay a periodic coupon during the term of the loan, the purchase price and the purchase price at the end of the term. However, some bonds may have specific features.

Advantages of bonds:
- In principle, as with most bonds, this type of investment does not carry any uncertainty (the amount, date of interim income and repayment of capital are determined at the time of issue).
- Bonds provide higher returns than short-term investments, with lower risk than equity investments.
- As a rule, the lower the issuer's rating (which implies a higher risk), the more attractive the yield.
- Bonds allow investors who are looking for returns to generate attractive returns.
- Investment in bonds, mainly in OECD government bonds, is possible for very low amounts and is thus accessible to everyone.
- In addition to regular income, bonds can generate capital gains when market rates fall below the rate of the held bond.
- Unlike" private " investments, bonds can usually be sold at any time on the secondary market.

Disadvantages of bonds:
- The capital is guaranteed only at maturity.
- During the term of the loan, the value of the bond will fluctuate depending on various factors, including the dynamics of interest rates and the financial stability of the issuing company.
- The real value of the principal at final repayment is generally lower than the principal at the time of issue due to inflation. This phenomenon, called "monetary erosion," is even more pronounced when inflation is high and bonds are long out of date. It will be compensated if the nominal interest rate is higher than the average rate of inflation over the entire life of the bond.
- Credit can only be purchased on the original terms during the subscription period. Outside of this period, the loan will be received at a variable price, and the purchase price will be higher, as it will include exchange fees.

2. A share is a certificate of ownership of a part of the company's capital. Thus, the shareholders own the company in proportion to the number of shares they own. Individuals who subscribe to them usually choose instruments with no maturity (they can only exit by selling the stock, no buyback is planned under the contract), no fixed yield, and no nominal or fixed value.

The share price is a trade-off between income (dividends and capital gains) and risk. Such risks can be explained by many factors that are both internal to the company (for example, its financial, technical
and commercial situation, investment policy, prospects and prospects of its economic sector, etc.), and external, since the stock market is influenced by political events, as well as the economic and monetary situation (both at the international and national level). In addition, emotional or irrational factors can increase market price fluctuations up or down. All of these complex factors affect the stock price and can make it relatively volatile in the short term. Thus, stocks should be considered as a long-term investment. In most cases, the stocks are grouped together in the “index” that combines action with common characteristics, whether from a geographical point of view (national indices such as the BEL 20, CAC 40, DAX, FTSE, Dow Jones, Nikkei) or from the point of view of industry, or the stock capitalization (index small cap, etc.).

Advantages of stock:
- In financial terms, it has been demonstrated that over a long period, the yield on stocks is higher than the yield on bonds. This is due to the risk premium that investors demand. Unlike bonds, stock returns are primarily made up of capital gains acquired over time, not just distributed income (dividends).
- Liquidity: Shareholders can sell quoted shares daily through the stock market. The liquidity of a stock indicates the ease with which it can be bought or sold.

Disadvantages of shares:
- In contrast to the fixed interest received on bonds, dividends are variable income, which depends on the results of the company's activities.
- The share price in the market fluctuates in accordance with the company's prospects and the general market trend.

3. A Collective Investment Union (CIU) is a general term for an entity, whether or not legally recognized, that receives funds from the public and invests them collectively in a group of transferable securities in accordance with the risk-sharing principle. CIU is a form of collective portfolio management. The most popular CIUS are "SICAVs" (open investment companies).

However, the term CIU covers a number of products that have a specific legal nature: - SICAVs (open-ended investment companies); placement funds (investment funds); - SICAFs (closed-end investment companies), including SICAFIs (closed-end real estate investment companies); PRICAFs (closed-end venture capital investment funds); SICs (debt securitization funds).

Advantages of CIU:
- Diversification: CIUS allow investors to create a diversified portfolio and distribute risks.
- Managing professional fund managers: greater returns and more efficient performance; professionals can respond more quickly to market events. CIU is the right solution for investors who do not have the time, desire, or necessary know-how to conduct their own portfolio management, including buying and selling stocks at the right time, selecting and arbitraging bonds, etc.
- Economies of scale: given the amount of funds involved, you can benefit from lower fees (for example, in stock market transactions) and get a higher return.
- Investment tailored to the needs of investors: the wide range of available CIUS and the specific nature of each one effectively meet the diverse and specific requirements of investors.
- Ability to invest small amounts: investors can invest in multiple markets or multiple currencies, even at modest costs; a diversified portfolio with a modest amount.
- Access to specific markets that are difficult to access or generally inaccessible to individuals (for example, Asian markets) or to complex financial products such as futures and options.
- Liquidity and transparency: the net asset value (in the case of SICAV) or the market price (in the case of SICAF) is calculated at least twice a month, and often even daily (this is relevant only within the framework of MiFID). In addition to the mandatory information provided to investors (the prospectus and annual and semi-annual reports, which must be submitted in advance to the regulatory authority), many financial institutions’ websites publish comprehensive information in the form of fund technical sheets and brochures. This freely available information allows investors to easily track their investments and the overall economic and financial situation.
Disadvantages of CIU:
- Fees: CIU units and shares typically generate a combination of management fees (the main component of the fee), initial and exit fees (which can vary significantly depending on the specifics of the CIU and the financial institutions that sell them), and exchange taxes.
- Depending on the type of fund and the underlying asset in which it will be invested, some disadvantages specific to the financial instrument in question should be taken into account.

4. Alternative investments are those investments that cannot be made through standard asset categories (bonds, stocks, or money markets). They have unique characteristics in terms of the risk-return ratio. In many cases, they are very complex.

There are four broad groups of alternative investments:
- real estate investments,
- hedging funds,
- direct investment,
- gold, gold mines, precious metals and commodities.

Advantages of alternative investments:
Alternative investments are investment instruments that, in principle, give the advantage of low correlation with traditional investments. Thus, they can significantly improve portfolio diversification and increase long-term returns while reducing risk.

Disadvantages of alternative investments:
- Product transparency is generally less than for traditional investments.
- The liquidity of alternative investments is generally lower than for traditional investments.
- These products are designed for well-informed investors who are well aware of the rules of the game and closely monitor market trends.

5. Derivative financial instruments have been developed to hedge the risks associated with exchange and interest rates and, above all, volatility. They are called derivatives because they are "derivatives" of the underlying financial instruments intended for hedging, they can be used for hedging or speculative purposes. A derivative as a derivative financial instrument is essentially a contract under the terms of which the parties have a right or obligation to perform transactions with the underlying asset, respectively, provided for in the contract. As a rule, the possibility of performing various actions: delivery, payment, purchase or sale – arises in relation to certain types of goods or securities. A derivative has the main feature: its price changes in the same way as the price of the underlying asset. The underlying assets are often indices, shares of Russian and foreign issuers, federal loan bonds, foreign currency, interest rates, and commodities (oil, precious and industrial metals) [7].

In accordance with the legislation of the Russian Federation [8], derivatives include futures and forward contracts, swaps and options. All derivative financial instruments are divided into OTC and exchange-traded [7]. Options and futures contracts are classified as exchange - traded, while forward contracts and swaps are classified as OTC instruments.

Derivative financial instruments give their owner the right or obligation to buy or sell an underlying asset (such as a stock, currency, or stock market index) at a fixed price before and during a specified period. A derivative should not be confused with an investment in an underlying asset. At the expiration of its validity period, it loses its value.
PROS AND CONS OF DERIVATIVE FINANCIAL INSTRUMENTS, THE MAIN PROBLEMS OF THE DERIVATIVES MARKET AND POSSIBLE SOLUTIONS

The pros and cons of derivative financial instruments (PFI) are presented in table 1.

Table 1: Advantages and disadvantages of derivative financial instruments

| ADVANTAGES                                                                 | DISADVANTAGES                                                                 |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| They give investors the opportunity to fully or partially cover all or some categories of assets in their portfolio when the assets that make up it may experience a “significant adverse trend” | PFI quoted in the markets are generally standardized to ensure an efficient market, so the underlying asset does not always exactly match the asset that the investor wants to cover. Individual coverage can be arranged, but this will be at the expense of the product’s liquidity |
| they provide an opportunity to speculate on a significant gain in the short term and activate the management of the securities portfolio | they are aimed at well-informed investors who are fully familiar with the rules of the game and closely monitor market trends |

The main transactions conducted with derivatives are listed below.

Hedging - is an insurance policy and at the same time a way to reduce the risk of potential losses associated with undesirable changes in asset prices for both the seller and the buyer, not provided for in the contract.

Speculation is the conclusion of transactions aimed at extracting profit from changes in the value of a derivative in the market.

Arbitrage- obtaining a fixed income on different stock markets by opening opposite positions on the same underlying commodity.

The main problems in the field of transactions in the derivatives market include the following:

- a speculative approach to risk identification and management: most often, the decision on risk management is reduced to the question of the cost of penalties; there is no forecasting of the consequences of the occurrence of a risk event in relation to the overall activities of the organization;
- lack of mechanisms that protect the interests of the parties to the agreement and guarantee that their goals will be achieved;
- involvement of stakeholders in regulating the terms of derivatives;
- the predominance of reflexive regulation of derivatives: there is a permanent process of amending the legislation as a reaction to the emerging problem.

In addition to the expansion of the legislation regulating the PFI market, the creation of specialized trading platforms for derivatives transactions and the introduction of new PFI in various sectors of the national economy [9], a number of additional measures can be proposed to solve the above problems.

1. First of all, it is necessary to increase the transparency of the financial market by comprehensively identifying all financial and non-financial risks associated with operations that are carried out on the stock market. When identifying risks, special attention should be paid to the risk of professional incompetence, which is directly related to the availability of specialized education, relevant skills and professional experience of employees engaged in operations with derivatives. Similarly, an effective measure to prevent the adverse consequences of financial transactions is the method of forecasting their consequences, modeling various outcomes when the value of both the derivatives themselves and the underlying assets for the corresponding derivatives increases or decreases.

2. The integration of financial markets implies the unification of disparate exchanges, their consolidation and consolidation as trading platforms. This will solve the problem of fragmentation of management and regulatory bodies in this area, as well as develop common institutional norms for conducting this activity.

3. The creation of international regulatory bodies, which will eliminate the fragmentation, inconsistency, "parochial" in the regulatory environment. The creation of global governance bodies and services at the level of territorial or continental financial markets will contribute to the growth of national economies in general, as well as to the globalization of financial markets themselves, in particular.
4. Development (strengthening) of control, supervisory and coordination functions in the regulatory bodies. This is particularly important given the length of integration processes, during which different participants react differently to the association. However, the general rules are the same for everyone and it is necessary to monitor the mandatory compliance with them.

5. Increasing investor confidence by increasing their financial literacy as a measure to prevent capital outflows. The presence of anti-crisis (counter-cyclical) programs in management supports the investor’s desire to place capital and his confidence that the unfavorable market trends will be overcome or, at least, smoothed out.

SECURITIZATION OF ASSETS AND EMERGING RISKS

In addition to derivatives, there are other derivatives in the securities market, for example, securitized ones. Securitization of the assets of organizations can be defined as the issue of special purpose (SPV) secured securities, the execution of which is carried out at the expense of income from a portfolio of assets or rights to these assets [10]. That is, in fact, it is financing due to the transformation of part of the financial assets of the organization into highly liquid capital market instruments that are traded on the secondary market [11].

Securitization of assets has a number of indisputable advantages for both the investor and the initiator. The initiator should be understood as an economic entity (usually a bank) that transfers to a special purpose vehicle (SPV) a portfolio of assets secured by cash flows from these assets.

The study of the international practice of securitization allowed us to classify securitization by distinctive features:

1) the type of asset. Depending on the type of cash flow generated, asset securitization is divided into two groups: securitization of existing claims and securitization of future claims;

2) by the execution mechanism. There are two generally accepted securitization schemes: classical and synthetic.

In the international practice of classical securitization transactions, there are a large number of legal barriers. At the same time, they are practically absent in synthetic securitization transactions. As a result, in some countries, for example, in Germany, the basis of this market is the mechanism of synthetic securitization [10].

The study of the mechanisms of conduction and emission of local and international transactions, securitization allows you to identify risks affecting the securitization, and to propose measures in the legal field of the Russian Federation to eliminate or substantially reduce specific risk. The most common risks affecting the securitization of assets can be grouped into three groups:

- risks that affect the formation and stability of cash flow,
- risks associated with the requirements for the participants of the transaction,
- the risks of the assets involved in securitization.

RISKS AFFECTING THE FORMATION AND STABILITY OF CASH FLOW

a) The risk of counterclaims against the account holder (SPV). In order to mitigate this type of risk, the bank account agreement must necessarily contain a ban on setting off the bank's counterclaims.

b) Bankruptcy (the introduction by the Central Bank of the Russian Federation of a moratorium on the satisfaction of creditors’ claims when the powers of the executive authorities are suspended). To reduce this risk, SPV should direct cash flows to the bank with the highest ratings, with high stability. The downgrade of this bank makes it possible to transfer them to a bank that has a rating comparable to the previous one.

c) The bankruptcy of the originator. In accordance with paragraph 4 of Article 134 of the Federal Law "On Insolvency (Bankruptcy)" [12], payments to individuals under employment contracts are included in the first and second priority of creditors. Therefore, if the initiator as an employer has a large staff (payments under the employment contract in the event of bankruptcy of the initiator are priority over other obligations), then the creditors’ claims for obligations secured by collateral may not be satisfied for a long period of time.
RISKS ASSOCIATED WITH THE REQUIREMENTS FOR THE PARTICIPANTS OF THE TRANSACTION

a) restriction on the ownership of equity shares;
b) restriction of non-core activities;
c) restrictions in the event of a merger, acquisition, or reorganization of the relevant organization;
d) possible lack of required expertise;
e) possible conflict of interests of the securitization organizers and rating agencies that receive commission payments based on the results of the securities issue;
f) provision of guarantees. The initiators and managers of securitization funds have a potentially large number of external credit enhancement tools—that is, provided by financial institutions outside of the initiator of the loans granted to the fund—aimed at increasing the level of liquidity, risk, etc., perceived by potential investors.

THE RISKS OF THE ASSETS INVOLVED IN SECURITIZATION

a) Credit risk (financial risk of default or improper performance by the debtor of its obligations under the transaction, i.e., the risk of possible default of the debtor). The initial goal of reducing the individual credit risk of participants is to increase the conditional volume of outstanding trades, which as a result will exceed the credit risk borne by the financial sector.
b) The risk of early repayment of obligations, which entails the need to reinvest early payments received at a lower interest rate.
c) Tax risk associated with changes in fiscal policy, the tax process;
d) Interest rate risk arising from mismatches in the timing of the sale of assets and liabilities and in the event of unpredictable changes in the economic environment.
e) Country risk.

SECURITIZATION: RUSSIAN AND INTERNATIONAL PRACTICES

The Russian securitization market initially developed with a focus on foreign investors, but later reoriented to the Russian client. Sustained economic growth with significant inflation and a low level of total borrowing to GDP, as well as the lack of long-term financing in the domestic market, contributed to the development of securitization in the Russian Federation. For the period from 2004 to 2016, the total volume of transactions on the securitization of assets amounted to 567,013.1 million rubles. When considering the structure of transactions, it is possible to note the dominance of certain groups of assets in the total volume of the mortgage securitization market (69%) and car loans (8%) [10]. The average maturity of issued secured securities for car loans is 5.6 years, for mortgage loans-27.4 years.

Development of the securitization market for corporate assets in the Russian Federation was the study of the legal framework of securitisation transactions in countries such as France, Spain, Italy, Portugal, Argentina, Luxembourg, which allowed to establish the differences in approaches to legal regulation: single comprehensive legislation and adoption of the list of legal acts in this field. When studying the legislation of European countries, a two-level legal system was considered, related to the mandatory application of normative acts to the contractual obligations of the European Parliament and the Law Council of 17 June 2008 No. 593/2008.

In addition, a separate study was conducted on the emergence, development and current state of the securitization of the US mortgage market, as the most developed in the world, which is of considerable interest to Russian practice. The Graham-Leach-Bliley Act, which was passed in 2000, contributed to the rapid growth of securitization in the United States, as the law lifted the ban on banks owning bonds and securities introduced by the Glas-Steagall Act of 1933 and separated banking and investment activities. As a result, between 2000 and 2006, the number of asset-backed securities (ABS) issued increased from $281.5 billion to $753.9 billion, and the number of mortgage—backed securities (MBS) issued by financial
Institutions increased from $101.7 billion to $917.4 billion. Banks attracted customers and issued loans, which in turn were grouped into homogeneous portfolios and sold to investors against the security of these securities portfolios. In order to attract investors and increase sales, banks collaborated with rating agencies to evaluate securities on the appropriate rating scale. Further, the banks transformed the securities issued earlier into collateralized debt obligations (CDOs) and sold them to investors.

Most of the income in the above-described securitization scheme, banks received from commissions for issuing and servicing loans, which led to the fact that huge amounts of loans were issued in the shortest possible time. Borrowers with more than 620 credit rating points, which were assigned by rating agencies according to their own methods, were absolutely formally checked. At the same time, if the borrower scored less than 620 points, then more complex checks were applied to him, since it was assumed that such mortgages would later be more difficult to securitize.

The study found that in the first two years, a default declaration of 20% more often occurs with borrowers with a credit rating of 621 to 625 points than with borrowers with 615 to 619 points. As a result, during the period from 2006 to 2016, there was a multiple decrease in the volume of securities issued with ABS, from $753.9 million to $186.1 billion, and a multiple decrease in the issue of mortgage-backed securities (MBS) by financial institutions from $917.4 to $96.8 billion.

Prior to the financial crisis, the generally accepted view was that securitization played a positive role for both the initiators of the procedure itself and for investors. Let's look at how securitization is carried out in the world today (fig. 1) and what advantages and disadvantages have been preserved.

![Figure 1. Simplified securitization lifecycle](image)

Securitization begins with the issuance and underwriting of loans, which are then regularly serviced, similar to traditional bank lending. Next, the issuer or initiator combines many loans, places them in a remote trust or a special purpose instrument (SPV), and structures the securities. The audit firm reviews the pool and provides a pool audit letter and a letter of agreed procedures covering the pool statistics provided to investors. Rating agencies may be asked to express an opinion on the creditworthiness of securities by providing a credit rating. The underwriters prepare the transaction disclosure documents and then evaluate and place the securities on the market where investors make purchases based on their risk reward preferences. The trustees manage the trust organization and represent the interests of the investors. The payments to the borrowers are then collected, combined, and sent to the trustee, who distributes the payments to the securities holders based on the payment flow defined in the transaction documents. Rating agencies monitor the value of securities and update the ratings if necessary. In secondary markets, investors continue to review and revalue securities based on their value. Broker-dealers create markets among investors who trade securities and set new prices.

While lending and securitization have recovered from the financial crisis, a number of weaknesses persist throughout the securitization lifecycle, increasing time delays, costs, and opacity. Across all asset classes, basic credit underwriting data (such as loan agreement terms, borrower credit profiles, and collateral information) is rarely standardized and sometimes not centralized even within the credit institution itself. Often, most of the work is done on paper, even in organizations that understand digital technologies, because you have to use certain paper documents, such as, for example, estimates, broker's opinions on prices and acts. Lenders use a variety of formats to record data, and digital records are often
just scanned copies of paper contracts. These records are stored on servers, data warehouses, and government offices scattered across the country. A separate repository provides additional security for the data, but it increases the difficulty of access or reconciliation and increases the likelihood of inconsistencies between initiators, underwriters, investors, regulators, and rating agencies. This information asymmetry reduces the efficiency of the market.

All these shortcomings in the organization of lending, of course, limit the degree of automation of loan servicing. Using manual intervention to reconcile and update data not only creates costs, but also increases the likelihood of errors. Each mistake is now more expensive, as regulators in recent years have increased their control over such transactions. There is also a growing need for better and more timely data. Easy access to high-quality data and greater automation of blockchain and smart contracts can create seamless integration between different securitization functions. If this technology were effectively implemented at the stage of obtaining and servicing loans, then structural efficiency growth would be possible throughout the entire life cycle. All data placed in the blockchain becomes immutable and is marked for subsequent audit. This immutability could significantly reduce the cost of subsequent verification. Nor will it be necessary to consult different data warehouses to obtain different pieces of relevant underwriting and maintenance information. In addition, since the data in the blockchain is tracked through audit tags, the risk of information loss or a change that leaves no record will be minimal.

For all asset classes, the key advantage of blockchain in obtaining and servicing loans is that lower-level participants, such as investors, can easily monitor a loan or a pool of loans from issue to maturity, be alerted to any changes, and, if desired, easily model the behavior of the service. Audit tags, by making any change easily visible and traceable, can reduce the likelihood of fraudulent changes. Data on loans and pools will become not only more complete and accessible, but also more reliable. This faster and easier access to more reliable credit-level data has the potential to increase the number of loans that initiators can sell. Some loans that may have previously fallen out of the pool due to a lack of credit level data or concerns about the accuracy of this data may now be attractive to buyers.

**CONCLUSION**

Summing up, it should be noted that despite the fact that the PFI market is one of the most significant and dynamically developing segments of the Russian financial market [13], the current situation of the Russian PFI market still weakly resembles the global financial markets of developed countries, does not fully meet the real needs of the economy [14], and in modern conditions of economic uncertainty and global political instability, it is critically necessary that the Russian market meets international criteria for the development of the financial market, including its derivatives segment [15]. Therefore, it is necessary to actively develop the derivatives market in terms of disclosure, repair the gaps in the legal framework to improve the organizational structure to conduct the process of making deals, and also to tighten the requirements for performance of obligations by the borrower. Improving market practices, introducing a clear and reliable regulatory framework for the functioning of the securities market, transparent approaches to tax regulation and economic literacy of investors will, according to the authors of the article, reduce the risks inherent in such complex financial instruments as PFI.
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