

UDC 336.7  
JEL G 12, G13

# DERIVATIVES MARKET DEVELOPMENT AND PRICING ON DERIVATIVES IN UKRAINE

**Matselukh N. P.,***Ph. D in economics, professor, director of scientific-educational institute of accountancy, analysis and audit, University of state fiscal service of Ukraine*

- A** *The aim of this paper is to define the specifics of derivatives pricing, taking into account the features of the development of the derivatives market in Ukraine. The emergence of innovative derivative financial instruments is caused the need of new approaches to pricing on them. Prices for innovative derivative financial instruments may depend on several bases. This situation exacerbates the risk of asymmetric information in the securities market. Innovative derivatives pricing processes depends on the dynamics of the market of securities, including derivatives market. Global derivatives market is growing faster than the market benchmark asset that increases the likelihood of price imbalances. The emergence of structured financial products has increased the risk of virtual value because one underlying asset can be used for a number of complex derivatives. This situation requires a legislative settlement treatment of derivatives and the formation of prices in Ukraine. Special legislation should define the rules for derivatives treatment and pricing. Such rules should aim at reducing the facts release derivatives one basis and full disclosure to all market participants.*
- K** *Derivatives pricing, structured financial product futures, index option.*

## РОЗВИТОК РИНКУ ДЕРИВАТИВІВ ТА ЦІНОУТВОРЕННЯ НА НИХ В УКРАЇНІ

**Мацелюх Н. П.,***кандидат економічних наук, професор, директор навчально-наукового інституту обліку, аналізу та аудиту, Університет державної фіскальної служби України*

- A** *Метою статті є виявлення специфіки ціноутворення на деривативи з урахуванням особливостей розвитку похідних цінних паперів в Україні. Поява інноваційних похідних фінансових інструментів зумовлює необхідність перегляду підходів до ціноутворення на них. Ціни на інноваційні похідні фінансові інструменти можуть залежати від кількох базисів. Така ситуація вносить додатковий ризик поглиблення асиметрії інформації на ринку цінних паперів. Процеси ціноутворення на інноваційні деривативи залежать від динаміки розвитку ринку цінних паперів, у тому числі строкового ринку. Світовий ринок деривативів зростає швидшими темпами, ніж ринок базисних активів, що збільшує ймовірність цінних дисбалансів. Поява структурованих фінансових продуктів зумовила зростання ризику виникнення віртуальної вартості, оскільки на один базисний актив може бути випущено кілька складних деривативів. Така ситуація вимагає законодавчого врегулювання обігу деривативів та формування цін на них в Україні. Спеціальне законодавство про деривативи має визначати правила їх обігу та процедуру ціноутворення. Такі правила мають бути направлені на зменшення фактів випуску деривативів на один базис та повне розкриття такої інформації для всіх учасників ринку.*
- K** *Деривативи, ціноутворення, структурований фінансовий продукт, ф'ючерс, опціон, індекс.*

## РАЗВИТИЕ РЫНКА ДЕРИВАТИВОВ И ЦЕНООБРАЗОВАНИЕ НА НИХ В УКРАИНЕ

**Мацелюх Н. П.,***кандидат экономических наук, профессор, директор учебно-научного института учета, анализа и аудита, Университет государственной фискальной службы Украины*

- A** *Целью статьи является определение специфики ценообразования на деривативы с учетом особенностей развития рынка производных финансовых инструментов в Украине. Возникновение инновационных производных финансовых инструментов обуславливает необходимость пересмотра подходов к ценообразованию на них. Цены на инновационные производные финансовые инструменты могут зависеть от нескольких базисов. Такая ситуация усугубляет риск асимметричности информации на рынке ценных бумаг. Процессы ценообразования на инновационные деривативы зависят от динамики развития рынка ценных бумаг, в том числе срочного рынка. Мировой рынок деривативов растет более быстрыми темпами, чем рынок базисных активов, что увеличивает вероятность ценовых дисбалансов. Возникновение структурированных финансовых продуктов обусловило рост риска возникновения виртуальной стоимости, поскольку на один базисный актив может быть выпущено несколько сложных деривативов. Такая ситуация требует законодательного урегулирования обращения деривативов и формирования цен на них в Украине. Специальное законодательство о деривативах должно определять правила их обращения и ценообразования. Такие правила должны быть направлены на уменьшение фактов выпуска деривативов на один базис и полное раскрытие информации для всех участников рынка.*
- K** *Деривативы, ценообразование, структурированный финансовый продукт, фьючерс, опцион, индекс.*

## Introduction

One of the modern financial markets characteristics is the emergence of innovative financial instruments. These tools are derived and combined, so the price for them often depends on a few basic assets. The emergence of these financial instruments, the growth in the volume of their turnover conduce the rapid capital movement. However, on the other hand, the pricing for such financial instruments is opaque and may significantly distort the information on securities market, which further destabilize the situation on the market. The securities market in Ukraine is still at the stage of creation, characterized by the predominance of OTC trading and non-transparent pricing on major securities. This is why pricing derivative securities is characterized by uncertainty which deepens the lack of special legislation on the circulation of derivative securities.

The problem of pricing on derivatives is actively investigated by foreign scientists. The theory of arbitration of pricing and various aspects taking into account the factor of risk pricing models presented in the papers of T. Bjork (Bjork T, 2009) [1], A. Eckner (A Eckner, 2014) [2]. Approaches to hedge risks and avoid default presented in the articles of S. Ghamami and I. Goldberg (Ghamami S. and Goldberg L.R., 2014) [3], J. Hull and A. White (Hull J. and White A., 2012) [4], M. Li and F. Mercurio (Li M. and Mercurio F., 2015) [5]. Complex studies of this problem in Ukraine are absent. Thus, N. Ivashchuk (2010) [6] explores the economic modeling as one of the tools of forecasting derivative prices. V. Gnyliak and M. Sweet (2012) [7], V. Yavorskaya (2014) [8] investigate the derivatives market development in general. Certain aspects of derivative pricing presented in the articles of L. Kostrach (2010) [9] and H. Kalach (2012) [10]. Therefore, the aim of the article is to identify the specifics of pricing derivatives taking into account the peculiarities of derivatives development in Ukraine.

### Analytical and empirical studies

In recent years, the functioning of the securities markets has changed so substantial that one can talk about a qualitatively new stage of their development, where the foreground is the use of innovative financial instruments that provide new opportunities for insurance against undesirable consequences of a changing market situation. Such innovations include derivatives which are the subjects of circulation at the markets of derivatives, and are an attractive tool for investing. These tools allow investors to not only hedge financial investment, but also effectively manage them, skillfully using current models and mechanisms of financial market [6].

Derivatives trading have reached a large scale on the main international stock exchanges, which are designed to reduce the impact of destabilizing factors on the mechanism of domestic prices formation, providing transparent pricing and insurance price risks. A spot and term markets are operating in Ukraine. The term market has a deal with trade of stock index future and stock index option. In this situation the assets can be traded through the different derivatives and that can be a reason of incorrect pricing. Therefore, analysis of pricing trends in the derivative markets is one of the most important for the economists.

The origin of the derivatives, and therefore establishing the prices for them, can be attributed to the time of the occurrence of trade and the first formal market structures of ancient Greece and markets at the Roman Empire. Some experts who explore the stock market believe that trade with the delivery of the goods in the future has existed in Japan back in the first century BC where the law set rules for the merchants about selling goods with delay of payment or future delivery with fixed price [11, p. 48]. The first of these instruments are reputed agreements with deferred payment (prototypes of modern fixed-term agreements).

Later, in the XVI century, the exchange form of the trade has appeared in the western countries. That would become the result of evolution from the forward deals with real assets (goods) to financial futures contracts. At the time of the agreement conclusion on the exchange the price of goods was determined. That allows avoiding possible price changes at the time of actual delivery. Later the standardization products was conducted on exchanges, i.e. implemented average standards of quality that enabled does not deliver the goods on the most trades and contributed to the introduction of futures. In the middle ages commodity exchange has successfully functioned in many cities in Europe. With the emergence of stock trading in the XVI century standardized pricing was started, the exchange was the institute that guarantees companies or persons to buy a matching sample of the goods and the party.

First term transactions and derivatives for tulip bulbs were appeared in the XVII century in the Netherlands. Manufacturers used the option agreement for protection from seasonal price fluctuations on products. However, the history of modern futures trading has started with development of derivative trading on stock exchanges in the United States, particularly on the Chicago Mercantile Exchange. The 19th century is characterized by the growth of the role of pricing in the insurance of financial risks. Price risks demanded from the participants of commodity market to seek

such agreements, which would allow them to insure against volatility in goods prices.

Therefore, futures and forwards is one of the oldest financial derivatives, the appearance of which is formed a special mechanism – pricing on derivatives. In general, the evolution from forward to futures contracts had passed the following stages: initial (sellers and buyers of agricultural products began to enter into agreements with delivery of goods through time), a standardized (held on the standardization of all terms and conditions of contracts), organized trade (finally took place on the formalization of the market forward contracts by the creation of specialized exchanges with his rules of conduct trade and guarantee the execution of contracts).

Historically, the emergence of the first analogs of instruments that reflect the concept of “derivative”, falls on the XVII century, whereas the term “derivative” appeared quite recently. It can be surely stated that is widely known today, the term “derivative” for more than thirty years ago did not have a wide practical application [6, p. 125-127]. Stock deals that now belong to this notion, first started to function as “insurance” or “risk management” several centuries ago. In view of this, the term “derivative” actually was put in use in the mid 80-ies of the last century [7, p. 12]. Most explanatory dictionaries the term “derivative” regarded as “an original tool”, which cost derivative of the fact the proposed price of any asset that lies at its basis (goods, securities, currencies) [12, p. 79].

Theoretically derivatives should promote the stability of the financial environment for the individual business units to guarantee the reimbursement of losses from changes in interest rates, exchange rates or rate of securities, i.e. to limit the risks, but the fact the implementation of the agreements for an indefinite time in the future, high liquidity, a significant leverage of derivative markets creates at the same time the ideal conditions for the speculative transactions and lays a greater element of uncertainty and risk in the financial system [10, p.13]. Given the foregoing, it should be noted that the basics of pricing derivatives arise with the advent of the first derivative financial instruments – transactions with a deferred payment (prototypes of modern fixed-term agreements), and trade them. An evolutionary stage in the development of pricing includes several stages: initial, standardized, organized trade with their rules and guarantee the implementation of agreements

Usually the purpose to purchase the derivatives is not getting the underlying asset, but the hedge price or currency risk, or speculative profit from changes in the price of the underlying asset. A distinctive

feature of derivatives is that they are not related to the amount of the underlying asset that revolves on the market. The owners of the underlying asset certainly have no connection to the issue of derivatives.

Hedging as a method of managing price and currency risk management belongs to the external methods of management. This means that hedge the involvement of third-party organizations (banks, financial companies, participants of stock trading). Shifting the risk of adverse market conditions to another party, hedger, on one hand, has every reason to plan their future cash flows, and from the other hand – the possibility of failure of the additional profits due to favorable price movement. If the hedges are the participants of the real economy – producers and consumers of goods whose market price is prone to strong price fluctuations than their first place purpose is planning the future and reducing risk. Additional income in the form of exchange rate difference is not included in the priorities of business entities that are hedging their risks [13, p. 374-380].

Derivatives have two components that differentiate them from conventional products: they do not require the original investment or need them in limited quantities; the price of these products varies from changes in the cost of basic securities and other market factors [9]. A mandatory feature of derivatives is that they are, without exception, have a clearly established validity till the occurrence of which they have to be redeemed [14, p. 146-151].

Derivatives themselves are a potential source of crisis on the stock markets, this is why Warren Buffett called derivatives weapons of mass destruction. Since 1987 derivatives were one of the main reasons most of the disasters on the stock markets – in particular, in 1987, they led to the famous “Black Monday”, remembered more than the 22% drop in the index of Dow Jones. Also operation with derivatives have made contribution to the ruin Barings Bank (a significant violation of the organizational rules of the bank also contributed to its ruin) and contributed to the collapse of Enron, the collapse of hedge fund LTCM, etc.

It is difficult to overestimate the role of derivatives during the crisis of 2008. The problem is not in the economic nature of derivatives, derivatives are a very useful financial tool used to reduce risks of participants at stock and other markets. However, there are several reasons which make the modern market of derivatives like the bombs of the clockwork. First, the derivative markets are often opaque. Also as a result of such opacity never exactly knows how many derivatives connected to the same underlying asset. The second issue of derivatives is uncontrolled

volume. At the end of June 2008 the total outstanding off-balance sheet derivatives was 683.7 trillion USD [15]. In such a situation the formation of virtual financial instruments (not secured by real value) develops, which formed a virtual value, thereby increasing asymmetry of information on financial markets.

The modern market of financial derivatives is the most growing segment of the global stock market (table 1).

#### DEFINITIONS OF STUDIED CATEGORIE

Table 1

YEARS	OPEN POSITIONS AT FACE VALUE						TOTAL, (BLN USD)
	INTEREST		CURRENCY		IPA		
	(BLN USD)	%	(BLN USD)	%	(BLN USD)	%	
2000	12626	89,39	96	0,68	1403	9,93	14125
2005	52296	90,50	174	0,30	5316	9,20	57788
2007	86135	89,10	303	0,31	10246	10,60	96674
2009	67056	91,66	328	0,45	5773	7,89	73157
2011	53298	94,23	308	0,54	2957	5,23	56563
2013	62177	93,77	341	0,51	3793	5,72	66311
2014	69118	93,90	375	0,51	4112	5,59	73605

Source: calculated by the author according to the World Federation of exchanges using data [16]

It should be noted that the structure of the trading on the stock exchange and over the counter markets are significantly different. The stock market presented OTC credit derivatives. Interest derivatives dominate on both types of markets (table 2).

#### THE VOLUME OF WORLD OTC DERIVATIVE MARKET IN 2002-2014

Table 2

YEARS	OPEN POSITIONS AT FACE VALUE (BLN USD)						TOTAL
	INTEREST	CURRENCY	IPA	CREDIT	COMMODITY	OTHER	
2000	64668	15666	1891		662	12312	95199
2005	211970	31364	5795	13908	5434	29199	297670
2007	346937	48620	9202	42580	7567	61501	516407
2009	449875	49181	5937	32693	2944	63270	603900
2011	504117	63381	5982	28626	3091	42614	647811
2013	561299	73121	6821	24349	2458	24860	692908
2014	611173	76114	7131	29118	2677	31125	757338

Source: calculated by the author according to the Bank of international settlements [17]

The following trends are caused by not only the importance of hedging interest rate risk, but also increase the volume of loans that you need to insure against interest rate risk related to financial intermediaries.

Traditional derivative trade, which has existed more than a quarter century, with each year becomes more difficult due to the development of financial engineering. The development of financial engineering led to the emergence of innovations on the market of structured financial products that combine the conservative component in the form of a deposit or bond, and risky component provided options or futures. The

application of this financial instrument allows the investor to preserve capital and gives the opportunity to obtain additional income for the derivative financial instrument. The concept of "structured product" in the scientific and theoretical context is not common. The idea that complex financial instruments consist of simple derivatives has already established. The distinguishing feature of such a combination is the initial transfer of risk of each component on a separate financial instrument. The task of the product is to meet the specific needs and expectations of profitability and risk. The product operates if we can create a repeated use of capital at low values of risk [18].



Because they are designed to meet the needs of investors as end consumers, they are called retail structured financial products.

S. Das maintained that the concept of structured products is valuable security that combines features of debt instruments and signs agreement with derivatives [19]. S. Das claims that structured product refers to a special class of debt instruments and the main attractiveness of these products is their ability to generate high capital involvement in the dynamics of the underlying asset together with the advance set the parameters of risk and profitability.

Since the mid-1990s, the issue and sale of structured products had a stunning success in many European countries, especially in Germany and Switzerland. Today the market is estimated at over 500 billion USD, the main share of them connected to European countries (about 60%) and Asia (around 30%) [20]. But along with the rapid development of the world market of the structured financial instruments arises and a number of issues related to the regulatory aspect of these markets regulation and the influence of various chaotic factors. Along with the noted issues global issues are the fair pricing of products. Secondary market structured products is characterized by low liquidity and a high degree of volatility. Prices for such tools depend not only on economic factors, but also on the political and even natural disasters. Revealing in this context could be a reaction of the indexes of stock markets on the earthquake in Japan 11.03.2011 p. It should be noted that an earthquake and tsunami caused collapse on not just the Japanese stock market, but also to world markets. On the fourth day after the fall of the country's leading earthquake Nikkei225 index has reached 13 percent, and the index of the leading companies of the Tokyo Stock Exchange Topix dropped on 12%. Wave drop spread to other world areas. Consolidated index of Asian Pacific region Asia MSCI fell during trading on 6,7%, Chinese CSI 300 completed a trade in red to 1,81% Australian index S&P/ASX200 dropped by 2.11 percent, French SAS 40 – 3.6%, German DAX – 4.55% [21]. Falling stock indexes in accordance with immediate affected the price of the derivatives.

Despite the exchange markets development where participants can trade products; many instruments were issued by market makers and they set the price of the product. Among the most interesting trends in pricing in the financial markets organized by derivatives is establishing connections between exchanges that operate in different parts of the world and different time zones. The creation of a global network of futures exchanges and establishing relationships between them allows to trade derivatives all day long.

It facilitates access to the exchange, because participants receive the opportunity to adjust their positions even after the end of the day on separate markets. In addition, traders who have open positions on one exchange can balance out their position on the other exchange. In this connection, Ukraine integration into the world economic space requires the improvement of derivatives trading on the domestic financial market and improves prices for them.

The origins of derivative trading in Ukraine are rooted in the XVIII century, when the Odessa market was created, where the standard futures contracts for agricultural products completed. Later in 1834 Kremenchug exchange was created. Thus was laid the foundations of the derivative mechanisms pricing. But for a long time, after applying the first derivatives, the stock trading in Ukraine declined.

Full formation of bidding on the term financial market segment is associated with the first steps of independence in Ukraine. So, in 1994-1995 the trade of currency futures on the Dnieper and the Ukrainian commodity exchange stepped up, which subsequently ceased to exist. Subsequently (1996 – 1997) observed a few scattered attempts to restore trading derivatives on exchanges, but they were not long-running through a small activity of participants in pricing and lack of proper regulation.

In 2003 a new stage in the development of the forward market with the opening of trading on currency futures, options of “Ukrtelecom”, “Biloserkivmerzha” and other issuers has begun. In 2004 the listing of PFTS includes options of OJSC “Ukrtelecom” and “TTC.” The period till 2006 is characterized by the rapid growth of the Ukrainian term segment along with the overall market rise of [22].

The next stage (2006-2008) is a chaotic stage of derivative market development and deficiencies of pricing. According to the reports of the National Commission on securities and stock market (in that time it was State Commission on securities and stock market) in 2007 (compared to 2006) the volume term market increased by 17.7 million UAH, in 2008 the term market showed a sharp decrease in the volume of trades to 0.27 mln UAH. [23].

The trading at term section of the «Ukrainian Exchange» started on May 27, 2010, and the first tool was the current futures contract on the index of Ukrainian shares. The advantage of futures on the index of Ukrainian shares is checking the type of contract (performed by cash payments without effecting actual delivery of the underlying asset) [24]. The share of term segment of UX in total concluded exchange agreements is 11.4% in the first quarter of 2015 [23]. Thus, it can be concluded that in a short period of

time, the market for financial derivatives demonstrates enough high development performance. The most of the achievements are the result of trading only one instrument – futures on the index of Ukrainian shares. It should be noted that compared with global trends, which show a growth rate of 22% for commodity options and futures, and 17% for stock options and futures on stocks, Ukraine has a significant potential market development derivatives (figure 1).

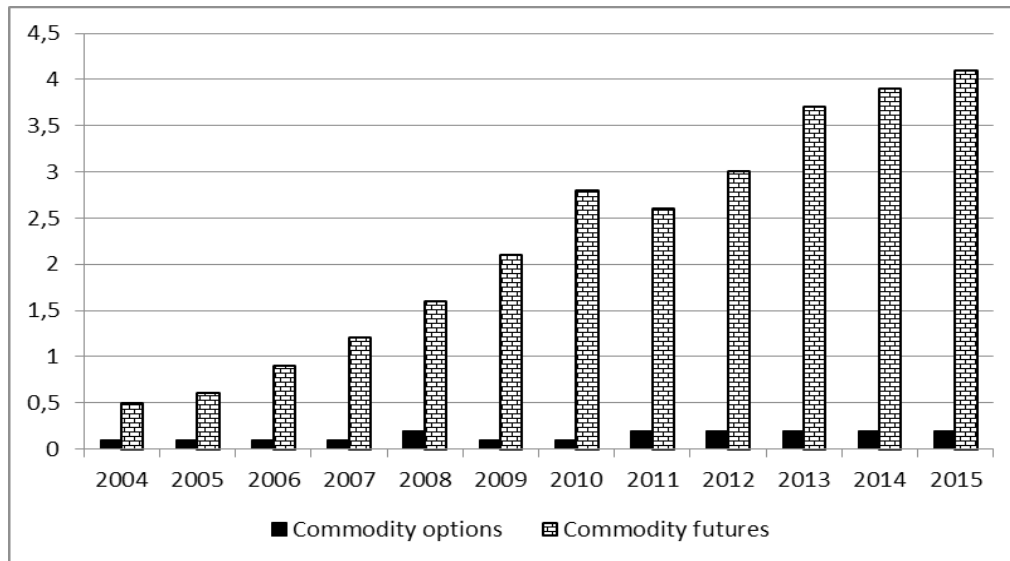


Fig.1. The volume of world trade commodity options and futures in 2004-2015, billions of contracts

Source: calculated by the author according to the World Federation of exchanges

The volume of futures and options trading in geographical terms are not uniform. So, the largest average turnover falls on North America and Europe (volume in Europe two times smaller than the North American), and the smallest average annual turnover in Asia. The volume of trading futures is more than three times higher than the volumes of trading options. In Ukraine (according to the Ukrainian stock exchange) futures trading volume exceeds the volumes of trading options on average 20 times.

It should be noted that with the development of the securities market, the spread of derivatives, variance sweep changes in prices decreased. So, in 2010 the price index fluctuation was within «-3,65 + 4,83», and in 2015»-1,8 + 2.04. However, stabilization of the dynamics of the prices of derivatives prevents the absence of a special law that would regulate derivatives turnover. Because according to the law, the organizers of the trade can combine activity with the trade on the stock market with clearing and transfer under the derivatives, which are placed on the bidding process organizer.

**Conclusions.** In my opinion, the shortcoming of the relevant legal provision is one of the greatest obstacles to successful development of the derivative market in Ukraine. The practice of the functioning of the Ukrainian term market is going ahead of its regulatory framework. Current regulation is imperfect, it does not take into account the world experience of the application of the term. The reasons for this situation lie also in

the absence of a unified approach to terminology (parallel use of terms “derivative securities” and “derivatives”, “options” and “option certificates”). So, in the Civil Code of Ukraine and the law of Ukraine «About state regulation of securities market in Ukraine» used the term «derivatives of securities», while not stated exactly what securities related to derivatives.

The term «derivative» is used in the tax code, which is characterized as a standard document that certifies the right and/or the obligation to buy or sell securities in the future, tangible or intangible assets, as well as funds for defined him. In the tax code applies the term «option», and not «an option certificate» which is as recorded by the regulative documents of the National Commission on securities and stock market Commission, which adopted in 2009, and this approach, in our view, is not conducive to the development of a civilized and modern market of derivatives. Now the participants of term contracts must prove that «an option certificate» is the same as «an option», although the definition of option certificate has nothing to do with the definition of the option in the Tax code. However, the main problem is the absence of a special law about derivatives, which clearly regulate their circulation and set prices for them. First of all, such a law is needed to limit cases of the release of several derivatives on one basis or at disclosure of such facts for all participants of the derivative market. Prospects for further research are the development of recommendations on improvement of special legislation on derivative pricing.

1. Bjork T. (2009) Arbitrage theory in continuous time. Oxford University Press.
2. Eckner A. (2010) Risk premia in structured credit derivatives. Working paper. Stanford University.
3. Ghamami S. and Goldberg L.R. (2014) Stochastic Intensity Models of Wrong Way Risk: Wrong Way CVA Need Not Exceed Independent CVA. Journal of Derivatives, 21:24{35.
4. Hull J. and White A. (2012) CVA and Wrong Way Risk. Financial Analysts Journal, 68(5):58{69.
5. Li M. and F. Mercurio F. (2015). Jumping with default: wrong-way-risk modeling for credit valuation adjustment. Working paper.
6. Ivashchuk N.L. (2010) Economic-mathematical modeling of processes of pricing custom options. Doctoral thesis. Lviv Ivan Franko National University, Lviv.
7. Hnyliak V.O. and Solodkiy M.O. (2012). Exchange commodity derivatives: theory, methodology, practice. Ahrar Media Group, Kyiv, Ukraine.
8. Yavorska V.O. (2012) Development of exchange-traded derivatives market in the conditions of economic globalization, Vistnyk KrNU named after M. Ostrogradskiy, Vol. 6/2014 (89), Part 2.
9. Kostrach L.M. (2010) Application of option contracts as financial derivatives, Zbirnyk naukovykh prats Natsionalnoho universytetu der-gavnoi podatkovoi sluzhy Ukrainy, Vol. 2. Electronic source. Available at: [http://www.irbis-nbu.gov.ua/cgi-bin/irbis\\_nbu/cgiirbis\\_64.exe?Z21ID=&I21DBN=UJRN&P21DBN=UJRN&S21STN=1&S21REF=10&S21FMT=juu\\_all&C21COM=S&S21CNR=20&S21P01=0&S21P02=0&S21P03=0&S21COLORTERMS=0&S21STR=znprnudps](http://www.irbis-nbu.gov.ua/cgi-bin/irbis_nbu/cgiirbis_64.exe?Z21ID=&I21DBN=UJRN&P21DBN=UJRN&S21STN=1&S21REF=10&S21FMT=juu_all&C21COM=S&S21CNR=20&S21P01=0&S21P02=0&S21P03=0&S21COLORTERMS=0&S21STR=znprnudps).
10. Kalach H.M. (2012). The stock market of Ukraine: tendencies and contradictions of development, nats. univ. DPS, Irpin, Ukraine.
11. Esh S.M. (2009). Financial market. Tsentri uchbovoi literatury, Kyiv, Ukraine.
12. Solodkiy M.O. and others (2013). Stock market: the problems of functioning and the trend of innovation development, KOMPRINT, Kyiv, Ukraine.
13. Verbitska I.I. (2013) Hedge of currency risks, Staly rozvytok ekonomiky, Vol. 4, PP. 374-380.
14. Shilga O.O. (2008). Problems and prospects of the application of financial derivatives on the stock market of Ukraine, Naukovi pratsi NDFI, Vol. 4 (45), pp. 146-151.
15. Levenko A.M. (2008). Indicators of a crisis in the stock market. Electronic source. Available at: <http://ena.lp.edu.ua:8080/bitstream/ntb/7718/1/83.pdf>
16. Derivatives Market Surveys [On-line] // World Federation of Exchanges & International Options Market Association: [web-page]. – Access at: <http://www.world-exchanges.org/files/statistics>.
17. Triennial and semiannual surveys: OTC derivatives statistics [Online] // Bank for International Settlements: [web-page]. – Access at:<http://www.bis.org/publ/otc>.
18. Knop R. (2002) Structured Products : A Complete Toolkit to Face Changing Financial Markets. New York: John Wiley & Sons.
19. Das S. (2001) Structured products and hybrid securities. New York: John Wiley & Sons.
20. Omelchenko V.V. (2010) Retail valuation of structured financial products. Ph. D. Thesis. State university "High school of economics", Moscow, Russia.
21. Mereminskaya E. and Kamara S. (2012). Radiation has frightened investors. Electronic source. Available at: [www.gazeta.ru/financial/2011/03/15/3555081.shtml](http://www.gazeta.ru/financial/2011/03/15/3555081.shtml).
22. Kalchenko I. (2007). Historical development of derivatives, Yuridichna Ukraina, Vol. 7. PP.69-79.
23. National commission of securities and stock market. – [web-page]. – Access at:<http://www.ssmc.gov.ua/>
24. Dehtiarova N.V. (2011). Problems of development of the Ukrainian term market, Finansy, oblik, audit, Vol. 18, PP. 68-75.

1. Bjork T. Arbitrage theory in continuous time. Oxford University Press, 2009.
2. Eckner A. Risk premia in structured credit derivatives, 2010. Working paper. Stanford University.
3. Ghamami S. and Goldberg L. R. Stochastic Intensity Models of Wrong Way Risk: Wrong Way CVA Need Not Exceed Independent CVA. Journal of Derivatives, 21:24{35, 2014.
4. Hull J. and White A. CVA and Wrong Way Risk. Financial Analysts Journal, 68(5):58{69, 2012.
5. Li M. and F. Mercurio F. Jumping with default: wrong-way-risk modeling for credit valuation adjustment, 2015. Working paper.
6. Івашук Н. Л. Економіко-математичне моделювання процесів ціноутворення нестандартних опціонів: дис. д-ра. екон. наук: 08.00.11 «Математичні методи, моделі та інформаційні технології в економіці» / Наталія Леонідівна Івашук; Львівський національний університет імені Івана Франка. – Львів: – 2010. – С. 272.
7. Гниляк В. О. Біржові товарні деривативи: теорія, методологія, практика: монографія / В. О. Гниляк, М. О. Солодкий. – К.: Аграр Медія Груп, 2012. – С. 12.
8. Яворська В. О. Розвиток біржового ринку деривативів в умовах світової економічної глобалізації/ В. О. Яворська // Вісник КрНУ імені Михайла Остроградського. Випуск 6/2014 (89). Частина 2. – С. 123–127.
9. Кострач Л. М. Застосування опціонних контрактів як похідних фінансових інструментів / Л. М. Кострач // Збірник наукових праць Національного університету державної податкової служби України. – 2010. – Випуск 2. – [Електронний ресурс]. – Режим доступу: [http://www.irbis-nbu.gov.ua/cgi-bin/irbis\\_nbu/cgiirbis\\_64.exe?Z21ID=&I21DBN=UJRN&P21DBN=UJRN&S21STN=1&S21REF=10&S21FMT=juu\\_all&C21COM=S&S21CNR=20&S21P01=0&S21P02=0&S21P03=0&S21COLORTERMS=0&S21STR=znprnudps](http://www.irbis-nbu.gov.ua/cgi-bin/irbis_nbu/cgiirbis_64.exe?Z21ID=&I21DBN=UJRN&P21DBN=UJRN&S21STN=1&S21REF=10&S21FMT=juu_all&C21COM=S&S21CNR=20&S21P01=0&S21P02=0&S21P03=0&S21COLORTERMS=0&S21STR=znprnudps).
10. Калач Г. М. Фондовий ринок України: тенденції та суперечності розвитку: монографія / Г. М. Калач ; ДПС України, Нац. ун-т ДПС України. – Ірпін, 2012. – С. 13.
11. Еш С. М. Фінансовий ринок: навч. посіб. для студ. вищ. навч. закл. / С. М. Еш. – К.: Центр учбової літератури, 2009. – С. 48.
12. Біржовий ринок: проблеми функціонування та тенденції інноваційного розвитку: [монографія / за заг. ред. М. О. Солодкий та ін.]. – К.: КОМПРИНТ, 2013. – С. 79.
13. Вербіцька І. І. Хеджування валютних ризиків / І. Вербіцька// Сталій розвиток економіки. – 2013. – № 4. – С. 374–380.
14. Шульга О. О. Проблеми та перспективи застосування похідних фінансових інструментів на фондовому ринку України / О. О. Шульга // Наукові праці НДФІ. – 2008. – № 4 (45). – С. 146–151.
15. Левенко А. М. Індикатори кризи фондового ринку/ А. М. Левенко. – [Електронний ресурс]. – Режим доступу: <http://ena.lp.edu.ua:8080/bitstream/ntb/7718/1/83.pdf>.
16. Derivatives Market Surveys [On-line] // World Federation of Exchanges & International Options Market Association: [web-page]. – Access at: <http://www.world-exchanges.org/files/statistics>.
17. Triennial and semiannual surveys: OTC derivatives statistics [Online] // Bank for International Settlements: [web-page]. – Access at:<http://www.bis.org/publ/otc>.
18. Knop R. Structured Products: A Complete Toolkit to Face Changing Financial Markets / R. Knop. – New York: John Wiley & Sons, 2002. – P. 78.
19. Das S. Structured products and hybrid securities / S. Das. – New York: John Wiley & Sons, 2001. – P. 10.
20. Омельченко В. В. Оценка стоимости розничных структурированных финансовых продуктов: дис. ... к-та экон. наук: 08.00.10 «Финансы, денежное обращение и кредит» / Владимир Владимирович Омельченко; Государственное образовательное бюджетное учреждение высшего профессионального образования «Государственный университет Высшая школа экономики». – М., 2010. – С. 35.
21. Мереминская Е. Радиация напугала инвесторов/ Е. Мереминская, С. Камера. – [Електронний ресурс]. – Режим доступу: [www.gazeta.ru/financial/2011/03/15/3555081.shtml](http://www.gazeta.ru/financial/2011/03/15/3555081.shtml).
22. Кальченко І. Історичний розвиток деривативів / І. Кальченко // Юридична Україна. – 2007. – № 7 С. 69–79.
23. Офіційний сайт Національної комісії з цінних паперів та фондового ринку. – [Електронний ресурс]. – Режим доступу: <http://www.ssmc.gov.ua/>
24. Дегтярьова Н. В. Проблеми розвитку українського строкового ринку / Н. В. Дегтярьова // Фінанси, облік і аудит. – 2011. – № 18. – С. 68–75.