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HISTORICAL DEVELOPMENT OF DERIVATIVES' UNDERLYING ASSETS

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Abstract

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The derivative transactions are able to eliminate the unexpected risk arising from the price volatility of the asset. The need for risk elimination relates to the application of derivatives.
This paper is focused on derivatives' underlying assets themselves. With the plain description, supported by progressive summarization, the authors analysed the relevant theoretical sources, dealt with derivatives, their underlying assets and their development in centuries. Starting in the ancient history, 2000 BC, the first non-standard transaction, very close to today's understanding of derivatives, becomes to be closed between counterparties. During the time, in different kingdoms and emporiums, derivatives started to play a significant role in daily life, helping to reduce the uncertainty of the future. But the real golden era for derivatives started with the so called *'New derivative markets'* and computer supported trading. They have extended their form from simple tools to most complex structures, without changing their main purpose hedging and risk – reduction.
For the main purpose of this paper it is impossible to split the development of derivatives from the very wide extension of underlying assets. The change of these assets was one of the main drivers in derivatives development. Understanding of the dynamic character of these assets helps to understand the world of derivatives.

assets, derivatives, forwards, futures, options, underlying assets

Derivates are used as a tool for risk management since time immemorial; since these derivatives facilitate the transfer of risk, hence have a positive impact on the economic system (Riederová, 2011).

Increased risk and uncertainty may cause a loss in a company; therefore, derivatives may provide a solution to hedge against the price volatility of the asset (Vashishtha and Kumar, 2010). Originally, the derivative contracts were used to hedge against the risk related to underlying assets such as incorporeal property, metals, or agriculture products. Of course, in the remote past, the underlying asset had a different form from today's instruments. Even if these derivatives have certain attributes in common compared to the today's derivatives, over time, the historical derivatives underwent rapid changes, especially in the context of today's Internet and technological society.

In the history, there were many milestones in the derivatives development. Many of them are connected with general historical landmarks, such as the adoption of the Declaration of Independence in U. S. (1776), French Revolution (1789–1799), stock market crash in 1929 (followed by the Great Depression), the first/second World War (first half of 20th century) or internet-fever in 1996–2001.

Despite the fact that the derivatives experienced the increase in their prevalence mainly in the last century, their roots date back to the past. In retrospect, the first coherent usage of derivatives was mentioned before the time of Christ. There are stories from the ancient Greece and Rome, and even from the Old Testament, describing the first usage of derivatives. Nevertheless, these stories are rather insufficiently based. Over time, the underlying asset has changed just as the environment and the interaction of demand and supply forces.

Derivative contracts obtain a more precise role; they offer a solution to the problem of risk caused by variations in the prices of the underlying assets. This underlines the importance of derivatives to effectively transfer the risk in a company.

As these derivatives do not have any independent value, their value is derived from the underlying asset. This article attempts to discuss the underlying asset development, types of traded underlying assets, historical landscapes influencing the derivatives, their trends and importance to comprehend the context of underlying base development. This article follows from the scientific publications of the authors.

MATERIALS AND METHODS

There are many approaches and perspectives in the broad field of derivatives research. For the purposes of this article elaboration, we analyzed the contemporary scientific publications and then synthesized the relevant areas, in the historical context. As a supporting method, the progressive summarization was employed, mainly due to phenomena examination. The pertinent information was extracted from the electronic databases resources, as the secondary source of information. This information serves as a base for inductive reasoning and a schema composition which summarises our findings. The article has a merit of theoretical and methodological layers, especially in the field of finance and economic sciences.

RESULTS AND DISCUSSION

Initially, the consideration of the historical development of the derivative base needs to be done. For these purposes, this subchapter is organized in the three parts dedicating to the development of derivatives contracts in the historical context. These parts deal with particular historical periods which have certain phenomena in common.

Beginnings of the derivatives

The logic of the derivative instruments may be seen around 2000 BC in the Middle East. There was a document in Assyria in the Hammurabi's reign, authorizing the *bearer to receive in 15 days in the City of Eshama on the Tigris 8 ½ minae of lead deposited with the Priestess of the Temple* (Einzig, 1970, 15). This contract can be considered as a first evidence of a derivative trading. It was an option in today's terminology.

However, there is more recognizable evidence, even in the Bible about the year 1700 BC. In the Genesis, chapter 29, Jacob bought an option for seven years of his labour as a guarantee of getting married with Rachel, Laban's daughter (Chance, 1998). Although Jacob in this story ended up with two wives, he did derivative contracts and the underlying asset was his own labour.

During the Greek civilization, Aristotle in his Politics (332 BC) provides another evidence of derivatives before the time of Christ involving philosopher Thales the Milesian. He purchased options on olive pressers and based on his astronomical calculations he amassed a fortune (Chance, 1995; Poitras, 2001). Thales and his transaction can be considered as a creator of option contracts and early example of OTC derivatives[1].

However, in ancient Greek and Rome, the roman emperors entered these contracts to provide the people with their supply of grain from Egypt (Chance, 1995; Poitras, 2001). In these times, Egypt was a part of ancient Rome and for its fecundity became the granary of the ancient world. According to the authors' opinions, this was the first real underlying asset in the form of grain.

However, as the time goes by, the derivative contracts have more and more features in common with standardized derivatives of today. While the derivatives before the time of Christ have a trace of myths and the underlying assets were services (incorporeal nature, Jacob's labour, etc.), the derivatives arising in our time can be regarded as widely used instruments, in the form of underlying assets as wool, rice, grain, cotton, metals or farm animals. One of such an example can be considered the Holland and Italy in the 12th century. This medieval society featured crude forms of derivative contracting (Poitras, 2001). The manorial lords agreed to provide their services, i.e. some protection from attacks, to another people in exchange for payments in agricultural products; however, these products had not been produced yet. So called "letters de faire" were broadly used instruments enabling future delivery of the goods (Poitras, 2001). The method of such a procedure was based on the sampling of particular goods determined for a sale. In this case, the underlying asset was a commodity and there was low – or no – need for initial investment. Just as today's derivatives, these contracts provided the buyer with their quality and price in advance.

In the medieval England, there were Cistercian monasteries trading with foreign merchants based on wool contracts (Donkin, 2001). It is curious; they were selling them the wool even twenty years ahead of time.

The important milestone in the field of derivative trading was the formation of centralized markets for commodity trading. The first objective was to facilitate the trading. The greatest expansion of such markets was noticed in Italy (Lucca, Genova, Florence, Venice, Milan) (Borsa Italiana, 2011). Fully developed bourse trading in commodities emerged in Antwerp, in 1531, followed by the English bourse

1 OTC derivatives have less standard structure and are traded in the so-called over-the-counter (OTC) derivatives markets

The Royal Exchange (1565) enabling the trading with forward contracts (NYSE Euronext, 2011). However, at the same time in Rome, there were also markets featured form of bourses, with specific location and time for trading (Borsa Italiana, 2011), similarly as on the bourses in Italy and England.

In the 1650 in Japan appeared the first future contracts. These contracts were closely connected with Yodoya Keian, who was able to precisely specify the rice price and based on that he contributed to the formation of the first future bourse of rice in Osaka, Japan (Poitras, 2001). Nevertheless, his acting were not supported by the government, so another records from Japan dated back to the end of 17th century, where the first institutionalized bourse for rice Dojima was formed (Tokyo Grain Exchange, 2011). These coupons were called "empty rice", as these contracts had the typical features of today's future contracts, and it was not an exception to trade even more rice than it is presented in Japan.

Whereas in 17th century in Japan people traded with rice, in Europe, especially in Holland, people traded with tulips. Despite the risk of OTC trading, the forward and option contracts had prospects for growth. These transactions did not impress only the prospective buyers, but also the speculators (Poitras, 2001). These contracts were actively traded by speculators, usually by individuals either directly or indirectly involved in trading these tulips, pushing the price up. This tulip mania was present not only on the biggest market in Europe, London, but also in Amsterdam, important financial centre for the society then, which was later exposed to the financial breakdown. This derivative market based on the tulip prices in the form of forward or option contracts became one of the oldest commodity markets ever. In 1637 this bubble burst, many traders ended up in bankruptcy and many speculators suffered a loss (Chance, 1998). The tulip case caused harm for all Dutch economy.

Modern markets for derivatives

Modern markets for derivatives are connected with the historical situation in U.S.A., in 18th century. After the adoption of the Declaration of Independence (1776) and recognition the independence of the United States by Great Britain (1783) became the United States a strong partner for this kind of trading. Whereas in 1848 the California Gold Rush culminated, in Chicago was created the first formal commodities exchange, the Chicago Board of Trade (CBOT), which is probably the major event for futures market with grain. CBOT solved the problem of credit risk and provided centralized location to negotiate forward contracts (Pathak, 2011). Due to the volatility of the quantity during the year, the "to-arrive" contracts were traded, representing permission to traders to lock in the price and deliver the grain later (Kolb and Overdahl, 2010). Moreover, these contracts proved as an effective tool for hedging and speculating on price volatility of the grain. Soon the benefits of such a trading were recognized by wide public and the standardization in the form of the first clearinghouse was formed. Today, we can recognize that there were three pillars of trading. First pillar introduced the future contracts in standardized form, i.e. quality, time and place of delivery; second pillar dealt with the clearinghouse formation, i.e. presence of intermediaries, guaranteed the fulfilling of the trading rules, and the third pillar involved a putting down a deposit. The underlying asset was not only the grain, but also the flour, hay, corn, or seed, nevertheless, in the tangible form of agricultural goods.

Later on, in 1870 the New York Cotton Exchange (NYCE) was founded and in 1874 the Chicago Produce Exchange, the predecessor of Chicago Mercantile Exchange (founded in 1919), was established. CME was the greatest bourse for derivative trading ever and can be considered as a spin-off of CBOT (Pathak, 2011). Originally, it was intended for agricultural goods trading, however, as the importance of financial derivatives rising, the commodity trading descended to the 3% of the overall trading capacity.

Derivatives in the 20th century

The 20th century involves two world wars, and the perspective for derivative trading did not begin favourable either. Many small operators emerged and they were known as fraudsters taking money from derivative transactions and disappeared suddenly. During these first decades, options, futures and various derivatives were banned from time to time in Japan, Europe and even in United States (Chance, 1995), therefore, any effort to regulate these markets needed to be done. The first half of 20th century ended up balancing with the repercussion of the Great Depression, which were intensified by the post-war consequences.

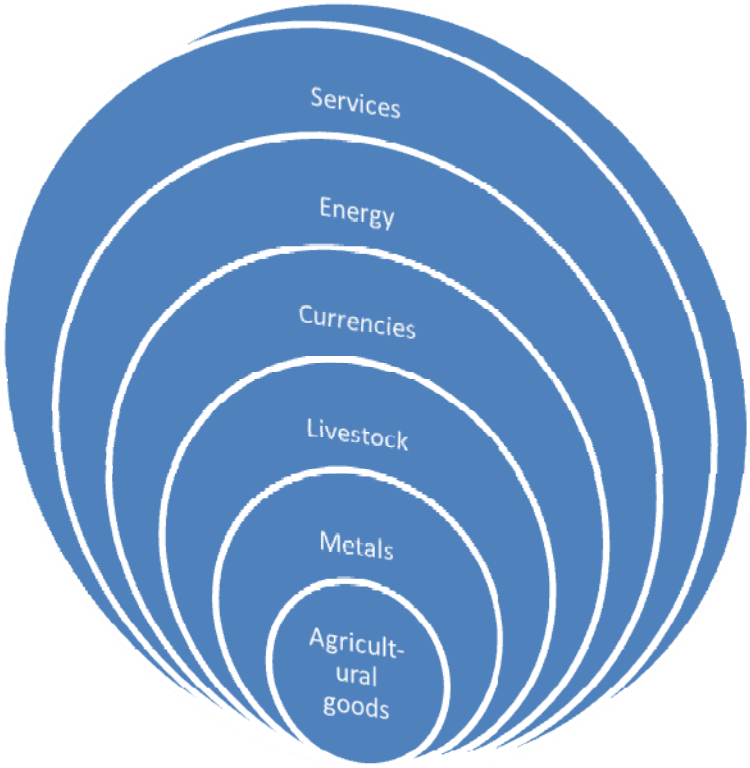
The second half of the 20th century commenced with two significant events in the future markets (Chance, 1995). In 1955 the Supreme Court ruled that profits from hedging are treated as the ordinary income and onion futures were banned. While during the WWII was the trading in Japan out of operation, during the 1950s, the silk trading in Yokohama was re-established and later on the textile bourse in Tokio was founded, followed by the rubber bourse and grain bourse (Tokyo Grain Exchange, 2011).

Despite the fact that the first future contracts on non-agricultural commodity appeared in 1933 on Commodity Exchange – silver, the growth of this trading began in 1950s, on London Metal Exchange – iron, New York Mercantile Exchange (NYMEX) – platinum, later on palladium (NYSE Euronext, 2011). The underlying asset was slowly changing from incorporeal property, over the agricultural goods to the metals. Whereas 1960s were typical with livestock trading (CME) or wool trading (Australia), the 1970s were focused on foreign currencies (on CME in 1972), treasury bills (on

CME in 1976) and interest rates (on CBOT in 1975) (CME Group, 2011), which had the incorporeal character, again. Although the financial centre of the world then was New York, Chicago experienced an expansion of futures and options contracts. In the centre of the interest stood foreign currencies, which were previously related to the dollar (since 1944), as dollar was related to gold. However, as the American economy grew the need for more flexible system too. In 1971, President Nixon terminated convertibility of the dollar to gold. The prices of currencies started to oscillate individually, as the prices of the commodities. As a consequence, the need for hedging grew and the market answered by the offer of such service (Chance, 1995). It was not only the underlying asset, which had changed, but also the derivatives instruments hence the derivatives markets. Members of CME decided to standardize the currency trading by foundation of International Monetary Market (IMM), in 1972. CBOT had not any standards on options trading; nevertheless the Chicago Board Options Exchange (CBOE) was established as a spin-off CME and CBOT (Pathak, 2011). Besides the option expansion, many innovations had emerged during 1970s. One of such an innovation is the IMM foundation with incorporeal property trading. Another example of innovation in 1970s was publishing of Black-Scholes model in 1973 as an outcome of cooperation with the primary objective to find out the price of options contracts (Black and Scholes, 1973; Pathak, 2011). Finally, in 1971, the NASDAQ Stock Market was founded as the world's first electronic stock market. Towards the end of 1970s and 1980s, apart from currencies as underlying assets, the derivative contracts on energy came forth (NYMEX), i.e. 1978 – fuel oil, 1981 – petrol, 1983 – diesel, 1987 – propane, 1996 – electricity. The volume of derivative trading grew gradually over the volume of prompt trading. All innovative instruments had the underlying asset in the form enabling physical delivery.

Inevitably, this expansion of derivative trading caused a need for organization, control and setting rules in the world-wide context. Therefore, in the mid-1980s International Swaps and Derivatives Association (ISDA) was established (Mishkin, 2010). Whereas in 1970s many new derivative instruments emerged, in 1980s were typical in using these new instruments on various new underlying assets. In 1982 began trading with options on sugar, and futures on gold.

The end of 20th century witnessed the formation of new kinds of derivative trading. In 1980s and 1990s the options on share indexes, currencies, bonds, futures and interests swaps (Flavell, 2010). At the end of 1990s, one can trade even the derivatives on weather. Close of the 20th century, the competition was tough and trading with derivatives exploded with the growth of IT/IS (Giddy, 1994). The logic of derivative trading had changed from simple protection against price volatility of the underlying assets to protection against financial risk connected with the unexpected price volatility of shares, bonds, or currency exchange rate. 1980s, however,



1: *Expansion of underlying assets*

noticed the appearance of new instrument called swaps (Pathak, 2011). The rise of swaps and another OTC derivatives contracts was caused by their complexity compared to other derivatives.

In 1990s, the expansion of swap contracts continued, firstly in the terms of currencies, later on interest rates. As a consequence of tough competition from previous years, many exchanges merged. Towards the end of 20th century, new underlying assets were used, i.e. T-notes, stock exchange indexes, indexes of city's bonds. New derivatives emerged, i.e. derivatives with underlying assets of other derivatives, options on currency futures, options on futures on currency indexes, options on swaps or credit derivatives. All the 1990s can be from today's perspective called a globalization period.

CONCLUSIONS

Development of derivative underlying asset underwent a transformation in the terms of its form. Initially the underlying asset was in the form of agricultural goods; however, the very first mention of trading meeting the basic features of derivatives was connected with incorporeal assets like labour, about the year 1700 BC. As developed the derivative instruments, the underlying asset has changed, too. First derivative contracts on non-agricultural goods appeared in 1900s, the metals experienced growth in trading in 1950s. Later on, one could trade with derivatives on livestock, foreign currencies, treasury bills or interest rates. Volume of derivative trading grew rapidly, i.e. derivative contracts on energy were brought about by the technological progress of 1980s. The end of last century experienced derivative trading on share indexes, T-notes, stock exchange indexes or indexes of city's bonds. New hybrid derivatives emerged, i.e. derivatives with underlying assets of other derivatives, options on currency futures, options on futures on currency indexes, options on swaps or credit derivatives. Fig. 1 describes this extensive development of underlying asset for derivative trading.

SUMMARY

The main focus of this paper was given to the derivatives and their development, as well as to the changing character and development of underlying assets.

The walkthrough the history of derivatives started in 2000 BC. Even in this period of time, we are able to trace back some spurs of transactions, which can be called for derivatives. But the first, real important milestone in the field of derivative trading was the formation of centralized markets for commodity trading. In 16th century, the Italy and England were able to trade with help of forward contracts. In the late 17th, Japan came with first futures, closely connected to the rice market. Already in this era, we can find the first written documents about futures – speculations. The real jump forward means for derivatives the 18th century. The new established USA market with Chicago's CBOT – the biggest bourse for grain trading – was significant pulse for wide spreading of derivatives. Next steps as New York NYSE and Chicago's CME in 19th century could be taken as a logical conclusion, following the successful CBOT example.

The 20th century is specific not only because of two world wars. Specific activities, leading to the control of derivative markets has been taken in several countries. The start of London's LME and New York's NYMEX was the trigger for start of trading metals. In the middle of 20th century, the Black-Scholes formula was formulated, allowing to traders the real pricing of their products. As a highest regulatory institution of derivative markets, the ISDA has been established.

The end of 20th century witnessed the formation of new kinds of derivative trading – options on share indexes, currencies, bonds, futures and interests swaps. At the end of 1990s, one can trade even the derivatives on weather. Close of the 20th century, the competition was tough and trading with derivatives exploded with the growth of IT/IS. Today are the derivatives most complex products, offering a wide spread of opportunities, but combined with certain risk.

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