

FAILURE OF THE CONTROL MECHANISMS IN US BANKS DURING THE CRISIS AND SPREAD OF THE FINANCIAL CRISIS INTO THE WORLD THROUGH STRUCTURED PRODUCTS

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Abstract: The aim of this paper is to explain the role of structured products, particularly CDOs (Collateralized Debt Obligation) and its modifications to the rise of the international financial crisis since 2008. In that year, a large investment group Lehman Brothers went bankrupt, which rocked the global capital markets, and subsequently a negative sentiment about the quality of loan portfolios was extended, especially of mortgage banks in the US, which by means called moral hazard, increased the value of mortgage loans. The capital guarantee of the largest mortgage banks and insufficient control of federal authorities resulted in the uncontrolled growth of unsecured mortgages and growth of CDO emissions that were linked to these loans. Granted state aid supplies needed liquidity to the banks through emergency programs.

Keywords: structured product, role, interconnectedness of capital markets, CDO, VAR.

1 Introduction

The aim of this paper is to explain the role of structured products, particularly CDOs and its modifications to the development of the international financial crisis since 2008.

The work is based on the following assumptions:

1. Structured financial product is by its nature a complex financial instrument, carrying a significant risk to the buyer (investor), particularly CDO, where the underlying asset consists of either an individual or entire packages of mortgage loans.
2. The financial problems of US banks, which were related to their loan portfolio. Decline of market capitalization was demonstrated on a sample of the largest US banks. Some banks were forced to be adopted by the federal authority, some have managed to withstand this situation and some ended their existence.
3. Interdependence of capital markets, namely the stock indexes DJI, EuroStoxx50 and NIKKEI that represent the capital market in the US, Europe and Japan during the crisis spread since September 2008 - December 2009, with the assistance of the VAR model with the application of shock (crisis).

2 Structured products

Structured financial products, as their name suggests, have a certain structure, which is dependent on many parameters. These products are concisely defined by Federal Reserve Bank of Chicago, which defines such products as: "Unlike derivatives, whose value depends on underlying assets are structured products hybrids that share elements of direct debt instruments and derivatives. Rather than to pay out a fixed or floating coupon, the interest payments of these tools are adjusted to countless possible indicators and courses."¹ Structured products are created through the so-called securitization of assets, which is the process by which this transition of assets (such as bank loans granted) on securities (so-called ABS = Asset-Backed Securities) occurs, which are intended for further trading. For this purpose it is necessary to establish a so-called Special Purpose Vehicle (SPV hereinafter), which is essentially an investment bank, and through this SPV issue coupons, which will be bought by other investors. These coupons include e.g. granted loans. As the granted loans are repaid, the bank

gradually repays coupons on vouchers to investors, but it does carry the potential risk that the granted loans will not be repaid. This risk is delegated to the investors themselves.

2.1 General risks of structured products

Duis Risks of these products are not largely different from the general risks associated with other financial instruments.

The most important common risks are:

- **Credit risk (issuer risk):** This risk is linked to the issuer's inability to honor its commitment. An investor or buyer of the product eliminated the risk that is associated with the underlying asset (with some kinds of these assets in the portfolio), but still faces the risk that arises from insufficient capital strength of the issuer. Currently, the vast majority of issuers of structured products are large banks of investment nature. Ways to reduce this risk is to diversify the portfolio with the aim to spread the risk to different issuers.
- **Currency risk:** This risk involves e.g. denomination of structured product in other than domestic currency. For example, while depreciation of the currency, the value of investment in such product decreases. The opposite situation can be a currency revaluation where there is a foreign exchange gain. Structured products - IRS etc. have currency swaps that can mitigate this risk to some extent, but this way of ensuring through financial derivatives is very expensive and by its very nature it is the initial loss.
- **Market risk:** This risk is associated with price movements on capital markets. The essence of this risk is the development of market prices versus our expectations. For example, a bond is inversely related to interest rates. When interest rates fall, prices of bonds grow and vice versa when interest rates rise, the prices of bonds fall. Investors abandon their positions and buy bonds with higher yields, thereby push bond prices up.²

2.2 Structured product CDO

By securitization of mortgage loans a structured product called CDO (Collateralized Debt Obligation) was originated, which was emitted by large mortgage banks and sold on the capital market. The purpose of these financial products was to obtain funds by selling packages of mortgage loans with long maturities, and thus earn twice (in interest on the principal of mortgage loans and from the emission of these products). The price of these CDOs was created on the stock exchange and was traded at market prices.

CDOs are divided into several types:

- **Collateralized Loan Obligations (CLO):** Underlying asset in this case is an ordinary loan provided to ordinary citizens, businesses, and cities.
- **Commercial Real Estate (CRE CDO) Underlying asset are realties.**
- **Collateralized Bond Obligations (CBO) Underlying assets are corporate bonds that are complemented by the bonds of emerging countries.**
- **Structured Finance CDOs (SFCDO):** Underlying assets are assets covered by tangible fixed assets.³

As is apparent from the very characteristics, these structured products are very risky, because underlying asset are loans, mortgage loans and other assets with long maturities, or a complicated appreciation of quality. The issuer of these products

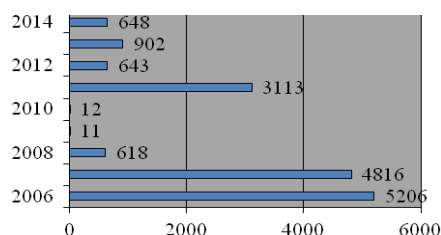
¹ McCANN, Karen and Joseph CILIA. Product Summary:Structured Notes. *Federal Reserve Bank of Chicago*. [Online] 1994. [2016-30-03]. Available: <http://web.cen.et.org.cn/upfile/84726.pdf>.

² SVOBODA, Martin a David ROZUMEK. *Investiční certifikáty*. Praha: Komise pro cenné papíry, 2005. ISBN 80-239-5317-6, s. 7-8.

³ REJNUŠ, Oldřich. *Finanční trhy*. 2., rozš. vyd. Ostrava: Key Publishing, 2010. *Ekonomie* (Key Publishing). ISBN 978-80-7418-080-4, s. 610-613.

transfers the risk to the purchaser, and thus deprives potential losses. The problem was that these were large tranches of billions of volumes and such emissions only other banks, pension funds, mutual funds and similar could afford to buy. Furthermore, the managers of these issues not only merged various loans and created the CDO, but they also combined them into several CDO packages and created so. CDO², CDO³ i.e. CDOs that contained one or two other CDOs where the underlying assets were e.g. corporate bonds or government bonds. These combinations logically resulted in complicated valuation and thus the investment mistakes occurred when investors had very little information about the true structure of these structured products.

Fig. No. 1: The value of worldwide CDOs issued in the period 2000-2010 (in mil. USD)⁴



From this graph results that the largest volumes of emission of these products occurred in 2006-2007. The largest volume of emissions was in the year 2006. In 2008 there was a sharp reduction in emission volumes of these structured products. A rapid decrease in the amount of these emissions is, in my opinion, caused by a loss of confidence in these products, which recorded greatest losses in the times of crisis, since the mortgage market in the US collapsed due to defaults on mortgage loans (subprime). The biggest mortgage lender Fannie Mae, Freddie Mac was placed under government control, and the US National Bank (FED) provided the capital to rescue the US mortgage market.

3 The financial problems of US banks

After the collapse of financial giant Lehman Brothers in September 2008, problems with bad loans began to relate to investment and mortgage banks, which applied what is called moral hazard before the crisis, which is something that we can incorporate into the mechanisms of expansion of the mortgage crisis in the US to Europe, though it is not directly related to this. This moral hazard related to the irrational behaviour particularly of banks. With the securitization processes and the emergence of CDOs and other products this moral hazard swelled to enormous proportions. The U.S. Securities and Exchange Commission (SEC) has allowed investment banks to raise debt, enabling to raise the leverage of 15 : 1 to 40 : 1, which means that a very small decrease in assets values would mean a catastrophic loss.⁵

Tab. No. 1: The largest US bank by market capitalization (in millions of dollars)⁶

Name of the bank	2006	2009
Citigroup	286 337	17 016
Bank of America	251 872	68 660
JP Morgan Chase	172 872	148 484
Wachovia Corp.	114 542	Bankruptcy
Merril Lynch	82 235	Takeover
Fannie Mae	130 456	Takeover
Freddie Mac	145 754	Takeover
Morgan Stanley	80 553	31 307

⁴ Its own design, data taken from Board of Governors of the Federal Reserve System. Global CDO Issuance, Annual Rate. Federalreserve.org [online]. [2016-04-04]. Available: <http://www.federalreserve.gov/pubs/ifa/2010/1010/ifa1010.htm>.

⁵ MUSÍLEK, Petr. *Trhy cenných papírů*. 2., aktualiz a rozš. vyd. Praha: Ekopress, 2011. *Ekonomie* (Key Publishing). ISBN 978-80-86929-70-5, s. 230.

⁶ INTERNATIONAL MONETARY FUND. *Resolution of Banking Crises: The Good, the Bad, and the Ugly*. *Imf.org* [online]. 2010. s. 35. [2016-01-04]. Available: <http://www.imf.org/external/pubs/ft/wp/2010/wp10146.pdf>.

The above table shows a rapid decline of the market capitalization or market value of all major banks in the US. From this list three largest mortgage banks were forced to submit to state or private surveillance (bailouts of the US government and Fed into these banks), in the case of Fannie Mae a private investor Warren Buffet bought a shareholding in this bank, and thus provided the necessary liquidity. This method of remediation was in my opinion not morally correct because it was not followed by any penalty or sanction by the competent authorities of the US Securities and Exchange Commission, the US government or the Fed, and the CDO emissions were not prohibited in the future. This gave the signal to Europe and European banks that were buying toxic assets in the form of bonds of indebted countries, to risk more, because their home country will rescue them on the principle of "too big to fail", which later happened.

4 Structured products

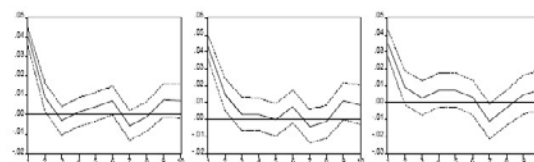
This chapter of the paper deals with the interdependence of global capital markets, since it is assumed that the interconnectedness of these markets is one of the mechanisms of spread of the crisis from the USA to Europe in 2008-2009. The capital market creates the pillar of the economy in developed countries, a place where investors seeking investment opportunities and businesses and other entities seeking capital for their business meet. Connectedness or depth gives a measure of the ability of capital market to react to the situation in the economy and in geopolitics. This interdependence will be confirmed or disproved by a simple VAR (The vector autoregression is an econometric model used to capture the linear interdependencies among multiple time series).

Model using the following assumptions and parameters:

- Equation: $y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + c + \varepsilon_t$. (y = vector of endogenous variables, A = matrix of coefficient c = vector of coefficient, ε = vector of innovation, p = order of delay of market response).
- Breusch-Godfrey test: The elimination of autocorrelation and heteroskedasticity.
- White's test and test Jarque-Beta: To test the normality of residues.
- The time series are stationary.
- The time series was selected from the period from September 2008 to December 2009, so that it reflects the period in question. Monthly frequency (total of 16 data).
- For input data stock market indexes are used: The US Dow Jones (DJ), which includes 30 highest-quality shares on the US stock market, European EuroStoxx50 containing shares of the 50 largest companies in Europe and the Japanese Nikkei.

The goal of this VAR model is to estimate connectivity using endogenous variables, i.e. a set of equity markets, and then on the basis of shocks within the vector of innovation. For calibration of this model is important the choice of delay (the reaction of stock markets), and this delay does not include autocorrelation and heteroscedasticity (= dispersion is dependent on a parameter, it is not autonomous).

Fig. No. 2: VAR reaction of DJI, Eurostoxx and Nikkei on crisis (from left to right) for the period January 2008 - December 2009⁷



⁷ Own processing (created with the help of the econometric program Eviews6) Input data (development of stock exchange indexes) taken from Patria. *Patria: Indexy* [online]. [2016-04-01]. Available: <http://www.patria.cz/indexy/home.html>.

From this graph results the symmetry of motion curves in positive values, and also in minus values. Curves are evolving in parallel almost equally. This indicates that the interconnectedness between these significant global capital markets is high and they respond to economic changes that have occurred in this period (the fall of the investment group Lehman Brothers, the collapse of structured CDO products).

5 Conclusion

The aim of this paper is to explain the role of structured products, particularly CDOs and their modifications to the development of the international financial crisis since 2008.

This paper deals with the following assumptions:

1. Structured financial product is by its nature a complex financial instrument, carrying a significant risk to the buyer (investor), particularly CDOs, where the underlying asset consists of either individual or entire packages of mortgage loans.
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First assumption was confirmed as structured products, namely CDO and its modifications are complicated because there is no known specific structure of the underlying asset. Underlying asset of these products may be either individual mortgage loans, packages of mortgage loans, but also the government or corporate bonds.

The second assumption was confirmed. CDOs were emitted in the United States and the buyers were mainly US investment banks, as evidenced by a rapid decrease in the market capitalization of all major US banks and the takeover of three banks representing mortgage market in the US. The federal government and the Fed took control of the banks (Freddie Mac, Fannie Mae) and deprived them of so. toxic assets.

The third assumption was confirmed through VAR method and simulations of shock (Lehman Brothers bankruptcy) for the period from September 2008 to December 2009. This shock has spread through the capital mechanisms and poor sentiment among investors to European and Japanese stock exchanges.

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