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FINANCIALIZATION AND COMMODITY MARKET STABILITY

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Abstract

Stability in supply of commodities is essential for manufacturing and doing business. This fact is unchangeable despite the passage of time and only the ways of trading of commodities differ. Especially in recent decades, the global economy has changed significantly and one of the major factors fueling its transformation is financialization. This phenomenon, gaining importance with the beginning of the 21st century, affects all areas of the economy. Commodity markets are not free of it either. This leads to various structural changes in terms of ways of trading, price formation and volatility in commodity markets. The aim of this article is to investigate the roots of financialization of commodity markets, and to assess its influence on their stabilitythrough investigation of time series data from 1991 to 2015 and examining correlation coefficients. The results of the study conducted for the purposes of this article depict not only the volatility of commodity markets, but also a positive correlation between prices of major commodities over the examined period and a positive correlation between prices of major commodities and equity markets from 2009 up to 2012, thus the period of recovery after the subprime mortgage crisis.

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Keywords: commodity markets, financialization, financial stability

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Introduction

The commodity markets play a significant role for the world economy, thus the recently experienced structural changes are important for the actors involved on those markets. With the ongoing financialization, the ways of trading commodities and investing in them attracts new investors, mostly originating from financial markets. This fuels the transformation of the commodity markets even further. Combined with the changes and turbulences in the world economy it may affect the stability of commodity markets. The aim of this article is to examine how financialization has impacted commodity markets and their stability. The author first reviewed the literature in order to investigate the root causes of financialization of commodity markets and to understand changes experienced by commodity markets. This has been followed by an assessment of volatility of commodity prices, which lead to a study of co-movement of commodity prices examined through correlation co-efficiencies between major commodities as well as between commodities and equity markets.

Literature review

The concept of financialization

Financialisation is a term most commonly used to describe the changes of relations between the real and financial sector in the economy. The latter starts to play a commanding role (Falkowski, 2011, p. 1). Under this term there are hidden numerous issues such as increasing debt of households, growing earnings from financial operations or a worldwide surge in mobility of capital (Stockhammer, 2010, p. 2). What is more, financialisation intensifies the transformation process of the economy, both in macroeconomic and microeconomic scale. It enlarges the role of the financial sector, distributes yields from the real sector to the financial and it is supposedly responsible for higher frequency of economic crises and makes the economy more prone to them (Palley, 2007, p. 2). However, probably the most complete definition of financialisation is given by Epstein (2005, p. 3): *"it means the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies"*.

Determinants of financialization of commodity markets

The globalisation processes of international financial markets in the 2nd half of the twentieth century is one of the milestones that enabled financialisation to happen. As a result, there was a significant increase in the scale of global capital flows, financial institutions and variety of financial instruments, especially with the growing usage of derivatives. The role of commercial banks as financial intermediaries decreased and in their place nonbanking financial institutions and institutional investors (such as insurance companies, investment funds or pension funds) gained importance (Oręziak, 2004, p. 154). However, these entities are more prone to risky ways of making extra profit, especially via using various, commonly highly complex derivatives. Nevertheless, the above mentioned structural changes in international financial markets would not be possible without the deregulation processes in the industrialized countries after the oil crises in the 1970s (Russo & Zanini, 2010).

There are many prerequisites justifying financialisation of commodity markets, which can be observed in the high volatility of commodity prices. One of the major reasons for this is the progressive distinction between financial markets and the real economy, which may be the cause of inadequate microeconomic decisions being made by investors closing deals for their production purposes. The next process is the "virtualization" of capital, highly connected with the above-mentioned separation of financial markets and the real economy. This term states that an increasing part of capital in the global economy is only in the form of digits on electronic accounts. Often this virtual money raises more money which has only a foundation in other virtual digits, unlike in the previous world economy, being covered by goods, commodities or services (Dudziński, 2011, pp. 23-24). Another factor enabling financialisation of the world economy, including commodity markets, was undoubtedly the quantitative easingused by the majority of developed countries as solutions to the subprime mortgage crises of 2007 and 2008. The policy of low interest rates by the European Central Bank, Bank of Japan and Federal Reserve System of the USA (FED)continued to flood the economies with cheap capital. Just recently in 2014 FED decided to withdraw from these policies (Rushton, 2014), while other central banks continue them. Economists and journalists

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point out that a policy of cheap capital introduced by central banks, which originally was meant to strengthen economic growth, is not as effective as it was supposed to be. This is because the major corporations and financial market investors are using cheap capital to mount a comeback of their pre-crisis positions through investments on financial and commodity markets (Warwick-Ching, 2013), whereas the governments assumed they would allocate it for investments beneficial to economic growth.

Beside changes in financial markets, dynamic growth of the emerging markets has also played a vital role in financialization of commodity markets. The biggest countries such as the People's Republic of China or India base their development on intense consumption of commodities, especially metals. Domestic enterprises in the vast majority use a material intense way of producing goods and services, for construction, infrastructure and manufacturing. According to the World Bank, China was responsible in 2009 for almost 30% of global import of copper and 25% of aluminum. But not only metals are consumed in huge quantities. In the same year, China imported over half of global production of soy and almost 30% of cotton (Roache, 2012, pp. 21-22). Moreover since 1990 consumption of industrial metals such as aluminum, copper, lead, tin, nickel and zinc (called refined metals) increased in China seventeen times (in India only two times). Chinese importance in global metal consumption of these metals rose from 5% in 1990 to 41% in 2011 (while India to around 3%). What is more, in the Chinese economy the usage of metals grew by 15% a year, while the demand in the rest of the world stood quite still. In addition, the economists from the World Bank predict that the demand for commodities (especially metals) from the Chinese economy in the second decade of the 21st century will remain high, and the latter giant - India, in the upcoming years will dynamically increase its demand for commodities (World Bank, 2012, p. 61). However, the production of metals is systematically increasing (Natural Environment Research Council, 2013), its growth is slower than the demand from Chinese enterprises. Simultaneously, the rising prices of metals being the result of increasing demand is used and artificially augmented by investors, mostly profiteers, making more and more transactions which additionally strengthens the demand, which leads again to higher prices.

The next factor gaining importance for commodity markets in recent years is the growing production of biofuels. Their usage is not a novelty, but due to new legislation introducing policies concerning sustainable and environmentally friendly growth in the USA and European Union in the first decade of 21st century, biofuel has become more popular. The combination of financial grants and growing oil prices led to development of the biofuel industry in the USA, which is the recipient of one third of US production of grains (Ke Tang & Wei Xiong, 2012, p. 64). This increases the demand for grains, and as well its prices.

The European Commission (EC) in its research predicts that to fulfill the requirements of the Europe 2020 plan (where ethanol is supposed to stand for about 10% in fuel markets in the EU, and biodiesel another 10%) there is a need to increase the global production of grains by about 2.5% for ethanol, and as well an extra 19% growth in production of vegetable oils before the year 2020. The EC also foresees that this may lead to about a 24% surge of prices for agricultural commodities being used for production of ethanol and biodiesel (De Santi, 2008, p. 17).

Changes on commodity markets

Financialization, as explained above, affects commodity markets, and as result of this process transforms them. The dynamic economic conditions of last two decades enabled a lot of investors originating from financial markets to flee into commodity markets in order to diversify their investment portfolios. Although such investments are not new, since the mid-2000s an intense pursuit of commodity investments enabling higher rates of return for financial investors took place, as it was fueled by the environment of low interest rates in the world economy (Alexander & Barbosa, 2007, pp. 46-59).

The growing interest in commodity markets can be measured by various indicators. One of the most commonly used is the value of open positions on commodity markets. From 2001 the value of capital invested on commodity exchanges has systematically risen. The flow ofcapital is allocated inalmost all available commodities, but the most popular are the ones where markets present the biggest fluidity, such as oil or gold. From the mid-1990s, in terms of the value of open positions on futures markets, WTI oil quadrupled, natural gas surged threefold and gold grew over two times (Dwyer, Gardner & Williams, 2011). However, the value

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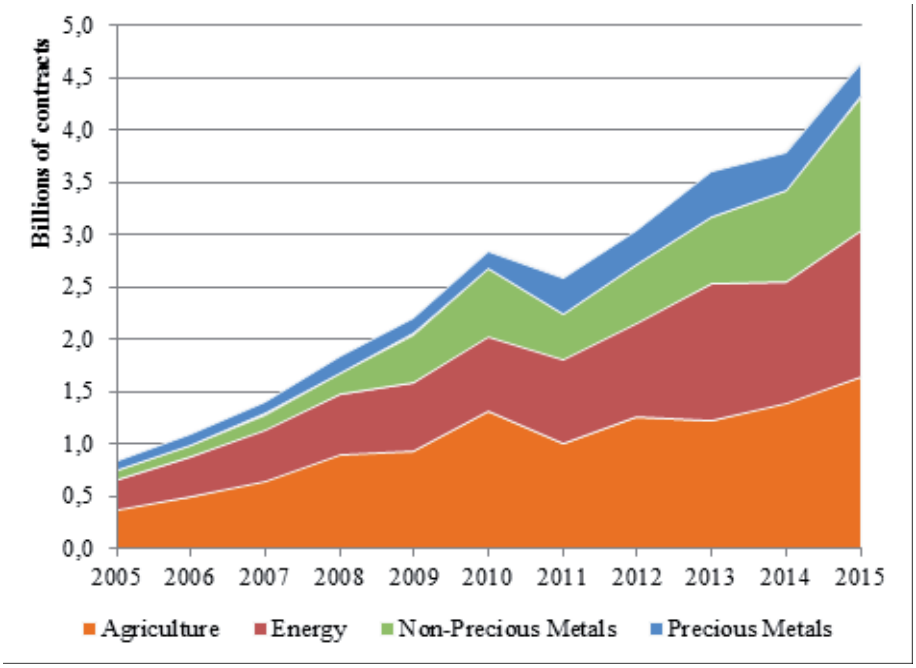
Exhibit1: Futures and options contracts traded on commodity exchanges, January 2005 - December 2015 (number of contracts, billions)



Source: Ackworth,W.(2015). FIA Annual Futures and Options Volume Survey: Asia Takes the Lead, Futures Industry Association. London, Singapore, Washington, March 2016, p. 25.

of open positions grew, a bigger increase can be observed in terms of the number of commodity futures and options contracts traded on exchanges which isdepicted in Exhibit 1. Since 2005, the volumeof contracts increased 5,6 fold from 830 million in 2005 4,6 billion contracts in 2015. There was a slight decrease observed only in 2011. It is noteworthy to mention that the highest increase in number of contracts occurred for non-precious metals, as it surged over 13 fold from 98 million in 2005 up to a substantial 1,28 billion in the end of 2015.

The notable rise of number of contracts after the year 2005 was enabled by various factors. Undoubtedly, all described drivers of financialisation of commodity markets had played some role in this situation. Nevertheless, it is also emphasized that the increase of volume of opened contracts has its origin in technological changes on commodity markets. Predominantly this is due to the development of *high frequency trading* - HFT, with the usage of algorithmic trading. HFT trading was first introduced on commodity exchanges in 2005, when this innovative way of trading had already started to play an important role on equity markets (Bicchetti & Maystre, 2012, pp. 28-29). The new technology spread quickly to other markets. For example, after introducing electronic trading, future contracts on WTI Oil the volume of contracts increased over three times, while in the meantime the possibility of electronic trading effected the decrease of non-electronic trades almost two times (Dwyer et al., 2011).

Apart from financial motives, legislation also started to support commodity investments, as in 2000 *The Commodity Futures Modernization Act* which was passed and changed the legislation.It amended US derivative markets and brought new possibilities for over-the-counter (OTC) derivatives, which were no longer under jurisdiction of CFTC. As an effect of this new law, OTC trading of derivatives could be done without position limits, transaction disclosure and supervisory obligations (de Schutter, 2010, p. 5). This was true especially prior to the outburst of the subprime mortgage crisis in the fall of 2007, in the OTC market commodity derivatives. According to data of the Bank of International Settlements (BIS, various issues), the notional amount of outstanding OTC commodity derivatives rose drastically from about 1 trillion USD to 13,5 trillions USD in June 2008. Still the same year, as an effect of a hike of counterparty risk,

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we could observe a rapid "escape" of investors from commodity OTC derivatives markets towards exchanges, as the notional amount leveled up between 3 and 4 trillion USD in the next years.

On the other hand, just after the crisis the market regulators decided to set up a new surveillance framework for commodity markets, in order to curb the excessive speculation - above the needs of natural hedging. In the United States and as well in the European Union plenty of new regulations have been passed, including MiFID II (Markets in Financial Instruments Directive), MAD II (Market Abuse Directive) directives in the EU andthe Dodd-Frank Act in the USA. In both regions, the main solutions introduced were: position limits, post-trade reporting, and mandatory clearing of all standardized OTC commodity derivatives (Żelazny, 2015). Although the new laws were meant to be strict, within time they were loosened. In May 2013, thus after only 3 years from publishing Dodd-Frank Act, the CFTC (US Commodity Futures Trading Commission) agreed that the position limits shall not be applicable for the biggest Wall Street investment banks (Cohan, 2013).

Engineering of new financial instruments

Investing in commoditiescan be done through various methods. The most traditional one is procuring physical commodities for storage purposes, however, this sort of investment is considered profitable only for precious metals. Another way of investing in commodities can be buying equities of commodity producers, refiners or merchants. Nevertheless, often the correlation between the equity price of such a company and the market price of their main commodity is low, which occurs mainly due to various strategic decisions of the board, and, as well, random events. For example, in 2010, there was an oil spill from one of the British Petroleum oil platforms in the Gulf of Mexicowhich resulted in a rise in oil prices and a drastic drop of BP equity prices. That is why, due to high costs of storage of commodities, and various risks and uncertainties of indirect investments in commodity related equities, most of the investors increased their presence on the commodity markets directly.This has been possible thanks to financial engineering, which easily spread from financial markets towards commodity markets.

One of the new ways of investing in commodities is to map and reflect in one's portfolio the weights of commodity indices, such as the Bloomberg Commodity Index (BCOM) or Standard and Poor's Goldman Sachs Commodity Index (S&P GSCI). BCOM value is based on 22 exchange-traded futures on physical commodities, split into five sectors: energy (playing a dominant role with about 35%), agriculture, industrial metals, precious metals and livestock. In S&P GSCI the weights of particular commodities depend on five-year average prices and current world production of a particular commodity. The energy sector represents the biggest share as well. Based on the commodity indices multiple instruments are constantly created, such us commodity index funds, commodity index-based ETFs (exchange traded funds), ETNs (exchange traded notes), ETCs (exchange traded commodities), investment funds (investing in commodities only or in commodity-based equities), commodity mutual funds, or futures strategy mutual funds (ICI, 2012). These instruments are traded on exchanges, however, as mentioned previously the over-the-counter market, and other informal markets, also play a vital role in trading commodities. As the counterparty risk on OTC markets is higher than on exchanges, mostly only big players act there. The trading concerns either bulk ordering of physical commodities or derivatives. Those derivatives are mostly swaps. However, recently the commodity OTC market is undergoing an interesting evolution, as a futurisation of swaps can be observed. This process is focusing on standardization of offered swaps, clearing them through exchange clearing houses (i.e. CME Clearing) in order to reduce the counterparty risk, as the clearing house takes over the risk of insolvency of one of the sides of the swap contract (Framularo, 2012). What is more, the commodity exchanges such as the Chicago Mercantile Exchange Group (CME Group) and Intercontinental Exchange (ICE) consequently introduced new cleared swaps on indices and particular commodities(i.e. soybeans oil, corn) (CME, 2012, p. 2).

Market stability

Before assessing the stability or instability of a particular market, there is an urge to define such a term, which is a troublesome activity. The word stable means having the ability to return to equilibrium after distortion. This phrase in an economy is most commonly used while discussing the role of macroeconomic policies and it means to sustain economic growth. However, such an

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understanding of stability may not be sufficient in this matter. Due to connections and similarities of commodity markets and financial markets, more appropriate will be the usage of the definitions of financial system stability. Such analysis can be justified due to the changes that commodity marketshave undergone in recent years, described in the previous paragraphs.

Prior to the recent financial crisis, stability has been expressed via a lack of instability, which has been explained by inefficiencies and distortions of the markets in the events of crisis, shocks etc. As emphasized by Schinasi (2004, pp. 3-4), there was no widely accepted model or analytical framework for assessing financial system stability, and thus market stability, as this phenomenon depends on multiple factors which might influence and characterize it. Although this ideawas published over a decade ago it is still valid, as almost each and every institution (i.e. central banks, supervision authorities) has their own approach and understanding of what is financial stability (IMF, 2011, p. 5; NBP, 2013, p. 20). Nevertheless, upon the works of Schinasi (2004) and Houben, Kakes and Schinasi (2004), two concepts of defining stability arose: wide and narrow. The wide approach presents only those features of a financial system which one should possess in order to be recognized as stable, in particular indicating the functions which such a system should fulfill and under what circumstances. The narrow approach defines the stability of financial systems as a lack of financial crisis. The majority of institutions favor the wide concept. As defined by Schinasi (2004):

> A financial system is in a range of stability whenever it is capable of facilitating (rather than impeding) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events (p. 8).

In other words, the stability of a financial system is a condition, when it fulfills its role in a continuous and effective manner, even in the event of unexpected and adverse shocks of a large scale. This definition can be easily adapted and adjusted to describe other systems or markets in the world economy, as it is both comprehensive and universal.

The matter of economic and market stability is among the top priorities of market supervisory councils, organizations and entities around the globe. As emphasized by the International Monetary Fund (IMF, 2015), promoting economic stability is to avoid economic and financial crises, large swings in economic activity, high inflation and excessive volatility across markets. Instabilities in each of these areas deepen uncertainty, might discourage investment and thus affect economic growth.

Methodology

While discussing financial or market stability, in the literature one mayencounter numerous contributions to the idea that price stability affects financial stability. This has been grounded by the work of Schwartz (1995) - also known as the Schwartz hypothesis - and supported later by Bordo, Dueker and Wheelock (2001) and Issing (2003). However, a group of French researchers -Blot, Creel, Hubert, Labondance, and Saraceno (2015) - upon their comprehensive analysis of 25 different variables with three different methods for the United States and the Eurozone from 1993 to 2012 reject the hypothesis that price stability reflects financial stability. They argue that the Schwartz hypothesis is not empirically well grounded (especially in the period of the last two decades). What is emphasised by Blot et. al (2015) is that no robust positive link between price stability and financial stability can be observed.

Having that in mind, assessing the stability of commodity markets cannot be determined only by their price volatility. Based on the aforementioned definition of stability, at least one more crucial aspect has to be taken into consideration, for exampleinterdependencies with financial markets. That is why the author decided to investigate the volatility of commodity prices and equity markets on a daily time series data from 1991 to 2015. Additionally, using the same time series data the author examined the correlation coefficient among commodity markets and between commodity and equity markets.

Results

Volatility of commodity prices

Discussing commodity and futures markets, inevitably one will come across the terms of speculation and volatility. Those two separate termsrecently have been connected with each other. After the subprime

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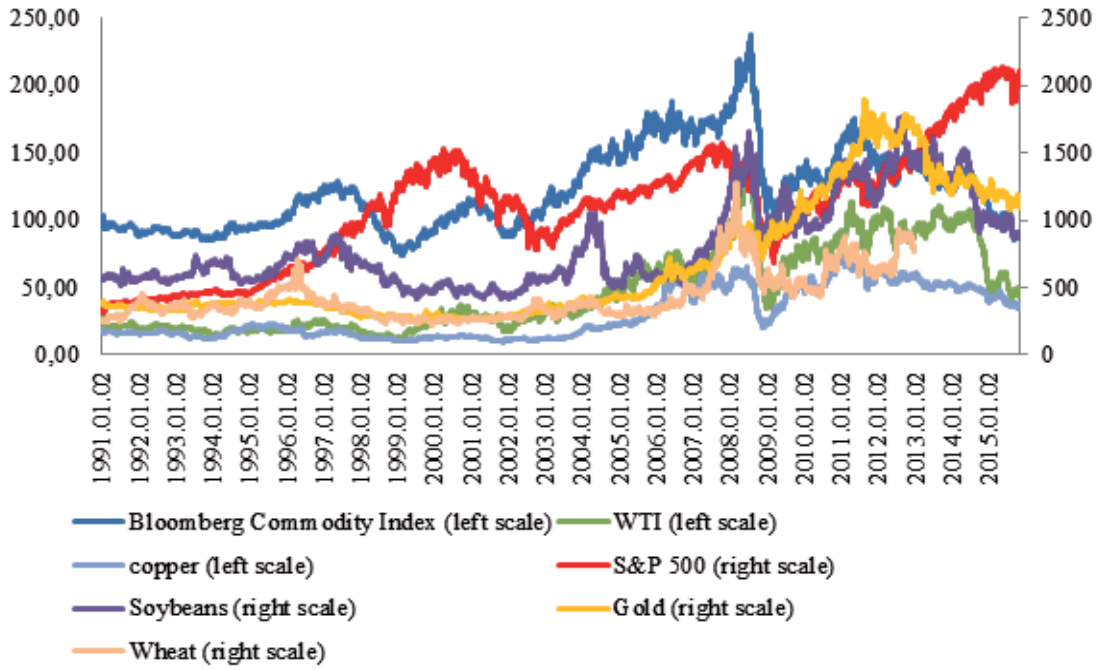
mortgage crisis, publications regarding commodity markets included an idea that excessive speculation causes volatility of commodity markets (FAO, 2009; Jorritsma, 2012; UNCTAD, 2012).Speculation itself is necessary to maintain functioning of commodity markets, and enable hedging activities. However, an inadequate or excessive level of speculation (exceeding the need of traditional hedgers) may lead to distortions of price dynamics which may cause problems, but such a level is difficult to be recognized on the market (Staritz & Küblböck, 2013). Volatility of commodity prices is clearly visible in Exhibit 2, which combines the prices of major commodities, the Bloomberg Commodity Index and as a comparison also the equityStandard and Poor's 500 index. In the analysed period the most significant is the price boom followed by a drastic drop in prices during the crisis between the years 2007 and 2009. The Bloomberg Commodity Index between these 2 years first rose from around 160 points up to 237 in July 2008 and then dropped by 57% to roughly 102 points in March 2008.

Interestingly, while interpreting the data another observation has to be made. While prior to the year 2006 the commodity prices moved separately, between 2007 and 2013 we can notice that they started to move together. This phenomenon is recognized as co-movement of commodity prices.

Co-movement of commodity prices

This topic is not new in economic literature, as it was introduced by Pindyck and Rotemberg (1990) over two decades ago. They analysed the dataset of commodity prices after the oil crisis of 1979 and showed a strong positive correlation between major commodity prices. Of course, it has been put in two questions by Cashin, Mcdermott and Scott (1999) almost a decade later, once they added to the exact same calculations the dataset for the 1990s, which was the era of steadiness for commodity prices. Their results disproved the previously mentioned work. The topic came back into vogue during the recent financial crisis. Numerous researchers analysed both the co-movement of commodity prices (Krätschell & Schmidt, 2012; Le Pen & Sevi; 2013; Tang & Xiang, 2010) and as well of commodities together with other asset classes, like equities (Bicchetti & Maystre, 2012). Of course, depending on the analysed data period and methods used the results differed. Nevertheless, the researchers argued that in the years after the crisis commodity prices experienced similar trends, even including a co-movement between commodities and equities. Especially between oil and

Exhibit 2: S&P 500 index and commodity prices (in USD per appropriate unit) from January 1991 till November 2015



Source: Thomson Reuters, via Thomson Reuters Eikon

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Table1 : Correlations between major commodities and S&P 500 index

January 1991 - November 2015						
	BCOM	WTI oil	wheat	copper	gold	soybeans
S&P 500	40,17%	62,02%	30,30%	55,41%	55,22%	46,84%
WTI oil	X	X	79,55%	92,01%	85,19%	84,31%

January 2009 - December 2012						
S&P 500	73,71%	89,13%	69,43%	79,40%	86,26%	78,24%
WTI oil	X	X	51,85%	84,19%	80,04%	62,83%

Source: Own calculations based on the data derived from Thomson Reuters, via Thomson Reuters Eikon

the S&P 500 equity index in short-term data analysis the positive correlation has been very strong reaching up to 90% (Bicchetti & Maystre, 2012).

The author of this article also examined the correlation coefficients among major commodities and between the major commodities and the S&P 500 equity index. The dataset for the study consistedof daily prices of theBloomberg Commodity Index (BCOM), S&P 500, WTI oil, wheat, soybeans, gold and copper. The results of such correlation for two periods of time are presented in Table 1. The first one is a complete period from January 1991 to November 2015, and the second reflects the period of recovery straight after the crisis from January 2009 to December 2012.

The presented data in Table 1 proves that for the period between 1991 and 2015 a significant positive correlation exists between major commodities (wheat, copper, gold and soybeans) and WTI oil, but not towards those commodities and the S&P 500 index representing the equity markets. The situation changed during the recovery period after the last financial crisis, between 2009 and 2012. In this period the interdependencies between all the studied commodities and the S&P 500 index rose, and especially for WTI and gold became significant over 85%. However, what is worth mentioning is that the correlation coefficient between gold and the S&P 500 index for the period of crisis, between 2007 and 2008, is negative and accounts for -32,77%. This can be easily explained, as the plunge started on the equity markets, and capital fled to precious metals, especially the gold market, where the ascending trend lasted longer, and the drop in the aftermath of the crisis was weaker. The significant sale on the gold market began once the equity markets regained momentum, after the year 2012.

The trends of a recent rise of correlation between commodities and equity markets have been also observed by the analysts from the International Monetary Fund. In their Global Financial Stability Report, they noted that the prices across asset classes are moving increasingly in unison. Such a tendency of global asset prices to move together across markets is nowadays at its highest level since the beginning of the crisis. What is more, the high correlation remained elevated even during periods of low volatility (IMF, 2015a). However, this report examined interdependencies among various asset classes: including equity markets, bond markets (of both developed and emerging economies) and commodity markets.

Co-movement of commodity prices and financial assets play various roles, but lead also to high market interaction recognized in volatility spillovers. As studied recently by Grosche & Heckelei (2014), during and after the recent financial crisis volatilities across commodity and financial markets moved increasingly in synchronization with significant parallel jumps. In their results they showed, that the S&P 500 index is the strongest net volatility transmitter across markets, and that the spillovers peak during the crisis periods. This is highly important in assessing its effects on market stability, as volatility is perceived to serve as a proxy measure of risk which is why substantialchanges in volatility and its spillovers across markets are able to negatively impact risk-averse investors (Barunik, Kocenda & Vacha, 2015).

Conclusions

Financialization can be named one of the main facilitators of structural changes of commodity markets in the past two decades. The new ways of investing, new motives, and what is most important - new investors, mostly originating from financial markets support the growing interdependencies between commodity and financial markets. This is reflected in both higher correlation of

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commodity prices with equities and rising volatility. Joined together it can also be describedas market interaction. Such interaction is reflected in volatility transmission and volatility spillovers. Commodity markets should still be perceived as stable and despite their volatility they have preserved their role of supporting supply and demand in commodities. Nevertheless, the recent changes and growing connection to financial market made them more prone to experience instability, which may have harmful results for the real sector of the economy dependent on commodities. The results of the study conducted by the author prove that correlation between equity markets and commodity markets arose to statistically noticeable levels in the period of recovery after the subprime mortgage crisis (between 2009 and 2012), while throughout the rest of the examined years were insignificant. On the other hand, the correlations between major commodities were high during the entire period studied.

The author recognizes the limitations of such assessment, and creating a more profound and complex analysis of the influences of the ongoing financialization and growing interdependencies between commodity and financial markets requires further research.

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