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Speculation in Food and Commodities - A Research Report: A Critical Discussion of the Econometric Research Method and an Alternative Analysis

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Abstract

This paper is a report of the research on the effect of speculation on commodities and food since deregulation. Econometrics can be applied to show how speculation influences price and vice versa. However, there is no clear empirical picture. In this paper, we examine the reasons for the lack of empirical clarity and arrive at a critical discussion of the econometric research approach. As an alternative approach, we use scientific logic on the basis of statistical data and other verifiable facts as method of investigation. This method allows us to derive the influence of speculation on spot prices. We find a negative impact of speculation why regulation is necessary.

Keywords: financial markets, speculation, commodities, food, econometric research

1. Introduction

In 2000 commodity markets were opened up for speculative investments, but in the public debate, the impact of speculation on food and commodities is still controversial. This paper evaluates the results of the main econometric studies. Will futures prices and price volatility be affected by speculation, creating false price signals? What are the effects of speculation? First, we examine any effects using the numerous econometric studies. Because the result is contradictory, a critical discussion of the econometric research method follows. For this paper, we therefore use scientific logic and New Behavioral Finance as an alternative to derive the effects of speculation on food and commodities on the basis of statistical data and other verifiable facts.

2. Effects of Raw Material Speculation - the Main Research Contributions

One method for determining the impact of speculation is to compare the price movements of commodities that speculators or investors invest in with those in which they do not invest. Indications of influence from the speculative index funds could result from a different development of the futures prices of commodities within the fund index and outside the index. Stoll and Whaley (2009) both found weak correlations between 0.13 and 0.20. Commodity prices outside of the commodity indices showed similarly low correlations to the index commodities. They conclude that index investments had no impact on prices.

Tang and Xiong (2012) calculated in the 1990s and early 2000s that there was no correlation between indexed commodities (below 0.1). The same was true between non-indexed commodities. However, in 2009 the correlation within indexed commodities increased to over 0.5 while the correlation between non-indexed commodities increased to only 0.2. This can be attributed to the influence of index investments. The prices of indexed and non-indexed commodities developed differently between 2004 and 2008. The indexed commodities rose steadily during this period and fell thereafter, reflecting not fundamental changes in supply and demand but the inflow and outflow of investment capital (Stoll & Whaley, 2009, p. 29 and 65), while the other commodities performed very differently. However, other influencing factors must also be taken into account here, such as market power on the supply side. In the oil market there is the OPEC cartel. Furthermore, different price developments result if the supply elasticities deviate from one another, causing the same increase in demand to have different effects on the prices of the products.

The effects of speculation are hotly debated in research. The influence of speculation on futures prices is already controversial. Irwin and Sanders do not find increased prices or increased volatility in commodity futures markets as a result of investing in indexed commodity funds. On the contrary, according to their empirical

studies, index investments resulted in lower price volatility (Irwin & Sanders, 2010). In contrast, the United States Permanent Subcommittee on Investigations found in its 2009 study that investments in index funds boosted grain futures prices on the Chicago Stock Exchange between 2006 and 2008 (Levin & Coburn, 2009, p. 2). The results of this study were attacked by researchers Stoll and Whaley (2009). However, the objectivity of this study is questionable as it was funded by Gresham Investment Management LLC and Gresham's business is based on financial investments in commodities. In contrast to other studies, Stoll and Whaley do not find any significant connection between index fund investments and commodity price increases on the futures markets. They only refer to the large positions that are reported in the COT report and only to the positions of index funds. Contrary to the subcommittee, Stoll and Whaley also believe that index investments do not affect the functioning of the futures market because between 2005 and 2009 only 3% of the contracts were physically settled and could therefore have an impact on spot prices, indicating that the differences to the spot price are not due to the index investments (Stoll & Whaley, 2009). This does not mean, however, that futures prices have not been positively influenced, since in fact 97% of non-physically serviced contracts show a large influence of non-commercials.

However, the decisive question is whether and to what extent speculation on futures markets influences current prices, i.e. spot rates, since this has a direct impact on food consumers and the processing industry and its end customers. Many empirical studies show a connection between speculation on the futures markets and the price development of the goods concerned on the cash markets as well as the volatility of the goods prices. Christopher Gilbert, for example, shows the connection between index-based investments and food prices, thereby explaining in particular the exorbitant increases from 2007 to 2008. Mario Lagi and others demonstrate this connection and the food price peak from 2010 to 2011 in a comprehensive model, including interviews with retailers and producers. For these periods, they show that speculation drove prices up to around 50% above the level created by physical supply and demand. They had their results checked by other researchers at Harvard University and the Federal Reserve Bank of Boston. Many other studies examine the influence of index fund speculation in commodities and in particular agricultural commodities and come to the same conclusions (Deutsche, 2006, p. 59f; Gilbert, 2010; Singleton, 2011; Lagi, Bar-Yam, Bertrand, Bar-Yam, 2011a; Chilto, 2012; Conrad, 2014; Conrad, 2015a; Conrad, 2015b). Mayer (2009) proves the influence of different types of speculators on commodity prices.

Pies, for example, argues that the prices of commodities that were not the subject of index fund speculation or even traded on futures markets also rose during these periods (Pies, 2013). However, one cannot conclude from this that there was no influence of index speculation as long as there are no long-term correlation studies between these commodities that rule out price transfer, e.g. as substitutes from indexed commodities to non-indexed ones (cross-price elasticity). There are also investors who speculate on rising commodity prices outside of index funds, i.e. buy non-indexed commodities forward or invest long in futures.

Futures prices represent a reliable calculation basis for returns on the storage of commodities. High futures prices therefore speak in favor of filling up the warehouses and building up new storage capacities (Peck, 1985, p. 44). The higher the futures prices, the higher the safe return on inventory. Krugman therefore sees an influence of futures prices on spot prices only through arbitrage, i.e. a shortage of spot supply through storage in order to sell at higher futures prices. However, he sees this effect only for copper and cotton, not for agricultural products, since storage did not increase (Krugman, 2011). For the agricultural markets, Pies et al. (2012) ascertained a reduced storage up to 2008 on the basis of wheat. However, he comes to the conclusion on the basis of incomplete data because - as he himself points out - many private storage facilities are not reported. Even though warehousing and storage capacities had not increased, we cannot necessarily derived any conclusions from this fact. If the investment costs for new storage capacity are high, futures prices would have to exceed spot prices for a longer period of time for the investments to be worthwhile. It also takes time to expand capacities.

The supporters of speculation explain the rise in food prices from 2007 to 2008 with other causes. Irwin and Sanders (2012) cite the strong increase in demand for commodities from China, India and other emerging countries, production interruptions for oil and lower consumer demand elasticity as reasons. Frenk (2011) counters that although Chinese oil demand rose by 12% in 2008, Europe and the USA fell into recession and with it international oil demand as a whole. The oil supply increased in the first 6 months of 2008, which does not explain the rise in oil price by 50% in the same period. Based on the negative correlation between real interest rates and commodity prices, Inamura (2011) finds that an overly easy US monetary policy also supported the boom in commodity prices. In the case of grain, increased biofuel production and weather influences are named as the causes.

In contrast to this, Baffes and Haniotis (2010) as well as Lagi et al. (2011b) come to the conclusion in their studies that neither the demand from the emerging countries nor that from the production of bio-fuels were

essential for the food price boom, but rather it was the demand from financial investors. Although Inamura (2011) also sees weather influences and tensions in the Middle East as reasons for the rise in raw material prices and above all the economic upswing in the emerging economies (output gap), she does not believe that they are sufficient to explain the significant increase.

At the very least, those who support speculation find it difficult to avoid explaining the slump in commodity prices after 2008 with the disappearance of speculative demand as a result of the financial crisis, since all other factors have persisted. The hedge fund manager Masters points out that not only was the absolute price increase never seen before the financial crisis, but neither was the slump that followed. This volatility can only be explained by the parallel financial flows, since there were no substantial changes at least in the supply of commodities during this period (Masters, 2009, p. 4).

In fact, Inamura (2011) discovered an increasing correlation between commodities and other forms of investment since 2005 and sees this as an expression of the increased financialization of the commodities markets by financial investors. During this period, the commodity markets reflect the same liquidity flows as, for example, the stock markets. This is indeed a very important finding as negative correlation has been a key reason for investors to diversify into commodities, thereby reducing the risk of the overall portfolio (Markowitz, 1952).

The empirical studies that have been carried out do not provide a clear picture. Some of the studies show that speculation has an impact on commodity prices, while others prove the opposite. According to the scientists of the Raiffeisen Association, the vast majority of empirical studies show that there is no demonstrable connection between the investment volume and the price increase (Petersen, Herlinghaus, & Menrad, 2012, p. 14). The NGO WEED sees this differently and lists over 100 speculation-critical empirical studies (Weed, 2012; Conrad, 2015a). The business ethicist Pies examined 35 studies and came to the conclusion that no negative effects of commodity speculation could be proven. Weed, in turn, accused Pies of ignoring important speculation-critical studies and of biasedly criticizing the method of the speculation-critical studies (Henn, 2013). In 2016, Haase, Zimmermann and Zimmermann (2016) examined one hundred studies on the effects of speculation on commodity future markets and found that the studies that find a negative impact from speculation are balanced with those that do not, independent of research quality. Recent studies have not clarified the overall picture much. Chari and Christiano (2019) found no empirical link between financialization and spot price behavior, whereas Bredin, Potì and Salvador (2021) found speculator influence during the period most associated with financialization on prices. Henderson, Pearson and Wang (2015) reported that non-information-based financial investments had important impacts on commodity prices.

Singleton (2014) showed that there were significant effects of investor flows on futures prices for the oil market. Juvenal and Petrella (2015) analyzed the oil market and found that global demand shocks account for the largest share of oil price fluctuations, while speculative shocks are the second largest influence. They reported that speculation played a significant role in the oil price increase between 2004 and 2008 and its subsequent crash. Knittel and Pindyck (2016) created a model to determine price development on the oil market without speculation and concluded that speculation has inferior influence.

Andreasson et al. (2016) found unidirectional linear causality from commodity returns to excess speculation for the majority of the considered commodities, in particular for agricultural commodities, which is why they doubt that speculation is driving food prices. Whereas Huchet and Fam (2016) examine the period from 1998 to 2013 and reported evidence in favor of the hypothesis of a positive impact of speculation in futures markets to returns on the underlying commodities. Lawson, Alam, and Etienne (2021) found that an increase in speculation led to a price increase of wheat, corn, rice and soybean and that the impact of speculation varies with the commodity in question and the measure of speculation used. Rice and wheat should generally be less sensitive than corn and soybean.

Samak, Hosni and Kamal (2020) used linear and nonlinear Granger causality tests and found evidence that food futures prices cause food spot prices. They also used cointegration and error correction models and found evidence that food spot prices cause food futures prices. Other methods do not bring more clarity. Garbade and Silber (1982) reported that about 75 percent of new information in the commodity spot market is first incorporated in future prices. Dipf, Flad, and Jung (2017) on the other hand, found that future prices influence the spot prices by only 10 percent.

3. A Critical Discussion of the Econometric Research Approach

Also as a result of the financial crisis, government organizations are increasingly resorting to econometric studies when assessing the effects on the financial markets (Williams & Cook, 2016, p. 701). Econometrics is generally used to determine “causal relationships in the absence of natural experiments, with time being used as

an essential proxy for causality" (Williams & Cook, 2016, p. 704). Starting in the 1950s and 1960s, econometrics have become the dominant form of applied economic inquiry (Quin, 1993; Frenk, 2011, p. 47).

However, empirically, no clear picture emerges from the econometric studies of the effects of speculation on food and commodities. Econometrics seems to be worthless here, a large effort that confuses the issue more than it contributes to the discussion with clear research results. Why is that?

Speculation advocates and speculation opponents mutually criticize the methodological weaknesses of the econometric studies, which are mainly based on Granger. Important conditions for the regression of time series are not given for commodities and food. The opponents of speculation accuse Irwin and Sander that they only applied lags of one week and that price influences cannot be limited to one week. Another criticism of the results of Irwin and Sanders is that the Granger test is not a suitable method for highly volatile variables. The results will be skewed (Frenk, 2011). A lack of covariance stationarity was generally found for highly volatile variables such as stock prices or commodities, which means that a condition for the regression of time series is not given (Pagan & Schwert, 1990); Phillips & Loretan, 1990; Frenk et al., 2011, p. 45; Schlecker, 2014; Conrad, 2014). Williams and Cook state that they are notoriously volatile and thus non-stationary with clear evidence of trending over time (Williams & Cook, 2016, p. 710). The alternative regression of the changes between the variables (differentials) according to Granger's co-integration approach also allows an approximation to stationarity at best (Granger, 2003, p. 361; Williams & Cook, 2016, p. 710).

To overcome the lack of statistical power due to the large volatility of returns in commodity futures markets Sanders and Irwin (2010) used cross-sectional tests. There the variables are compared in the same single period or point in time and not with a sequence of points in time (Aulerich, Irwin, & Garcia, 2014). They reported little evidence that the relative size of weekly financial index positions in twelve agricultural futures markets is correlated to subsequent returns across markets. Thus the empirical results provided small evidence that long-only index funds impact returns across commodity futures markets. Later Irwin and Sanders (2012) used quarterly data on financial index positions in nineteen agricultural, energy, and metals futures markets to conduct cross-sectional tests but found no evidence of a significant cross-sectional relationship with returns or volatility.

Irwin and Sanders are also accused of using unrepresentative data. But the same applies to the study by Stoll and Whaley. The positions of the index funds are ultimately not transparent because the DCOT swap dealer data also contain many positions from other market participants. For example, the Commodities Futures Trading Commission (CFTC) estimates that only 41% of positions in crude oil futures belong to index funds (Frenk, 2011, p. 47; Masters & White, 2008, p. 33). This creates a general problem as well. The quality of the data is also questioned, as they are usually based on surveys or are incomplete (Williams & Cook, 2016, p. 708; Irwin & Sanders, 2012, p. 258; Frenk, 2011, p. 48; Conrad, 2013). For example, OTC derivatives did not have to be reported in the periods examined. It was only after the financial crisis that they had to be registered or traded through clearing houses (Conrad, 2013).

The speculation advocates also argue, for example, that the sharp increase in demand for commodities from China, India and other emerging countries, production interruptions for oil, less consumer demand elasticity and US monetary policy were the causes of the price increases. In the case of grain, the increased biofuel production and weather influences are cited as causes (Irwin & Sanders, 2010), pp. 4; Pies, Prehn, Glauben, & Will, 2013b). If so many factors really affect the prices, neither the Granger test nor the cross-sectional tests would be applicable due to multi-causality, because not all influencing factors were tested separately as variables. The same applies to the Granger test for weather influences, because the necessary stationarity of the variables is missing (Schulze, 2004, p. 17; Hassler, 2003, p. 813). The problem is of a more fundamental nature. If causal variables are not extracted, Granger tests can show correlations that do not exist (spurious regression). The same applies to purely random correlations, which can arise particularly with short observation periods.

Econometrics impresses with highly developed and complex mathematical methods and a clear result. It comes across as very scientific, which has certainly contributed to its wide-spread use. With the help of econometrics, however, it seems that both an influence of speculation on prices and the opposite can be proven. This contradiction reveals the dilemma of econometric research. Causality cannot be proven. Correlations can have many reasons (Conrad, 2014; Conrad, 2015a).

With its model-based statistics, econometrics allows to calculate many connections with a great degree of effort and make a grand impression, depending on the sample with its respective probability. It does not matter if there is no real economic sense from these calculations. The senselessness is sometimes apparent: "the level of beauty in high schools has an effect on criminal propensity 7-8 years later." (Mocan, Tekin, & Fedako, 2007). In 1929, Yule found a correlation of 0.95 between the ratio of marriages in the Church of England to all marriages and the death

rate for the years 1866 to 1911. Henry developed was he later jokingly referred to as a new theory of inflation in 1980, in which he showed the correlation between rainfall in the UK and development of price levels (Zorita, 2006).

In addition, the econometric analyzes are difficult to verify from the outside due to the complexity and the non-transparent data basis and therefore do not meet Popper's falsification criterion in the narrower sense. The same applies to the inconsistency of the results. Granger causality may have never been supposedly to proof causality, but unfortunately it is more and more applied this way, and also very uncritically in relation to the economic conclusions. Form this perspective, it is important to apply the Popper falsification criterion to each study. Each study is a hypothesis, which has to be tested if it is in line with reality until it has been falsified.

According to Karl Popper, who founded the Critical Rationalism school of thought, the universal validity of scientific hypotheses must be refutable, thus falsifiable. The original purpose of Popper's falsificationism was to provide a demarcation criterion for which of the actual activities of investigation count as real, empirical sciences (Popper, 1958).

Every econometric calculation claims to represent the truth with a clear result. A scientific method that produces accurate but contradictory results on the same subject is not only contradictory but also dangerous. An apparent accuracy arises when the results are no longer logically questioned and compared with other facts and arguments. In the case of agricultural and commodity speculation, the inconsistency is striking, but how many issues are there where individual econometric analysis remain unchallenged.

In addition, the Popper criterion is not fulfilled if the assumptions are not in line with reality. If the choice of data influences the result or models based on assumptions are used in the econometric studies, the reference to reality must be questioned. The results can be influenced not only in the selection of assumptions, but also through the construction of the models. Other researchers have simply miscalculated. Results may be considered scientifically proven for years if other researchers do not decide to follow the calculations in detail, which would otherwise have identified the errors. Harvard professor Martin Feldstein showed in 1974 in the renowned "Journal of Political Economy" that the increases in social benefits in the USA since 1937 had displaced the tendency to save money in private persons. Six years later Leimer and Lesnoy showed that Feldstein had miscalculated (Feldstein, 1974, p. 905; Berkley Initiative for Transparency in the Social Science, 2023). The thesis from Levitt and Donohue from 2001 suffered a similar fate. They had said that the main reason for a drop in criminality rates in USA since the early 1990s was the legalization of abortion in 1973. They maintained that unwanted children are raised in conditions that increase the probability that they will become criminals. Four years after the publication in the renowned Quarterly Journal of Economics Foote and Goetz (2005) discovered their mistaken calculations.

The dangerous feature of mathematics is that it almost always provides exact and clear results, thus considered proof, based on the model assumptions and design, which explains the increasing popularity of financial mathematics. Numbers are facts. But this is not economic reality, since people create the economy. People do not always act rationally; they are in fact often emotional and sometimes wrong. Figures are facts, but people are not. Economic science cannot be an exact, deterministic natural science, but a social science. Including irrational behavior in models does not change the incalculable nature. There is a good reason why the economists often argue publicly over the best method. The progress made in academics through economic science and progress applicable in practice has been very slight in comparison to the natural sciences. Even more, it is very difficult to objectively evaluate the value of research contributions in a social science (Conrad, 2022).

The econometric method is therefore not scientifically suitable for analyzing the effects of speculation on food and commodity prices. Further econometric studies will not change the contradictory results of the agricultural and raw material studies. The two camps of supporters and opponents of speculation are still irreconcilably opposed. After this flood of empirical studies that repeatedly examine the same thing and always come to different conclusions, it is time to use scientific logic to carry out a general analysis based on the known facts.

4. A General Analysis of the Effects of Speculation

The supporters of speculation see themselves as champions of liberalized markets, i.e. the basic functions of the market economy, and therefore reject any restriction on speculation with commodities and derivatives. But one could also see the so-called liberalization of the markets around the year 2000 as non-compliant market intervention. It shifted the balance of power in favor of speculation, disrupting price signals in the real economy.

From 2000, commodity funds could be constructed with unlimited volume. The derivatives on commodities were added later. Commodities were negatively correlated with traditional investment options and therefore

allowed for diversification based on Markovitz's portfolio approach, thereby reducing risk for investors. As a result, the financial investors (so-called non-commercials) as new players increasingly shaped the commodity markets. The expression of the financialization of the commodity markets emerged.

For example, between late 2002 and March 2008, speculative financial flows into indexed commodities surged from $13 billion to $260 billion, with indexed commodity prices rising 183% (Masters, 2009, p. 5). Exchange-traded options and futures on commodities more than tripled from 2002 to mid-2008, and OTC derivatives volume increased fourteen-fold to approximately US$13 trillion. The ratio between speculators (financial investors, so-called non-commercials) and hedging players in the real economy (so-called hedgers) turned from 1:4 to 2:1. The share of non-commercials in the market volume rose from around 30% to about 70% (Conrad, 2015a).

Speculation at one's own risk is an essential part of a market economy system. If speculation on the markets on both sides of the market brings new market participants who buy or sell, this has a stabilizing effect on prices due to the higher liquidity. In the case of commodity speculation, speculators can fulfill an important function if they buy the commodities forward from the producers who process them and thus relieve them of the risk of price changes. Speculators thus take on the task of insurance. This is also a major argument made by advocates of unfettered speculation (Pies & Will, 2013, p. 5). For example, the co-president, managing director and CEO of Goldman Sachs, New York, Gary Cohn, argues in favor of allowing non-commercials, saying that there used to be only producers who wanted to sell on the futures markets in order to compete hedge against price fluctuations. Thanks to the non-commercials, liquidity is now also available on the opposite side (U.S. Government Printing Office, 2008). With this statement, however, Cohn forgets to name the processors of commodities, who are traditionally the buyers in the futures market for many commodities and agricultural products (Masters, 2009, p. 4). In addition, index investors, unlike speculators, never sell because they want to buy to diversify their portfolio or because they want to buy commodities in a fixed ratio to their other investments to diversify risk. Furthermore, their return orientation is contrary to the processors who want to buy at low prices. Rising prices attract even more investors. In addition, as at the peak of raw material speculation in 2008, a producer can face up to 4 speculators, and speculation now goes far beyond mere hedging. Although speculators also buy and sell among themselves (Domanski & Heath, 2007, p. 65), this can still lead to an increase in futures prices if there is excess demand. Up to the peak in 2008, the index funds invested almost exclusively long, thus generating strong additional demand (Stoll & Whaley, 2009, p. 21).

If commodity producers perceive futures prices as historically high, they will sell their production forward, removing supply from the future spot market. Furthermore, the prices of the end and intermediate products with raw material shares can also rise if the producers hedge their supply-positions on the futures markets. Even if investors only invest in derivatives such as commodity options, this indirectly creates physical demand for the commodities referenced by the derivative, at least in part because the option writers (sellers) need to hedge the open position. Derivatives such as call options affect the cash price if the option holder can insist on physical delivery. Thus in 2008 Porsche was able to purchase VW with call options cheaper than on the stock market and then increase the VW share secretly to 74%. The option prices did not reflect the scarcity of the VW share, since they had been calculated on the basis of past price fluctuations. They were therefore much too low. The demand surplus then led to a short squeeze and a huge increase in the VW price. Option writers must therefore make sure they are at least partially physically secure and inquire about the commodity.

Last but not least, the parallel development of share prices and commodity prices suggests an influence of financial flows on commodity prices (see figure 1), which seems to have diminished in recent years.

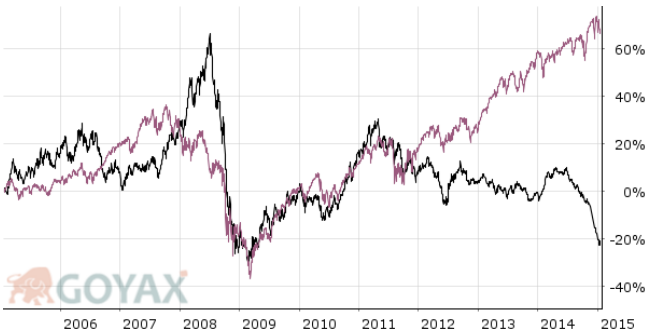

Figure 1. Development CRB-Index/Dow Jones Industrial

Note. Purple/bright: Dow Jones, black/dark: CRB Thomson Reuters/Corecommodity CRB Total Return Index, Source: http://www.goyax.de/crb-index-Chart (accessed 01/21/2015).

Cheng, Kirilenko, and Xiong also show the downside of the inflow of liquidity from speculation. Just as the inflowing liquidity of non-commercials made the traded goods more fungible on the market, the withdrawal of liquidity in 2008 put the market under pressure. A similar phenomenon befell the emerging markets during the 1997 Asian crisis (Cheng, Kirilenko, & Xiong, 2012).

For Stoll and Whaley, investing in commodities is no different from other investments such as stocks. For Krugman, however, speculation is a zero-sum game. What one wins, another loses (Krugman, 2008). Stoll and Whaley fail to recognize that the money that goes into commodities is not productive. No production facilities are financed, as can be the case with shares, for example. Commodity investments do not increase the growth of an economy. There is also no direct compensation for shortages, as is the case with arbitrage, i.e. the exploitation of spatial price differences. An investment in commodities is always aimed at future price increases and is therefore speculation. Even if portfolio diversification is the motive, investors still expect rising commodity prices. The reason for the price increases can be scarcity, but there are also other reasons such as cost increases or inflation.

For Krugman, every future long contract is matched by a short contract, which is why he sees no price influence. "Buying a futures contract for oil does not reduce the quantity of oil available for consumption; there's no such thing as "virtual hoarding" (Krugman, 2008). However, it must be said that supply and demand are not influenced on the spot market, but on the futures market they are. Of course, a futures contract can only be concluded on the futures market if there is also a short position for the long position, but excess demand will pull prices up until a market player considers the opposite position lucrative. So one could say that an additional demand for commodities c.p. drives up prices on the futures markets.

Even if there is no influence of the futures prices on the spot prices due to a shortage of supply as a result of increased storage, an influence via expectations cannot be ruled out - as Lagi and others show: ".. we interviewed participants in the spot market who state unequivocally that they base current prices on the futures market. The use of futures prices as a reference enables speculative bubbles on the futures market to influence actual food prices." (Lagi, Bar-Yam, Bertrand, Bar-Yam, 2011a, p. 5).

Will increased futures prices affect spot prices? The fact is that financialization has brought new market participants with different economic motives to the commodity markets. Because investors wanted to diversify their portfolios, massive long positions were built up until the financial crisis. Many billions of liquidity came onto the markets as additional demand. Since investors did not want the commodities delivered, the additional demand only directly impacted the futures markets and not the spot markets. This resulted in a higher secure storage yield, which – if it exceeds the storage costs – sooner or later leads to a shortage of supply and thus also to price increases on the cash market. It can therefore be assumed that the futures prices will have an influence on the spot prices if the excess demand on the futures market is high and lasts for a longer period of time. The other influences mentioned can reinforce the trend. Speculation thus influences both spot and futures prices in the commodity markets, thereby sending price signals to market participants and influencing supply and demand. In order to steer production in the right direction, speculators would have to be better informed than the market. Is it conceivable that speculation for production generates false signals or even a speculative bubble?

5. Bubble Formation Through Speculation?

In economic theory, the effect of speculation is still controversial. According to the fundamentalist efficient market hypothesis by Eugene Fama and others, a deviation in futures prices from fundamental data caused by speculation would not be possible at all, because prices always reflect all information rationally. So he reasons that rising futures prices would only indicate scarcity in the future (Gilbert, 2010, p. 10). This would mean however, that speculation would not be worthwhile because the price difference would only reflect the storage costs. And it is often argued that when a bubble forms, other market participants form counter-positions when the fundamental data deviate. New Behavioral Finance contradicts this by demonstrating irrational investor behavior. The empirical investigations of this behavior-oriented research direction confirm the psychologically oriented, non-deterministic explanations. It turned out that investors perceive and evaluate the information available to them very subjectively and, in contrast to the neoclassical world of models, do not always maximize the expected utility when making their decisions (Conrad, 2005). Speculation can therefore also be non-rational behavior that is no different from betting and games of chance. The reverse is also conceivable, that speculation generates false signals for production and thus causes bubbles and crashes.

Derivatives play a special role here with their theoretically unlimited leverage. If futures are used for speculation for example, they artificially multiply the demand effect of the money used on the futures prices, which can have a corresponding effect on the spot prices via arbitrage movements and the formation of expectations, as Lagi and

others have supported through interviews (Lagi, Bar-Yam, Bertrand, Bar-Yam, 2011a, p. 5). The price signals are distorted, which can lead to resource misallocation. For example, speculation in derivatives can drive up the prices of staple foods or commodities such as oil (see figure 2). The result is that the costs for the manufacturing economy and consumers rise. The commodities sector will invest and expand its capacities if prices continue to rise. Since there is no corresponding demand for the commodities, the speculative bubble will burst sooner or later and prices will fall. The commodities sector then gets into trouble due to the overcapacities that have built up. The losses, or rather the costs, of such trend speculation are borne by the consumers and the real economy. When it comes to staple foods, the speculators and the banks that support them are faced with strong allegations: "According to studies by the World Bank, UNCTAD and the International Food Policy Research Institute (IFPRI), financial speculators drove grain prices up in 2007/2008. … Food became unaffordable for many families. The rapidly rising food prices led to hunger protests in 61 countries. The number of people going hungry rose by more than 100 million and in 2009 exceeded the record mark of one billion people for the first time." (Oxfam Deutschland, 2023, translated from German).

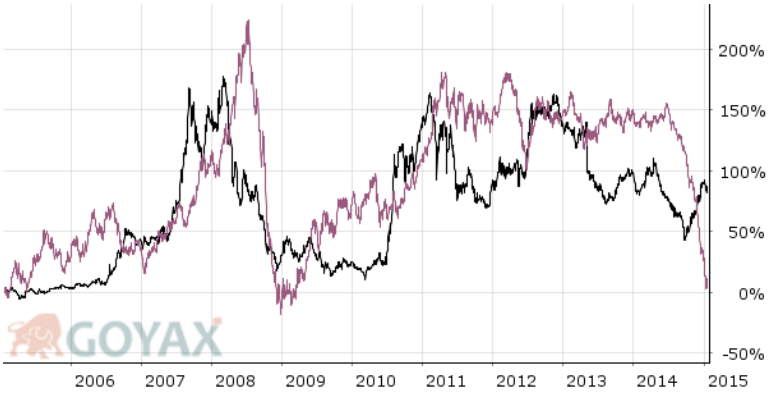

Figure 2. Price development for wheat and oil

Note. Purple/bright: Brent Crude Oil price, black/dark: Matif wheat price (Euronext milling wheat price), (source: http://www.goyax.de/matif-weizen-Chart, accessed 01/21/2015).

Although the commodity boom on the financial markets has slowed down, there are still individual segments with severe real economic distortions as a result of investments by non-commercials. For example, the investment volume of commodity funds in platinum from the end of 2008 to the end of 2013 increased by 90%. The price of platinum increased by 90% in the same period. A similar influence can be observed with gold. From the end of 2012 to the end of 2013, the investment of commodity funds in gold fell from 85 million troy ounces to 60 million troy ounces. Instead of asking for gold, it was now offered by the funds, with as much gold being sold in one year as was bought in three years previously (Nestler, 2013). As a result, the price of gold fell by around 26% (see figure 3).

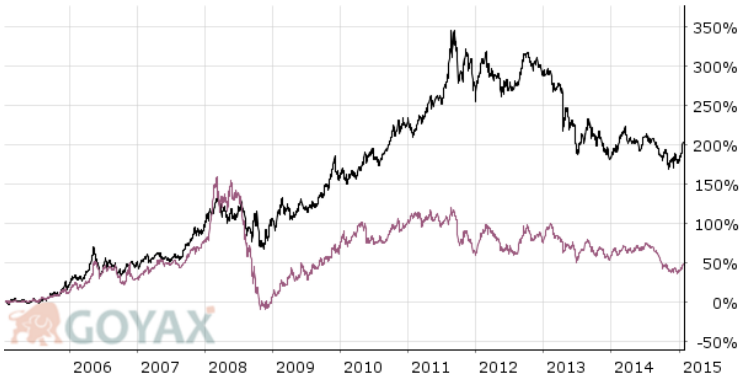

Figure 3. Price development of gold and platinum

Note. Purple/bright: platinum price troy ounce, black/dark: gold price troy ounce (source: http://www.goyax.de/gold-Chart, accessed 01/21/2015)

6. Conclusion

The trend to extend the econometric method to more and more topics has shown itself to be a dangerous mistake in the example of agricultural and commodity speculation. In view of the many weaknesses of the econometric method, it seems very daring and dangerous to conclude that there is no connection between speculation and price increases, especially from the fact that no regression can be found.

Many studies have been conducted on the basis of poor or imperfect data. But what is neglected in all studies is, in addition to a discussion of methods and data, the economic discussion based on statistical data and logic as a scientific method. Rather, one gets the impression that the econometric studies are becoming more and more mathematically complex without any economic significance being gained as a result. This cannot be the future of economics. From this point of view, the future of economics seems to lie more in application-related field studies on economic objects of investigation and behavioral experiments. Econometrics will have its importance but must be applied very critically and transparent:

- First, are the assumptions of econometric models realistic? This means that at the beginning of every econometric work there must be some kind of proof of reality.

- Second: Is there an economic logic behind the connections shown?

- Third: Do the relationships shown match general statistical data?

- Fourth, complexity should not lead to immunity. Therefore, researchers together with the publisher should provide a way to verify the calculation and the underlying data, for example in a separate cloud.

- Fifth, most importantly, are assumptions and correlations supported by behavioral science? Do people behave as the model or correlations suggest?

Although speculation can compensate for future imbalances of supply and demand as the exploitation of temporal price differences, in which the speculative demand leads to a price increase, for example, which in turn signals the producers to increase supply, it does not necessarily do so, since the future shortages are uncertain, and the present prices at arbitrage are known. The speculators should be better informed than the market, but this cannot be assumed. Speculation can therefore also be non-rational behavior that is no different from betting and gambling. The reverse is also conceivable, that speculation generates false signals for production and thus causes bubbles and crashes.

Derivatives with their theoretically unlimited leverage play a special role here. For example, when futures with margins are used for speculation they artificially multiply the demand effect of the money used on futures prices, which can correspondingly affect spot prices via arbitrage movements and expectation formation. The price signals are distorted, which can lead to resource misallocation. For example, speculation in derivatives can drive up the prices of staple foods or commodities such as oil. The result is rising costs for the manufacturing economy and consumers. The commodities sector will invest and expand its capacities if prices continue to rise. Since there is no corresponding demand for the commodities, the speculative bubble will burst sooner or later and prices will fall. The commodities sector then gets into trouble due to the overcapacities that have built up. The losses, or rather the costs, of such trend speculation are borne by the consumers and the real economy.

To sum it up: when something is sold that either does not exist or is only lent or bought for which there is no real economic use, it artificially alters supply and demand. The price develops differently than it would to influence supply and demand to the desired extent (Masters, 2009, p. 17). With derivatives, instruments were added that are often not based on demand or supply for the real economy and that can massively distort the supply or demand side through leverage. Furthermore, with the non-commercials, players were admitted to the markets who do not pursue real economic goals, but rather the diversification of their investment portfolio or, such as hedge funds, are purely speculative. In principle, there is nothing wrong with speculation as a market phenomenon, but if speculation is made with commodities that fulfill important real economic functions, such as food in particular, misallocations can cause massive damage. Likewise, an insurance of risks through derivatives makes economic sense and is therefore justifiable, but not an uncontrollable, market-distorting and system-endangering speculation. In order for market forces to be able to develop for the benefit of the general public in the sense of Adam Smith, it is therefore necessary to limit these influences that do not conform to the market.

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