

## **Abstract**

The aim of this paper is to find a strategy that would work even during bear markets. Such a strategy should be profitable even when the equity markets are down and could be used as a hedge during those bad times. Common sense suggests that maybe some different asset classes could be used for such purpose. Therefore this paper examines the relationship between prices and skewness of commodities from the practitioner's point of view, where such idea is based on something similar in the world of equities, the Lottery effect in the stocks. Individual investors tend to prefer stocks with lottery-like payoffs in the search for the as high profits as it is possible and they are willing to play the equity lottery. Unfortunately, in the lotteries, there is a small number of winners, a large number of losers and one happy lottery ticket issuer that has profited from it. Studies have found, that stocks with lottery-like payoffs have negative abnormal returns if they are compared to the stocks with non-lottery-like payoffs. The same results are found in the world of commodities, where the lottery-like characteristics can be measured by skewness. Most importantly, such a strategy consisting of going long four commodities with the lowest skewness and shorting four commodities with the highest skewness is profitable and negatively correlated with the equity market.

### **Authors:**

**Radovan Vojtko**, CEO & Head of Research, [Quantpedia.com](http://Quantpedia.com)

**Matúš Padyšák**, Quant Analyst, [Quantpedia.com](http://Quantpedia.com)

## **Related literature**

The skewness effect in commodities is related to research about lottery-like stocks. Stocks with such characteristics are well-researched and for example, Bali, Cakici and Whitelaw in the *Maxing Out: Stocks as Lotteries and the Cross-Section of Expected Returns*, have investigated the significance of extreme positive returns in the cross-section of stocks. Results suggest that there is a negative and significant relationship between the maximum daily return over the past one month and expected stock returns. Lin and Liu in their research: *Skewness, Lottery-Like Features, and the Cross-Section of Stock Returns* linked skewness and lottery-like stocks. Their study suggests that individual investors are willing to pay for a small probability to win a large payoff or in other words, to buy stocks with a high skewness. However, according to the authors, the aforementioned leads to the negative relation between skewness and return in the cross-section. The research suggests that skewness and lottery-like characteristics are deeply connected and this relationship could be utilized. In commodities, Fernandez-Perez, Frijns, Fuertes and Miffre (*Commodities as Lotteries: Skewness and the Returns of Commodity Futures*) have studied the relationship between skewness and subsequent returns in commodity futures markets. According to this research, going long commodities with low skewness and shorting commodities with high skewness is significantly profitable and this cannot be considered as compensation for the risks associated with backwardation and contango. The authors state that skewness is also found to explain the cross-section of commodity futures returns beyond exposures to the backwardation and contango risk factors previously identified.

## **Skewness and commodities**

Nothing lasts forever and this definitely stands true for the financial markets. Economies and markets have their seasonalities and cyclicalities, where bull markets alternate with bear markets. Bull markets are connected with particularly good performance of the stocks and profiting investors; however, on the other hand, during the bear markets, investors tend to loose in the falling equity market. Therefore, during these times, it might be better for practitioners to invest in a portfolio that is negatively correlated with the equity market to gain

profit instead of counting loses. Such strategies usually involve different asset classes that are able to perform even during bad times. Motivated by the recent fall of the S&P500 index at the end of the 2018, which could be taken as the proxy for the equity market performance, we would like to present a strategy that is profitable itself, but with an added value of negative correlation with the equity market, to be able to perform in desired way also during the “ bad“ times.

Many times, if one anomaly is found in some asset class, later research would find that the same anomaly is present also in another asset class. Usually, as a great example could serve the world of equities, where the research is probably the biggest and many anomalies originally found in the equities, are later also found in commodities, FX or bonds. In recent years, the finance literature has widely studied the anomalies connected with lottery stocks – stocks that have a probability of a large payoff, but this probability is small, or in other words, the lottery stocks have high skewness. Moreover, these stocks tend to perform the worst during bear markets, and therefore, it is even more natural to short them. Individual investors tend to prefer stocks with lottery-like payoffs in the search for the as high profits as it is possible, and they are willing to play the equity lottery. Unfortunately, in the lotteries, there is a small number of winners, a large number of losers and one happy lottery ticket issuer that has profited from it. Studies have found out that stocks with lottery-like payoffs have negative abnormal returns if they are compared to the stocks with non-lottery-like payoffs. The aforementioned leads to overpriced "lottery" stocks and utilizing such overpricing by shorting the lottery stocks can move the investor into the role of “lottery issuer“, rather than an unsuccessful lottery player.

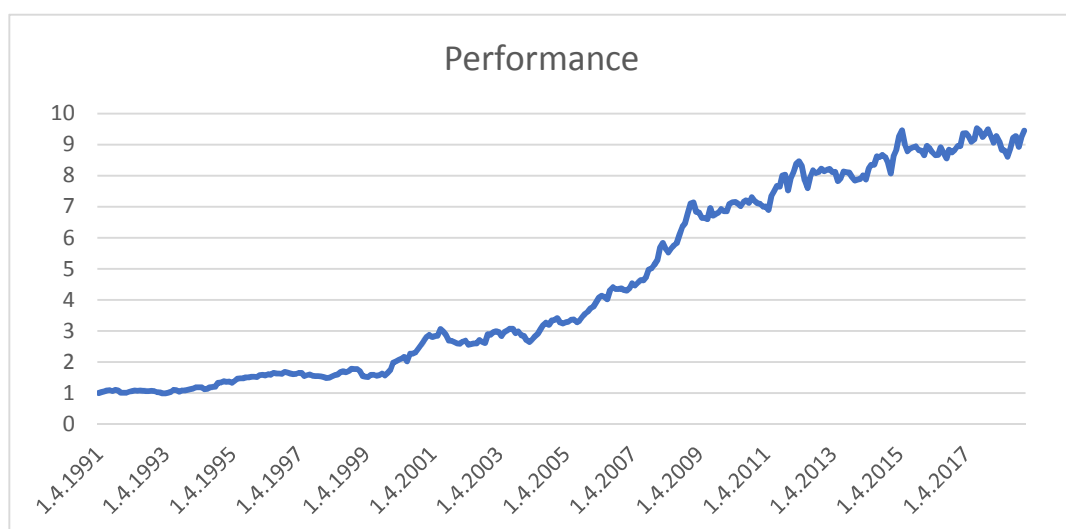
As we have previously mentioned, the same anomaly that was already found in the equities is often found also in the commodities. Commodities as an asset class are quite distinct from equities, and therefore, they can often be used as a diversifier to equities. Such a fact lead us to present a commodity-based strategy, that would not only be a possible way how to diversify equities, but it would also be profitable and attractive to trade. Moreover, in the later section, we would like to point out that the strategy picked by us could be used as a hedge against equity market since it is negatively correlated with the equity market. There is strong evidence that investors have a preference for lottery-like assets (the assets that have a relatively small probability of a large payoff or in other words, big skewness) and research has identified that these assets also include commodities. Past research has found that investors could prefer commodities with positive and high skewness because they overweight

the right tail of probability (the probability of extreme positive returns) or in other words, they are willing to play the lottery. However, the same as in the equities, higher degrees of skewness or lottery-like features should earn lower expected returns also in the commodities. Therefore, it should be profitable not to play the lottery, but rather be “the lottery ticket issuer“ by shorting the commodities with high skewness and going long commodities with low skewness.

Additionally, such a strategy would be easy to perform by practitioners and the required analysis could be easily and fastly made in a spreadsheet or some statistical software, while the execution requires just the usage of liquid futures or possibly CFDs.

## Data and the strategy

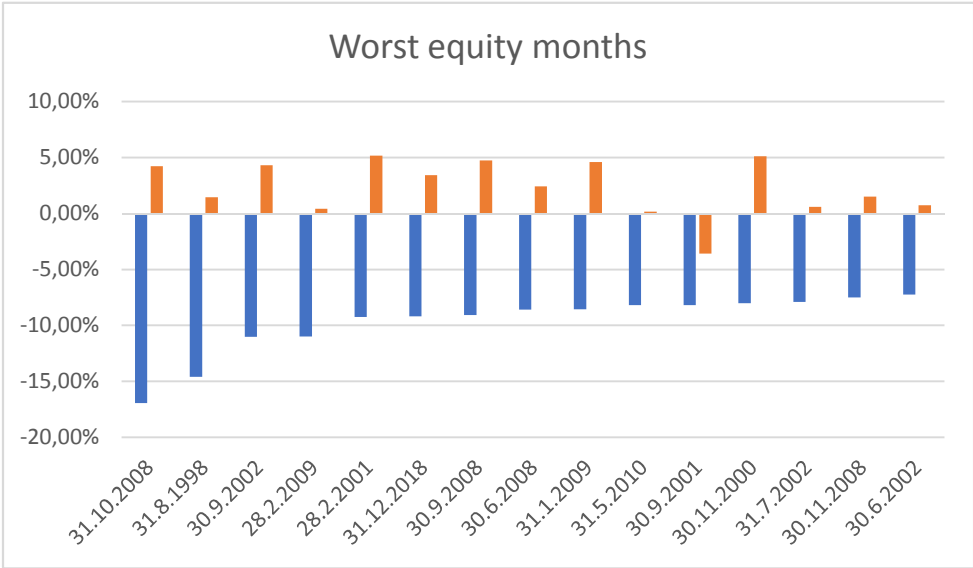
The investment universe consists of 22 commodity futures, namely: soybean oil, corn, cocoa, cotton, feeder cattle, gold, copper, heating oil, coffee, live cattle, lean hogs, natural gas, oats, orange juice, palladium, platinum, soybean, sugar, silver, soybean meal, wheat and crude oil. The backtesting period spans from 30.4.1992 to 31.1.2019, to ensure that the anomaly is alive and working in the present. Our analysis started by calculating skewness each month from daily returns by going 12 months into the past for all futures in our sample. Nextly, we would rank the commodities each month, based on their skewness. The final execution of the strategy consists of going long four commodities with the lowest skewness and shorting four commodities with the highest skewness. Therefore the strategy is rebalanced monthly and each commodity has equal weight in the portfolio.



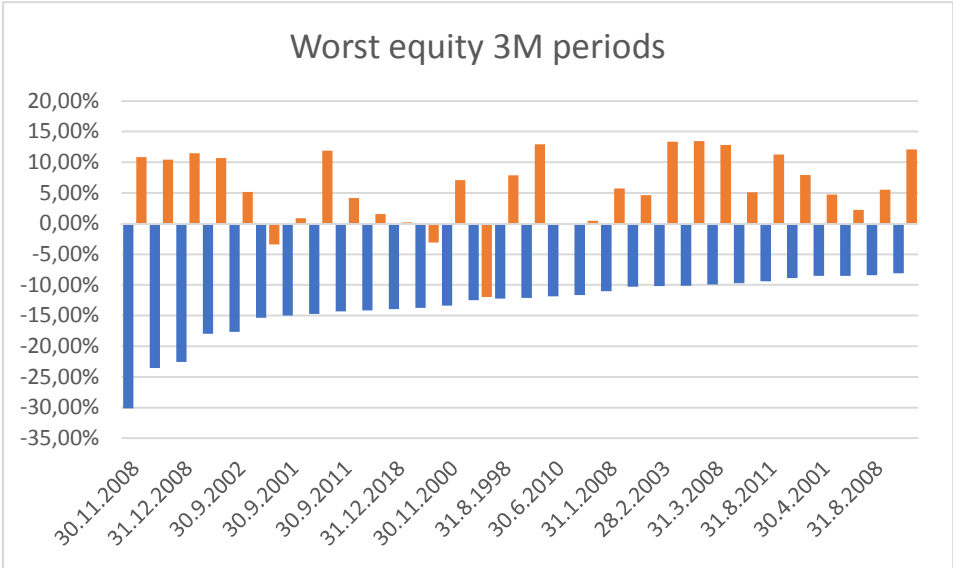
Clearly, the strategy is profitable, a dollar invested in 1991 would result in 9,45 dollars by 2019, what results in **yearly performance** of 8,43%. Moreover, the risk of the strategy is relatively low, with **the maximal drawdown** of 16,27%. This results in a **return to a drawdown ratio** of 0,52.

### Equity market and commodity skewness strategy

In the previous section, we have proved that our strategy is profitable, and we have also previously mentioned that this strategy could be used as a hedge against equity market. Our research suggests that the performance of the equity market represented by the S&P500 index is negatively correlated with the performance of the skewness strategy. Therefore, if the equity market performs badly, our strategy should be still profitable. Moving into numbers, the correlation between S&P500 index and the skewness commodity strategy is -0,32. Moreover, this correlation is even more negative if we would look on months where the index was below its own 10 months moving average. During these times, the correlation is even lower -0,36. This indicates that the strategy is working even if the equity market is not performing well.



If we would look upon the worst months of S&P500 index (blue) and compare it with the performance of the strategy (orange), we would see that although the commodity strategy would not have as large positive profits as equities would have negative, but at least the performance is at most times positive, and therefore the investor would partially cover some losses. During our backtesting period, when the monthly performance of the S&P500 index was negative, the average return was -3,49%, while the average return during those months of the commodity strategy was 1,10%. Having 119 observations and rejecting the hypothesis that returns could be normally distributed, non-parametric tests absolutely rejected the hypothesis that the average returns could be zero in both cases; therefore we consider this relationship as a statistically significant. A similar, but more obvious pattern could be observed if we would look upon three months overlapping returns.



During most of three months periods when the equities perform badly, the commodity strategy is able to perform in a profitable way.

To sum it up, the lottery anomaly in commodities is alive and performs in a desirable way, also in the recent period. Moreover, the profitable strategy based on this anomaly could also serve as a hedge against equities and offer a profitable possibility to invest during times when equities are low.