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# **Comparison of the results of long and short straddle option strategies on the WIG20 during 2005–2015**

## **Introduction**

Derivatives are instruments whose price depends on the price of other ‘basic’ instruments. They are traded on derivatives markets. Often stock exchanges play the role of these markets. Almost anything can serve as a basic instrument. Most often indices, stocks, commodities or bonds are used as an indication for derivatives prices. One of the main reasons why this market exists is the need to ensure protection against risk, and to give speculators access to the market in the hope it will bring large profits (Jajuga K. and Jajuga T. 2004). In general, derivatives are agreements between the buying and selling sides that a transaction will be carried out in the future. The date of execution and buying or selling price is determined by the two sides of a contract (Podgórska and Klimkowska 2005). In this article, options are used to empirically assess the performance of the strategies advanced.

Options can be used during variable market trends, in changeable circumstances, and are dependent on forecasted price level and volatility. The aim of the article is to investigate what was the rate of return of two options strategies: long straddle and short straddle. The research hypothesis was formulated that, in the years 2005–2015, strategies which were used on the assumption of the low volatility of the WIG20’s value offered higher rates of return than other strategies.

The empirical research has been conducted using data obtained from the Warsaw Stock Exchange. It covers 11 years from 2005 to 2015. A long straddle strategy consists of 2 options bought at the money (ATM) – 1 call option and 1 put option. Contrarily, to build a short straddle strategy one must sell 2 ATM options – call and put. In the article, the performance of the strategies was tested and compared to the WIG20 index. The structure of the article is as follows.

In section 1 derivatives: options and futures are described thoroughly. Section 2 is devoted to a literature review. In section 3, a detailed description of the data, methodology and results is presented. Finally, the conclusions are drawn.

## 1. Derivatives on the financial market

There are 2 sorts of speculation (Budnikowski 2006):

- stabilising speculation,
- destabilising speculation.

The first one occurs when speculators buy or sell, for instance, currency in the opposite direction to the current market trend. It contributes to the stabilisation of the exchange rate. Contrariwise, if speculators trade in the same direction as the prominent market trend, it bolsters the destabilisation of the exchange rate. One of the major features of derivatives is financial leverage, whose effect is the multiplication of the profit or loss of an investor. Rates of return received from stocks, for example, are far less volatile than yields from instruments with financial leverage. In the case of futures or forward agreements, both parties put down a monetary deposit which serves as a guarantee of solvency. Fundamentally, this amount of money is, as usual, a small part of the value of the contract. Notwithstanding this, profits or losses are calculated on the basis of the whole contract value. As a result, investing in a small deposit can lead to taking advantage of favourable changes in the prices of underlying assets. On the one hand, it attracts a lot of investors in hope of achieving fast and high earnings. On the other hand, this makes derivatives extremely dangerous for inexperienced individuals (Mejszutowicz 2012). To the term *derivatives* belong several instruments which create various possibilities for both portfolio hedging and speculation. The most widely-known derivatives are as follows: futures, forwards, options, swaps.

The basic legal problem is whether the contract is, or is not binding for both parties. With a view to this issue, these instruments can be classified as conditional and unconditional. The name of the second group means that the parties participate in futures, forwards or swaps. There is always execution and settlement. Conditional transactions are binding only for one side of the contract, the second side has the opportunity to take profit from an instrument (if market circumstances are favourable). If market circumstances are unfavourable, one may bear no excessive costs. The obligation of an option seller is the execution of contracts. At the same time it is the right of a buyer. To this group of instruments belong put and call options (Górski 2007).

Investors who take a long position in both forwards and futures expect a rise in prices of the basic instrument. Those who take a short position (they are selling contracts) benefit from a price downturn. In the case of contracts on an exchange rate utilized by exporters and importers, it serves as a manner to secure cash flow from a trade agreement with foreign contractors. In this way, importers make

sure they will bear a constant cost of the acquisition of products or services in the domestic currency. On the other hand, exporters may get a fixed income in the domestic currency. When the exchange rate increases, it improves the profits of exporters who have receivables in foreign currencies. Just the opposite is the situation when the exchange rate falls – then amounts due decrease and profits fall, too. It is totally different for importers, who benefit from an exchange rate decline and bear the costs of an upturn in the exchange rate (Górski 2007).

Options constitute another group of derivatives. Options, similar to other groups of derivatives such as futures, forwards and swaps, are agreements between 2 investors concerning buying or selling an underlying asset at a stated date in the future. What is more, payments depend on the strike price. However, the main difference between options and other derivatives is that executing them is an option for the holder and a necessity for the writer. An investor who buys an option can execute it on the stated day in the future, if he or she really wants to. The selling side of the transaction has the obligation to execute the options if the buyer wishes to do this. The role of a basic instrument can be played by various 'assets' such as stocks, commodities, stock indices, bonds or currencies. They can be even futures or other options (Ford 1997). Unlike non-option agreements, the profile of option income is asymmetric. The buyer can potentially earn unlimited amounts of money. His loss is restricted to the amount of premium he paid to the seller at the beginning of the contract. The situation of the seller is just the opposite. His loss is potentially unlimited and his earnings are limited to the premium received at the start of the agreement. In the example of futures and forwards, the profile of income possible to obtain is symmetrical for both parties.

As has been shown, the situation for options is totally different. With a rise or decline in assets price, the amount of money earned does not change linearly. In terms of possible exercise moment, two sorts of options may be singled out. The first type is the European option, which can be exercised on the stated day of expiration only. There is also the American type of option which can be exercised at any time until it expires. In this case, the moment of execution depends on the will of the investor (Milo 2000). The three most important features of options are as follows (Jajuga K. and Jajuga T. 2006):

- the market price of the underlying instrument,
- the option premium paid by the holder to the writer at the beginning of the agreement,
- exercise price.

Investors must decide whether to exercise an option or not. They take this decision on the grounds of the relation between the striking price of an option and the current price of the underlying instrument. When an option is *in the money* (*ITM*), the striking price (for call option) is lower than the price of the instrument. Exercising an option in such a situation is recommended. For a put option, the striking price should be higher than the current market price of the underlying

asset. There are also two other types of options: *at the money (ATM)* and *out of the money (OTM)*. The main feature of the ATM options is a market price that is equal at a given time to the exercise price. In turn, for the call OTM options, the exercise price is far higher than the current market price. Conversely, for this type of put option, the strike is much lower than the newly quoted market price (Jajuga K. and Jajuga T. 2006). When it comes to index options utilized in the research in this article, they are somewhat different than other types of options, namely, there is not an actual physical delivery (because it would be difficult or impossible to deliver an index). Instead, there is a cash settlement on the day on which an option expires. On that day the holder of an *in the money* call option receives the sum of money that amounts to the difference between the price of the instrument and the striking price. If it is a put option, the buyer would receive a settlement equal to the difference between the strike price and the current instrument price (Jajuga K. and Jajuga T. 2006).

To sum up this part of the considerations, it is important to emphasize that if a transaction brings a profit in the case of a growing price, and causes losses when the price falls, it is advisable to take a short hedging position. In the reverse situation, when a spike in prices causes losses and a plunge in prices brings profit, a long hedging position is needed. Hedging strategies reduce the total level of risk, so they should be cordially welcomed by a management board. Nevertheless, there are some reasons why some entrepreneurs fear applying hedging strategies. First and foremost, a firm can be badly perceived against the background of its competitors in a situation where it generated profits connected to positive price movements, but lost huge capital on a hedging strategy. Owing to the application of hedging, a company loses opportunities for high profit or even makes a loss. This is the alternative cost of using financial instruments to hedge operational activity. Compared with other companies in a sector, especially in the context of a relatively rare application of hedging strategies, it can lead to a bad assessment of the managerial skills of a firm which uses such strategies (Hull 1999, p. 115–117).

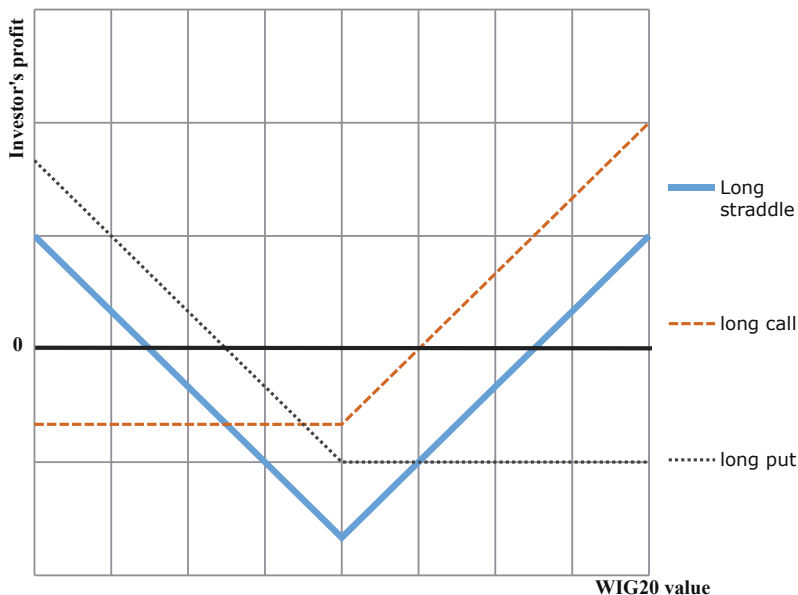
The specificity of options allow an investor to earn in every market trend. Normally, a stock buyer collects profits when stock indices are rising. However, an options buyer or an options writer can base successful investment strategies on the forecast level of prices volatility. Several options can be used to create combinations. In such a case their sensitivity to price changes of an underlying instrument is summed up (Szopa 2012, p. 70).

Generally, option strategies can be divided in terms of the scale of market volatility. Typical strategies devised for low volatility are the short position on a call or put option, a short straddle and short strangle. Among typical strategies devised for high volatility are the long position in a call or put option, a long straddle and long strangle.

The strategies created by the simultaneous purchase or sale of put and call options are called straddles. These strategies are the object of interest in this article.

The long straddle presented on Chart 1 is a strategy which utilizes buying two options – put and call with the same strike price and expiration date. In effect, it enables money to be earned when the volatility of the market is high. At the moment of transaction, an investor pays a double premium. Consequently, price movement has to be relatively strong to compensate for the initial expenses. Nevertheless, in this situation, the direction of changes does not matter at all. The only important thing for investors is changeability. Usually, a long straddle consists of options very close to the current price of an underlying instrument, which makes them ATM (at the money) options. This composition does not include any sold options, so putting margin is not required – an investor cannot lose more money than was invested at the beginning (into the sum of the two option premiums). If the price oscillates, and a horizontal trend prevails on the market, there is no view for profits (Mejszutowicz 2012, p. 97–102; Francis 2000, p. 770–771). Generally, this strategy enables profits to be gained on a volatile market, especially when prices move constantly in one direction (Juszczuk; Shalini and Duraipandian 2014).

Chart 1  
Long straddle payoff diagram

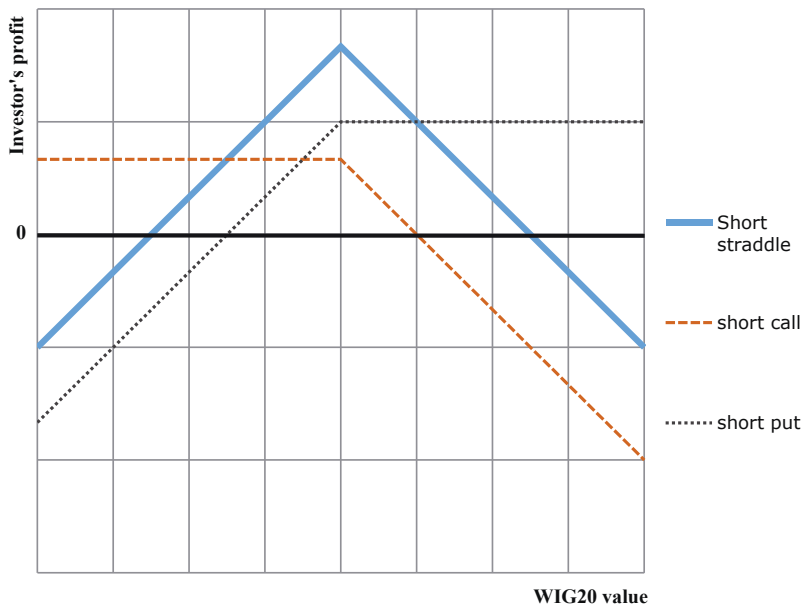


Source: own study.

The short straddle presented on Chart 2 is a completely opposite (but symmetrical) position to the long straddle described above. It comprises of two sold options – put and call, with the same expiration date and strike price (Dziawgo

2012, p. 166). Investors who utilize this composition forecast few changes in price of the underlying instrument before the final day of expiration. Therefore, a short straddle is constructed during periods of low volatility of prices. As in the previous example, often ATM options are sold. It ensures quite a high premium is obtained by an investor, however, it requires putting a deposit down concurrently. In the event expectations regarding price changes fail, an investor may suffer from crucial, potentially unlimited losses (Francis 2000, p. 770–771). Long and short straddle strategies are often used by speculators (Pallavi et al. 2013).

Chart 2  
Short straddle payoff diagram



Source: own study.

Strangle strategies are quite similar to straddle strategies. Their objective is to earn on high volatility (long strangle) or low volatility (short strangle). However, the strike prices of options are not the same as in the case of straddles. The execution prices are different, so OTM options are used to build such strategies. In the article, it was assumed that the performance of the basic and most popular strategies for low and high volatility should be verified. Therefore, the long and short straddle option strategies have been applied.

## 2. Literature review

Option strategies are considered in literature not only from the investors' point of view. For instance, in an article by Briys and de Varenne (1997) short straddle strategies were mentioned in the context of the insurance industry. They claim that equity resembles such an option strategy. As far as input decisions are concerned, a short straddle can be useful to reduce income risk and, concurrently, raise the expected utility (Moschini and Lapan 1992). In the study by Hall, Pinnuck and Thorne (2013) a short straddle was compared to a strategy on the market which relied on buying companies which are the subject of a takeover and selling the bidder (the firm which wants to acquire the other firm).

In the study by Sheu and Wei (2011) an algorithm for an effective option trading strategy was utilized. It was based on superior volatility forecasts and actual option price data downloaded from the Taiwan stock market. They indicate that a long or short straddle 15 days before the options' final settlement day can be a profitable strategy. Margin-based transaction costs were taken into consideration. Budik (2014) utilized the long straddle strategy in order to verify its performance. He assumed that an earnings announcement is the fundamental fact which indicates moments of increased volatility on the stock market. Enke and Amornwattana (2008) demonstrated a hybrid option trading system, developed through a methodology that utilizes a generalized regression neural network. It was shown that the model outperformed trading models based on volatility or return forecasting. Ravichandra (2017) compared the performance of long straddle, pure options and stock investments. Data from 3 companies from the IT industry was used. It appeared that the long straddle was a far better strategy than the others. In passing, it can also be stated that a long straddle can be used successfully not only on capital markets. Bobriková (2016) argues that it is an efficient tool to limit financial losses for agricultural industries. Farmers in particular can hedge their risk against high temperature volatility.

The application of other option strategies should also be mentioned. For example, Gordiakov'a and Lalić (2014) hedged price rises by the long strangle strategy with barrier options. They analyzed the profit and cost function of hedging for buying an underlying asset. It turned out that up and knock-in call options were appropriate for hedging purposes. Moreover, barrier options constituted a more cost-effective strategy than vanilla options. In general, long straddles are often used when the direction of price movements cannot be predicted with confidence, but an investor assumes that the scale of price changes will be significant (Chuang 2013). Tan and Bing (2014) demonstrated this type of strategy on two companies in the technology sector. They used Bayesian statistics. The conclusion was that it can be traded safely. Moreover, Rusnakova and Soltes (2012) used this strategy based on barrier options to analyze profit functions from secured positions. The short strangle can be used to devise a pyramid strategy (Ko 2012). In the article,

Korean data was utilized to test the strategy, which was based on theta-measurement of decreasing time-value of options. The results showed that the strategy offered greater stability and higher returns than the other methods usually applied.

The literature in Poland on the utilization of option strategies on the Warsaw Stock Exchange is not very broad. In this article, several of the articles have been mentioned. For instance, Pawłowski (2013) presented derivative strategies applied by 2 big Polish companies – PGNIG and KGHM. These firms hedge against some types of risk, such as volatility of exchange rate or commodity prices. Królik-Kołtunik (2012; 2013) presented a short straddle, short strip, short strap and long collar options strategies on the WIG20 on the Polish capital market. It has been proved that the profitability of the short straddle strategy was the highest when the WIG20 value has low volatility. So did the short strip strategy. Conversely, a short strap strategy was efficient when prices on the market fell. Strip as well as strap strategies have also been presented by Ziętek-Kwaśniewska (2009). In another article, the efficiency of a long straddle strategy was tested in 2007–2012 (Widz 2013). It is a strategy which should be profitable on a market with strong upward trends. Despite the fact that in the research period volatility on the WSE was high, it turned out that the strategy did not bring profits. The reason for that was the high premiums which rose with the growing volatility. In theory, straddle strategies should be profitable when volatility is high (Jóźwik 2014). However, premiums normally grow with volatility, so most of the advantageous effect seems to be unobtainable. R. Węgrzyn (2015) investigated the influence of interest rates and transactional costs on the payment profile of option strategies. Straddle, spread and strangle strategies were tested. It appeared that the basic income profiles of option strategies that are presented in the literature are often simplified and do not include the effects of interest rates and transactional costs. The analysis proved that the influence of interest rates depends on the position taken. In general, short strategies improve the outcome, whereas long strategies deteriorate the performance.

Stolorz (2007) argues that option strategies reduce risk. In particular, the use of mathematical analysis can be useful for adequate strategy selection. Majewska (2006) described a long and short straddle strategy based on call and put warrants. In another article Majewska (2008) compared methods of volatility estimation of options quoted on WSE. The conclusion is that it would be difficult to indicate the best method unambiguously. However, standard deviation gives accurate results and is relatively simple to calculate.

Bąk et al. (2013) analyzed the influence of hedging strategies on revenue of companies. They used derivatives to cover market risk. Piekunko-Mantiuk (2010) verified the efficiency of several option strategies on the WIG20. She used only strategies with limited risk. Of course, when investing in options, one must be aware of risk. ‘Toxic’ derivatives in Poland during the financial crisis in the years 2007–2009 was a huge problem caused by inappropriate use of options (Flotyński



2015). Then, option strategies require specialist knowledge in the field of financial investments. Particularly, in companies it should be adjusted to the scale of operations so adequate parameters ought to be set (Dziawgo and Dziawgo 2013).

### **3. The selection of data, stages of the research and the performance of advanced option strategies**

The time scope of the research embraces 11 years from 2005 to 2015. During this period, various market trends occurred. There was a dynamic growing trend from 2005 to the middle of 2007. Then, till the spring of 2009, the WIG20 plunged and decreased in value significantly. A similar situation occurred on global stock indices all over the world – the majority of them lost significantly in value. From the middle of 2009 to 2010 there was a rapid upward trend. In the following years, unfortunately, this lost pace and the trend converted into a horizontal one. This sideways trend lasted until summer 2015 when a sharp decline in prices started. Therefore, the research period is convenient for testing, due to the presence of all possible market trends. Detailed investigation should answer the question of whether a long straddle or short straddle is profitable in a horizontal trend or growing/declining trend. Another thing is that the performance level of the strategies could vary remarkably depending on the period (when there is high or low volatility on the market). Such a time scale enabled the holistic assessment of the profitability of the 2 strategies.

Data for the research was obtained from the Warsaw Stock Exchange and *gpwinfostrafa* portal, which is run by this institution. Both long straddle and short straddle utilized ATM call and ATM put options. This means that these were options with a strike price as close to the current WIG20 value as possible. Options were purchased on a quarterly basis. Consequently, trades were carried out in March, June, September and December of each year. Only options with the closest quarterly expiry date were selected, so consecutive options in the portfolio existed for 3 months.

Usually, investors apply long straddle and short straddle strategies when they expect the market volatility to be either high or low. As a result, the use of these strategies depends on predictions of the strength of price movements. A long straddle is based on the assumption that the volatility of an underlying instrument price will be high. Contrary to this, a short straddle is based on the assumption that the volatility of an underlying instrument price will be low. The final settlement is dependent on the scale of price changes. However, even in unfavourable market conditions such strategies can be profitable. Paradoxically, when the volatility is quite low, a long straddle may sometimes be money-making. This is because in such a case options can often be bought quite cheaply. Consequently, a positive settlement (on the expiration day) from a relatively small price movement can

compensate for the premium that has been paid. Similarly, when volatility is quite high, a short straddle may sometimes be money-making. This is because, in such a case, there is a surge in options prices. As a consequence, a negative settlement (on the expiration day) from a relatively big price movement cannot exceed the premium that was received by the writer.

Normally, the decision whether to apply a long or short straddle is based on investors' expectations on future market trends and their direction. In the research, due to the lack of data, and in order to make the study more objective, investors' expectations were not considered. Instead of them, it has been assumed that such strategies can be tested in all market circumstances. Thus, these strategies have been tested during the entire period of the study. Such an approach enabled the author to draw some conclusions about the efficiency of both strategies in various market trends.

In table 1 and 2, the statistics from the WIG20 call and put options applied to the strategies in the years 2005–2010 and 2010–2015 are presented, respectively. Information about 2010 has been divided into tables 1 and 2. The following information is listed in the tables: date of trade, value of the WIG20 at the trade and expiration date, tickers (names) of options, option premiums that were received or paid (this was dependent on the sort of strategy applied), strike prices of the options, expiry date, the value of the WIG20 towards the call option's strike price. When it comes to the last 2 columns, there are 'ITM' or 'OTM' attributes assigned to the options. When an option expires in the money (ITM) it is worth exercising, so as to realize a settlement for the buyer of an option. When an option expires out of the money (OTM) it signifies that the premium paid by the purchaser constitutes a profit in total for the seller.

In table 3, 4 and 5, data about the settlement of each trade is presented. The tables are divided into a long straddle part and a short straddle part. There is information about each call and put option settlement included. In columns 2, 4, 9 and 11 information about the settlement of call/put options is included. This is based on the calculation of the difference between the strike price and the current value of the underlying instrument (or the difference between the current value of the WIG20 and the strike price for a call option). In columns 3, 5, 10 and 12 the final data about each option is included, because it covers additional information about the option premium paid or received. An option premium increases profit in the case of the option's seller and decreases profit in the buyer's case. In columns 6 and 13 the final profit or loss on a trade (investment strategy) is mentioned. This is the sum of the profit/loss on the call and put options. This column is very important, because it signifies how much money was earned or lost on each trade. It is crucial to emphasize that the brokerage commission was deducted from the final result. Brokerage commission in Poland is normally paid on each option when buying or selling it. The second fee payment comes when a buyer or seller makes the opposite trade on an option before its expiration, or

at the moment it expires. Therefore, commission is typically taken twice. In the research, the commission per 1 trade on an option was assumed to be 10 PLN. So, 1 option is a 20 PLN cost for an investor. For a long straddle or short straddle strategy there were 2 options multiplied by 2 transactions on each. As a result, the brokerage fees per strategy amounted to 40 PLN. This cost was deducted from the sum of call and put options profit. In columns 7 and 14 the value of the portfolio is listed. The initial value of a portfolio was as high as 100,000 PLN. Losses on options decreased the value of the portfolio but profits increased its value. In the last columns of the consecutive strategies (columns 8 and 15) profit/loss on a trade in relation to the initial capital (in PLN) is presented. As a consequence, a profit/loss on a trade was divided by 100,000 PLN (the initial portfolio's value).

The analysis of the results brings important findings. First and foremost, in the whole research period there were 43 quarters during which the strategies were traded. This number can be simplified to state that there were 46 trades. Therefore, there were 86 options per 1 strategy. In total, there were 172 options in the long straddle and short straddle portfolios. When it comes to the long straddle, 67% of trades (29 quarters) made losses. Only 33% of trades (14 quarters) brought profits. The result of the short straddle is quite the reverse – 33% of trades made losses and 67% of trades made a profit. It appears that even the brokerage commission did not deteriorate the results significantly. The most important thing is the final value of the portfolios after 11 years of simulated trading. The long straddle strategy lost almost 16,000 PLN of its initial value. At the end, the value of the portfolio amounted to 84,240 PLN. However, the final result of the short straddle strategy was far better, as it earned more than 12,000 PLN. The final result was +12% of the value of the initial capital. The portfolio's value amounted to 112,319 PLN. The changes of portfolio values are presented on Chart 3. It is clearly visible that the performance of the short straddle strategy was better. However, it seems that this difference was not distinct for 2005–2008. During this period, both strategies made neither a high profit nor a loss. The significant difference began in 2009, during the global financial crisis. From the short straddle point of view, the best periods were 2009–2011 and 2013–2014, when it earned a lot of money. Certainly, the periods mentioned were very bad for the long straddle strategy. It must be stated that the short straddle strategy was far more successful than the long straddle strategy.

Table 1  
 Statistics for WIG20 call and put options applied to the strategies in 2005–2010

Dates of trade / expiration	Value of WIG20 (at the date of trade)	Tickers of call / put options	Call option premium	Put option premium	Strike price of options	Value of WIG20 (at the date of option expiration)	Value of WIG20 towards the call option strike price	Value of WIG20 towards the put option strike price
2005-03-18	1970.17	OW20F5200	54	86	2000	2029.99	ITM	OTM
2005-06-17		OW20R5200						
2005-06-17	2029.99	OW20I5200	74.1	62	2000	2453.63	ITM	OTM
2005-09-16		OW20U5200						
2005-09-16	2453.63	OW20L5250	43.95	73	2500	2596.16	ITM	OTM
2005-12-16		OW20X5250						
2005-12-16	2596.16	OW20C6260	94	108	2600	2831.34	ITM	OTM
2006-03-17		OW20O6260						
2006-03-17	2831.34	OW20F6280	162	144	2800	2553.32	OTM	ITM
2006-06-16		OW20R6280						
2006-06-16	2553.32	OW20I6260	146.1	199.95	2600	3003.11	ITM	OTM
2006-09-15		OW20U6260						
2006-09-15	3003.11	OW20L6300	185.25	173.05	3000	3410.06	ITM	OTM
2006-12-15		OW20X6300						
2006-12-15	3410.06	OW20C7340	145	120	3400	3314.67	OTM	ITM
2007-03-16		OW20O7340						
2007-03-16	3314.67	OW20F7330	162	182	3300	3815.42	ITM	OTM
2007-06-15		OW20R7330						
2007-06-15	3815.42	OW20I7380	160	181	3800	3775.24	OTM	ITM
2007-09-21		OW20U7380						

2007-09-21 2007-12-21	OW20L7380 OW20X7380	3775.24	182	190	3800	3482.63	OTM	ITM
2007-12-21 2008-03-21	OW20C8350 OW20O8350	3482.63	199	189.9	3500	2821.3	OTM	ITM
2008-03-21 2008-06-20	OW20F8280 OW20R8280	2821.3	231.2	187	2800	2686.78	OTM	ITM
2008-06-20 2008-09-19	OW20I8270 OW20U8270	2686.78	134.9	161	2700	2433.87	OTM	ITM
2008-09-19 2008-12-19	OW20L8240 OW20X8240	2433.87	199.9	141.95	2400	1777.9	OTM	ITM
2008-12-19 2009-03-20	OW20C9180 OW20O9180	1777.9	195.3	194	1800	1506.5	OTM	ITM
2009-03-20 2009-06-19	OW20F9150 OW20R9150	1506.5	115.3	135	1500	1965.17	ITM	OTM
2009-06-19 2009-09-18	OW20I9200 OW20U9200	1965.17	118	164.05	2000	2147.28	ITM	OTM
2009-09-18 2009-12-18	OW20L9210 OW20X9210	2147.28	189.05	118	2100	2322.64	ITM	OTM
2009-12-18 2010-03-19	OW20C0230 OW20O0230	2322.64	180	122.6	2300	2441.39	ITM	OTM
2010-03-19 2010-06-18	OW20F0240 OW20R0240	2441.39	144	98	2400	2361.16	OTM	ITM
2010-06-18 2010-09-17	OW20I0240 OW20U0240	2361.16	116	156.7	2400	2539.42	ITM	OTM
2010-09-17 2010-12-17	OW20L0250 OW20X0250	2539.42	143	79.5	2500	2759.52	ITM	OTM

Source: own calculations based on the data of index WIG20 and options' quotations from <http://www.gpwinfostrefa.pl/>

Table 2  
 Statistics for WIG20 call and put options applied to the strategies in 2010–2015

Dates of trade / expiration	Value of WIG20 (at the date of trade)	Tickers of call / put options	Call option premium	Put option premium	Strike price of options	Value of WIG20 (at the date of option expiration)	Value of WIG20 towards the call option strike price	Value of WIG20 towards the put option strike price
2010-12-17	2759.52	OW20C1280	78	105	2800	2779.69	OTM	ITM
2011-03-18		OW20O1280						
2011-03-18	2779.69	OW20F1280	78	122.4	2800	2880.13	ITM	OTM
2011-06-17		OW20R1280						
2011-06-17	2880.13	OW20I1290	58	134	2900	2298.52	OTM	ITM
2011-09-16		OW20U1290						
2011-09-16	2298.52	OW20L1230	129.2	128	2300	2116.03	OTM	ITM
2011-12-16		OW20X1230						
2011-12-16	2116.03	OW20C2210	160.2	95.4	2100	2337.92	ITM	OTM
2012-03-16		OW20O2210						
2012-03-19	2337.92	OW20F2235	85.2	94.6	2350	2233	OTM	ITM
2012-06-15		OW20R2235						
2012-06-18	2233.38	OW20I2225	57.15	150.15	2250	2380.32	ITM	OTM
2012-09-21		OW20U2225						
2012-09-21	2380.32	OW20L2240	92	82	2400	2583.06	ITM	OTM
2012-12-21		OW20X2240						
2012-12-21	2583.06	OW20C3260	69.6	68.6	2600	2486.3	OTM	ITM
2013-03-15		OW20O3260						
2013-03-15	2486.3	OW20F3250	76.7	81.6	2500	2233.64	OTM	ITM
2013-06-21		OW20R3250						

2013-06-24	2233.64	OW20I3225	58.5	139.2	2250	2408.16	ITM	OTM
2013-09-20		OW20U3225						
2013-09-20	2408.16	OW20L3240	104.5	100	2400	2408.84	ITM	OTM
2013-12-20		OW20X3240						
2013-12-20	2408.84	OW20C4240	108	92.7	2400	2365.96	OTM	ITM
2014-03-21		OW20O4240						
2014-03-24	2365.96	OW20F4240	91	498.25	2400	2462.13	ITM	OTM
2014-06-20		OW20R4240						
2014-06-20	2462.13	OW20I4250	49.9	121.55	2500	2539.6	ITM	OTM
2014-09-19		OW20U4250						
2014-09-22	2539.6	OW20L142550	60.85	70.95	2550	2311	OTM	ITM
2014-12-19		OW20X4255						
2014-12-19	2310.88	OW20C152300	82.2	55.9	2300	2408	ITM	OTM
2015-03-20		OW20O152300						
2015-03-20	2407.7	OW20F152400	49.35	80	2400	2299	OTM	ITM
2015-06-19		OW20R152400						
2015-06-19	2299.35	OW20I152300	89.75	60.2	2300	2168	OTM	ITM
2015-09-18		OW20U152300						
2015-09-21	2168.19	OW20L152150	122.6	91.95	2150	1858.87	OTM	ITM
2015-12-18		OW20X152175						

Source: own calculations based on the data of index WIG20 and options' quotations from <http://www.gpwinfostrefa.pl/>

Table 3  
The performance of long straddle and short straddle strategies tested in the research in 2005–2008

Dates of trade / expiration	Long straddle						Short straddle						
	Settle- ment of call option (in PLN)	Profit/ loss on call option (in PLN)	Settle- ment of put option (in PLN)	Settle- ment of call option (in PLN)	Profit/ loss on call option (in PLN)	Value of portfolio (in PLN)	Settle- ment of call option (in PLN)	Profit/ loss on call option (in PLN)	Settle- ment of call option (in PLN)	Profit/ loss on call option (in PLN)	Profit/ loss on strategy (in PLN brokerage com- mission included)	Settle- ment of call option (in PLN)	Profit/ loss on call option (in PLN)
2005-03-18 2005-06-17	299.9	-240.1	0	-860	-1140.1	98859.9	-1.14%	-299.9	240.1	0	860	101060.1	1.06%
2005-06-17 2005-09-16	4536.3	3795.3	0	-620	3135.3	101995.2	3.14%	-4536.3	-3795.3	0	620	97844.8	-3.22%
2005-09-16 2005-12-16	961.6	522.1	0	-730	-247.9	101747.3	-0.25%	-961.6	-522.1	0	730	98012.7	0.17%
2005-12-16 2006-03-17	2313.4	1373.4	0	-1080	253.4	102000.7	0.25%	-2313.4	-1373.4	0	1080	97679.3	-0.33%
2006-03-17 2006-06-16	0	-1620	2466.8	1026.8	-633.2	101367.5	-0.63%	0	1620	-2466.8	-1026.8	98232.5	0.55%
2006-06-16 2006-09-15	4031.1	2570.1	0	-1999.5	530.6	101898.1	0.53%	-4031.1	-2570.1	0	1999.5	97621.9	-0.61%
2006-09-15 2006-12-15	4100.6	2248.1	0	-1730.5	477.6	102375.7	0.48%	-4100.6	-2248.1	0	1730.5	97064.3	-0.56%
2006-12-15 2007-03-16	0	-1450	853.3	-346.7	-1836.7	100539	-1.84%	0	1450	-853.3	346.7	98821	1.76%
2007-03-16 2007-06-15	5154.2	3534.2	0	-1820	1674.2	102213.2	1.67%	-5154.2	-3534.2	0	1820	97066.8	-1.75%



2007-06-15 2007-09-21	0	-1600	247.6	-1562.4	-3202.4	99010.8	-3.20%	0	1600	-247.6	1562.4	3122.4	100189.2	3.12%
2007-09-21 2007-12-21	0	-1820	3173.7	1273.7	-586.3	98424.5	-0.59%	0	1820	-3173.7	-1273.7	506.3	100695.5	0.51%
2007-12-21 2008-03-21	0	-1990	6787	4888	2858	101282.5	2.86%	0	1990	-6787	-4888	-2938	97757.5	-2.94%
2008-03-21 2008-06-20	0	-2312	1132.2	-737.8	-3089.8	98192.7	-3.09%	0	2312	-1132.2	737.8	3009.8	100767.3	3.01%
2008-06-20 2008-09-19	0	-1349	2661.3	1051.3	-337.7	97855	-0.34%	0	1349	-2661.3	-1051.3	257.7	101025	0.26%

Source: own calculations based on the data of the WIG20 index and option quotations from <http://www.gpwinfostrefa.pl/>

Table 4  
The performance of long straddle and short straddle strategies tested in the research in 2008–2012

Dates of trade / expiration	Long straddle						Short straddle							
	Settlement of call option (in PLN)	Profit/loss on call option (in PLN)	Settlement of put option (in PLN)	Settlement of call option (in PLN)	Profit/loss on call option (in PLN)	Value of portfolio (in PLN)	Settlement of call option (in PLN)	Profit/loss on call option (in PLN)	Settlement of call option (in PLN)	Profit/loss on call option (in PLN)	Profit/loss on strategy (in PLN)	Settlement of call option (in PLN)	Profit/loss on call option (in PLN)	
2008-09-19 2008-12-19	0	-1999	6221	4801.5	2762.5	100617.5	2.76%	0	1999	-6221	-4801.5	-2842.5	98182.5	-2.84%
2008-12-19 2009-03-20	0	-1953	2935	995	-998	99619.5	-1.00%	0	1953	-2935	-995	918	99100.5	0.92%
2009-03-20 2009-06-19	4651.7	3498.7	0	-1350	2108.7	101728.2	2.11%	-4651.7	-3498.7	0	1350	-2188.7	96911.8	-2.19%
2009-06-19 2009-09-18	1472.8	292.8	0	-1640.5	-1387.7	100340.5	-1.39%	-1472.8	-292.8	0	1640.5	1307.7	98219.5	1.31%
2009-09-18 2009-12-18	2226.4	335.9	0	-1180	-884.1	99456.4	-0.88%	-2226.4	-335.9	0	1180	804.1	99023.6	0.80%
2009-12-18 2010-03-19	1413.9	-386.1	0	-1226	-1652.1	97804.3	-1.65%	-1413.9	386.1	0	1226	1572.1	100595.7	1.57%
2010-03-19 2010-06-18	0	-1440	388.4	-591.6	-2071.6	95732.7	-2.07%	0	1440	-388.4	591.6	1991.6	102587.3	1.99%
2010-06-18 2010-09-17	1394.2	234.2	0	-1567	-1372.8	94359.9	-1.37%	-1394.2	-234.2	0	1567	1292.8	103880.1	1.29%

2010-09-17 2010-12-17	2595.2	1165.2	0	-795	330.2	94690.1	0.33%	-2595.2	-1165.2	0	795	-410.2	103469.9	-0.41%
2010-12-17 2011-03-18	0	-780	203.1	-846.9	-1666.9	93023.2	-1.67%	0	780	-203.1	846.9	1586.9	105056.8	1.59%
2011-03-18 2011-06-17	801.3	21.3	0	-1224	-1242.7	91780.5	-1.24%	-801.3	-21.3	0	1224	1162.7	106219.5	1.16%
2011-06-17 2011-09-16	0	-580	6014.8	4674.8	4054.8	95835.3	4.05%	0	580	-6014.8	-4674.8	-4134.8	102084.7	-4.13%
2011-09-16 2011-12-16	0	-1292	1839.7	559.7	-772.3	95063	-0.77%	0	1292	-1839.7	-559.7	692.3	102777	0.69%
2011-12-16 2012-03-16	2379.2	777.2	0	-954	-216.8	94846.2	-0.22%	-2379.2	-777.2	0	954	136.8	102913.8	0.14%

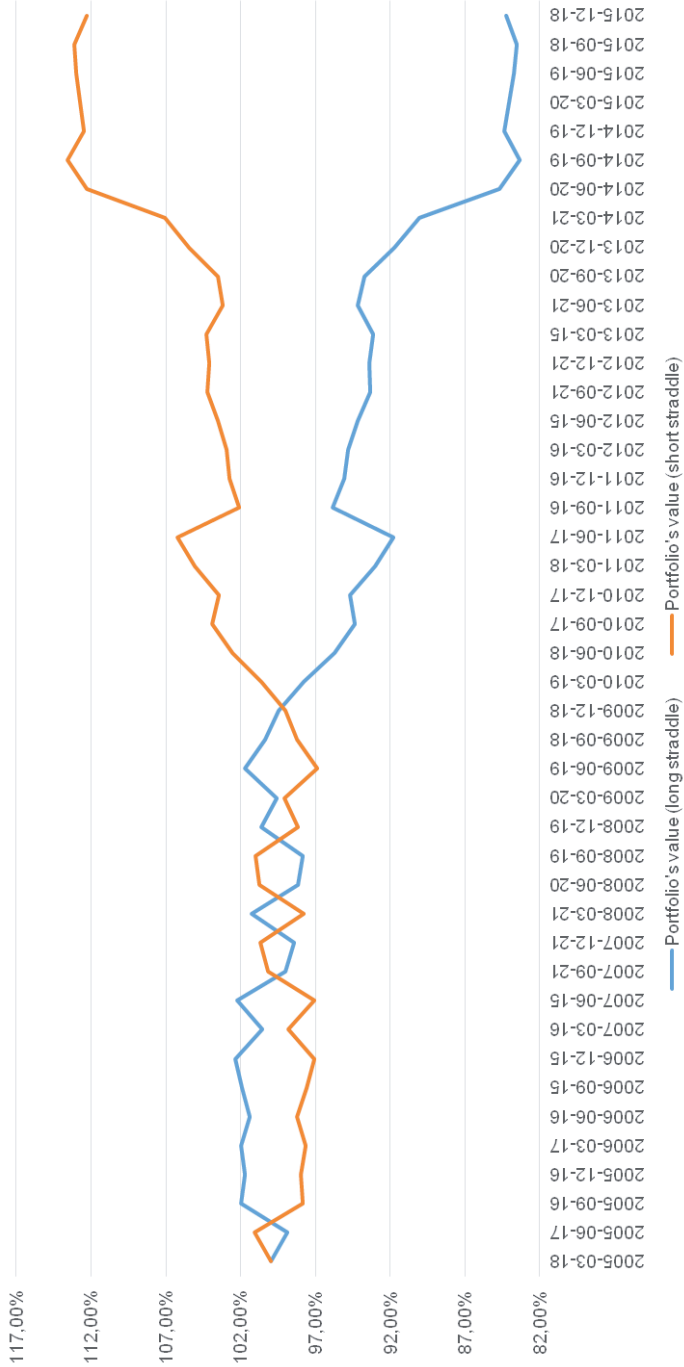
Source: own calculations based on the data of the WIG20 index and option quotations from <http://www.gpwinfostrefa.pl/>



2014-06-20 2014-09-19	396	-103	0	-1215.5	-1358.5	83366.3	-1.36%	-396	103	0	1215.5	1278.5	113593.7	1.28%
2014-09-22 2014-12-19	0	-608.5	2390	1680.5	1032	84398.3	1.03%	0	608.5	-2390	-1680.5	-1112	112481.7	-1.11%
2014-12-19 2015-03-20	1080	258	0	-559	-341	84057.3	-0.34%	-1080	-258	0	559	261	112742.7	0.26%
2015-03-20 2015-06-19	0	-493.5	1010	210	-323.5	83733.8	-0.32%	0	493.5	-1010	-210	243.5	112986.2	0.24%
2015-06-19 2015-09-18	0	-897.5	1320	718	-219.5	83514.3	-0.22%	0	897.5	-1320	-718	139.5	113125.7	0.14%
2015-09-21 2015-12-18	0	-1226	2911.3	1991.8	725.8	84240.1	0.73%	0	1226	-2911.3	-1991.8	-805.8	112319.9	-0.81%

Source: own calculations based on the data of the WIG20 index and option quotations from <http://www.gpwinfostrefa.pl/>

Chart 3  
The changes in long straddle and short straddle portfolio values in 2005–2015



Source: own study.

## Conclusions

To conclude, the research proved that using the short straddle ATM strategy in 2005–2015 gave better results than using the long straddle ATM strategy. The short straddle offered higher and more stable rates of return. Therefore, the aim of the article has been achieved. The profit earned from the short straddle contrasted with the loss made by the long straddle. From 2005 to 2008 nothing special happened in terms of portfolio values – there was no significant difference. However, in the following years the performance started to vary crucially. The short straddle strategy was very profitable in the years 2009–2011. Contrary to this, substantial losses were made on the long straddle portfolio. Presumably, this would have been caused by the high prices (premiums) of the options. It was favourable for option sellers, who were given high premiums, but was detrimental for option buyers, who were obliged to pay high premiums to open their positions. Therefore, the higher premiums were not compensated by the lower volatility of prices, which led to losses on the long straddle strategy and gains on the short straddle. Contrariwise, the period from 2013–2014 is mainly characterized by the horizontal trend. Obviously, by its very nature, selling options ought to be more profitable than buying them during such market circumstances. Simply, selling options is much more efficient during a sideways trend. Taking all the above into account, it must be stated that in the years 2005–2015, the strategies which were used on the assumption of low volatility of the WIG20 value offered a higher rate of return than other strategies. As a result, the research hypothesis has been verified positively.

This article is a contribution to the knowledge about capital markets (especially the Polish one). The basic aim of option strategies application is to hedge against risk. In the real economy it can be used, *inter alia*, by exporters or importers in order to have more stable cash flows. On the stock market, due to the financial leverage offered by derivatives, they are often the object of speculator interest. Moreover, options are particularly useful for securing the value of stock portfolios. Therefore, they have a huge economic significance. Without index options quoted on the WSE, it would be difficult to hedge against a potential downfall in prices. Such a role is played by futures, however only to some extent, because, contrary to options, their profit/loss profile is symmetrical. As a consequence, options are often a more convenient tool to hedge against risk, as it does not exclude potential profits (as in the example of futures when the position in stocks is fully adjusted to the position in contracts). Furthermore, options can be components of sophisticated investment strategies. Taking the above into account, options are important financial instruments on the WSE whose role ought to rise steadily in the future, along with the increase in investor awareness of risk on the stock exchange. Together with the growing derivatives segment of the WSE, it will become a more important source of income for the stock exchange.

Of course, there is a huge field for further research. It would be particularly interesting, for instance, to verify what the results of both strategies are over a term longer than 11 years. Furthermore, it could be tested not only on the Polish capital market but on foreign stock exchanges, too. Another idea would be to thoroughly investigate the relation between the volatility of stocks/indices prices and the performance of short and long straddle strategies. Independently of the results of such empirical outcomes, there are a lot of possibilities for the application of options on capital markets, and this will support this kind of derivatives in becoming more and more popular among investors.

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# Comparison of the results of long and short straddle option strategies on the WIG20 during 2005–2015

## Summary

There is a huge variety of derivatives on the Polish financial market (i.a. options and futures on stocks or indices). Options offer a lot of possibilities in the creation of advanced strategies. They can be used during variable market trends, in changeable circumstances, and are dependent on forecasted price level and volatility. The aim of the article is to investigate what was the rate of return of two options strategies: long straddle and short straddle. The research hypothesis was formulated that, in the years 2005–2015, strategies which were used on the assumption of the low volatility of the WIG20's value, offered higher rates of return than other strategies. In the empirical research, quotations from the Warsaw Stock Exchange have been utilized. In the period given, higher profitability was obtained by selling options.

**Keywords:** option strategies, long straddle, short straddle, derivatives, financial market