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PARAMETERIZED TRADE ON THE FUTURES MARKET ON THE WIG20

Iwona Piekunko-Mantiuk, Ph.D.

Białystok University of Technology
Faculty of Engineering Management
Ojca Tarasiuka # 2 Street, 16-001 Kleosin, Poland
E-mail: i.piekunko@pb.edu.pl
ORCID: 0000-0003-1973-0700

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Abstract

Research background: Market participants have been trying to forecast future price movements and create tools to facilitate making the right investment decisions since the beginning of the operation of stock exchanges. As a result, there are an increasing number of methods, tools, strategies and models to make the decision process which is becoming extremely complicated.
Purpose: to maximize the simplification of trade rules and to check whether it is possible to parameterize transactions based on the length of price movements in order that the system built in this way would generate profits.
Research methodology: empirical research was conducted on data from the period between 20/01/1998 and 29/06/2018 covering listing futures contracts for the WIG20. First, the length of the price movements was determined according to the closing rate, then the frequency of individual lengths of the price movements was determined so transaction parameters were fixed. Next, the parameters were optimized and the rates of return from the tested options were examined.
Result: It is possible to parameterize transactions based on the length of price movements and to create a simple investment strategy which generates profits. In the audited period, the optimal length of traffic was 25 points with a simultaneous use of a profit/loss ratio of 1 : 1, 1 : 2 or 1 : 3.
Novelty: an original investment strategy based on the parameterization of transactions that is based on length of price movement and profit/loss ratio.

Keywords: parameterized trade, futures contract, futures on WIG20, futures contract market

JEL classification: G11, G14, G17

Introduction

Market participants have been trying to forecast future price movements and create tools to facilitate making the right investment decisions since the beginning of the operation of stock exchanges. As a result, there are an increasing number of methods and tools to support stock investors to the extent that one click in a computer program is enough and a signal for the appropriate position is generated automatically. At the same time, financiers are building more and more sophisticated and complex models that require a number of data, often not directly related to the market[1] and difficult to access, and consequently also expensive. On websites and social networks, one can find and/or buy countless allegedly efficient and effective investment strategies. All of this makes it more and more difficult to efficiently move around the stock markets, and the process of making investment decisions itself becomes extremely complicated. Investors, who exist in the crush of the multitude of methods, tools, strategies and models, have difficulty in finding useful trading rules.

In relation to the above, the overriding goal of the considerations contained in this work was to maximize the simplification of trade rules and to check whether it is possible to parameterize transactions based on the length of price movements in order that the system built in this way would generate profits. Empirical research was conducted on data from the period between 20/01/1998 and 29/06/2018 (5,118 trading sessions) covering futures contracts on the WIG20. Data on the quotations was taken from the site database Stooq.pl.

1. Technical trade and market efficiency

The last fifty years is the period in which an on-going discussion about the efficiency of markets, the superiority of fundamental analysis over technical analysis (and vice versa) and the rationality of investment decisions made (behavioural finance) have been present. At the same time, it is difficult to indicate in which direction these considerations ultimately go, because each of these concepts is supported by numerous studies and has both its supporters and opponents. According to the hypothesis of an effective market, asset prices contain all available and relevant information (Fama, 1970, p. 383). This statement also lies at the basis of technical analysis (Murphy, 1999, p. 2). At this point, however, the similarities end. The theory of market efficiency states that on the basis of generally available information, above-average rates

[1] E.g. in 2015 research was conducted on companies included in the S & P index, which shows that publicly available data (derived from Google Trends) on the collective collection of information on companies can be successfully used in investment strategies (Heiberger, 2015).

of return cannot be achieved, and changes in the prices of financial assets are of a random nature. Therefore, any attempt to make profits using a technical analysis is ultimately futile (Tharavanij, Siraprapasiri, Rajchamaha, 2015). Furthermore, according to the effective market hypothesis, strategies based on the analysis of historical price movements (technical analysis) should not be useful, because all market participants are rational and are able to react quickly to all market information. This is in clear contradiction not only with a technical analysis, but also with behavioural finances that negate the rationality of market participants, indicating that the human mind is often imperfect in perceiving reality and information processing (Szyszka, 2009, p. 34). Additionally, the problem of access to information appears. S.J. Grossman and J.E. Stiglitz have shown that if the acquisition and processing of information is expensive, the market price cannot take into consideration all available relevant information (1980, pp. 393–408). If that were not the case, there would be no justification for obtaining and processing costly information in the first place, and access to all websites such as Reuters or Bloomberg would be completely free.

There is more evidence that confirms the possibility of achieving above average profits. In 2007, in the Journal of Economic Surveys, Ch. Park and S.H. Irwin presented a review of empirical research published in 1988–2004 on the profitability of strategies based on technical analysis. Out of 95 analyses, 56 research studies showed the profitability of technical trade, 20 obtained negative results, and 19 gave different results (Park, Irwin, 2007, pp. 786–826). The results of the research that have been published recently also do not give any real conclusive evidence, but one can observe a shift of evidence in the direction confirming the profitability of technical trade. Such evidence is provided by research by R. Rosillo, D. de la Fuente and J.A.L. Brugos (2013), V. Subramanian and K.P. Balakrishnan (2014), S.M. Nor and G. Wickremasinghe (2014), T.T-L.Chong, W.K. Ng and V.K-S. Liew (2014), G. Cohen and E. Cabiri (2015), S. Gold (2015), J. Wang and J. Kim (2018). Different approaches are presented by H. Yu, G.V. Nartea, C. Gan and L.J. Yao (2013), P. Tharavanij, V. Siraprapasiri, K. Rajchamaha (2015), A.J. Hejase, R.M. Srour, H.J. Hejase, J. Younis (2017), according to whom, the most popular technical trade strategies cannot generate statistically significant returns.

So if there are such important differences in the published research, maybe it is advisable to try to construct a strategy that would omit the possibility of predicting price movement or its lack of. Certainly no one denies the fact that there are two types of price movements on the market – upward and downward. There is also no doubt that these movements occur alternately, that they have different lengths and are shaped in different periods. For this reason, a strategy that takes into account the length of the price movement is analysed in a later part of this work.

2. Research methodology

The short-term strategy presented below is based on radically different assumptions than those that are the basis of currently created investment systems and is not by any means based on forecasting, using indicators or any models.

As a starting point, the assumption was made that the strategy:

- should be as simple as possible,
- should be possible to use at any time (no need for waiting for an input signal),
- cannot be time-consuming,
- should be possible to parameterize (the amount of profit or loss on one transaction should be known in advance, the profit/loss ratio).

The starting point for such assumptions was the discussion above and the lack of consensus regarding forecasting, the possibility of achieving above average profits and the rationality of decisions. For this reason, it was necessary to select those elements that are indisputable and also instruments that turnover gives the opportunity to earn regardless of the prevailing economic situation. Hence the concept of parameterizing translation based on the length of price movement and testing it on a derivative instrument.

Empirical research was conducted on futures on the WIG20 and on data downloaded from the Stooq.pl database from the period from 20/01/1998 to 29/06/2018 (5,118 trading sessions).

The research procedure was divided into four stages:

- determining the length of price movements (in points) according to closing prices in the period 20.01.1998–29.12.2017,
- determining the frequency of individual lengths of price movements and choosing the appropriate length for a given instrument,
- parameter optimization: length of movement, a profit/loss ratio (1 : 1, 1 : 2, 1 : 3, 1 : 4), opening and closing positions,
- observation of quotations in real time and determination of strategy effectiveness (measured by the rate of return) in the period 3.01.2018–29.06.2018.

The studies took into consideration 24 variants of the strategy, differing in the length of the price movement, the ratio of loss to profit and the exit rule (fixed and rolling output levels were applied, using the rule "cut your losses and let your profits run"[2]). The tested options assumed the following rules:

a) there is always an open long or short position (always on the market);

[2] Individual investors have a behavioural attitude called a predisposing action – they sell their earning shares too quickly and keep losses too long (Odean, 1998). The application of the rolling closing level of the profit generating

b) the first position is opened when:
   – opening price > closing price from the previous day; long position at the closing price,
   – opening price < closing price from the previous day; short position at the closing price;
c) the opening of the next transaction takes place with the simultaneous closing of the previous one,
d) the length of the movement is: 20 points, 25 points, 30 points;
e) the ratio of loss to profit is: 1 : 1, 1 : 2; 1 : 3, 1 : 4;
f) the closing of the position takes place on the level determined by the multiple of the tested traffic executed with the order for the closure with the price limit (permanent level) or in the second option – on the level determined by the multiple of the tested movement executed with the order with the activation limit for the next session (rolling level).

Additionally, with reference to assumption no. 3 of the strategy, i.e. limitation of time allocated for the implementation of the strategy, it was adopted that the quotations are observed every day at closing and the order is issued depending on the tested variant at closing or as orders with activation for the next day.[3]

3. Results

In the first place, the length of price movements measured in points according to the closing rate in the period from 20th January 1998 to 29th December 2017 was determined. In the audited period, 2,492 price movements were distinguished during 4,995 trading sessions. The shortest price movement had 1 point and occurred 24 times while the longest had 549 points and occurred once and it was a downward movement (Figure 1).

Then, the compartments with the lengths of 20, 25 and 30 points were created and it was checked how often such a spread had occurred. Results for 20 and 25-point intervals are shown below.

position was aimed at counteracting such an action – on the one hand, it secured in the case of regression of traffic, and on the other hand it managed to keep the earning position in case of the continuation of traffic.

[3] There is no need to observe the quotes and to react during the session; in the case of an unfavourable change in the rate, the position will be automatically closed at the level of maximum loss or at the level determined by the multiple of the used price movement. In this way, the earned profit is secured, and at the same time in the case of movement in the "right" side the position is maintained and the profit multiplied.

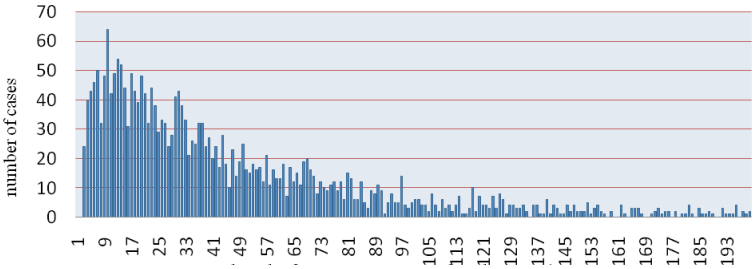

Figure 1. Length of price movement measured in points according to closing prices

Source: authors' own work.

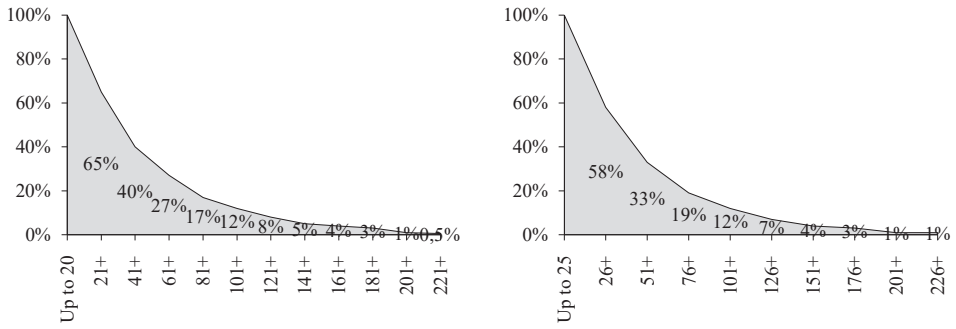

Figure 2. Cumulative frequency of occurrence length of price movements calculated for the 20 and 25 pts intervals respectively

Source: authors' own work.

As it turned out, in the examined period nearly 65% of price movements had a length of at least 20 points, nearly 58% of movements reached a length of at least 25 points, and slightly over 51% achieved a length of at least 30 points. Because longer movements were too rare (already at the length of 31 points, the cumulative percentage dropped below 50%) there was a risk that too few positions could be closed with profit at the assumed level. Taking into consideration shorter moves (less than 20 points), it turned out that the market closes its positions too quickly. For this reason, these three lengths of movements were included in further tests.

The best positive effects were obtained for the length of movements equals to 25 points, while closing the position at the level of the multiple of the tested movements with the executed order with the activation limit for the next session (rolling level). The rules of the three best policy options are presented in Table 1.

Table 1. Parameters of the three best variants of the tested strategy

No.	Elements of the strategy	Variant I	Variant II	Variant II
1.	Opening of the first transaction	– opening price > closing price from the previous day; long position at the closing price, – opening price < closing price from the previous day; short position at the closing price		
2.	Opening of the next transition	with simultaneous closing of the previous one		
3.	Length of the price movement	25 points	25 points	25 points
4.	Ratio of loss to profit	1 : 1 and more	1 : 3	1 : 2
5.	Closing of the position	– profitable: a multiple of the tasted traffic executed with an order with an activation limit for the next session (rolling level),* – on loss: an order with the limit of PKC activation at closure**	– profitable: a multiple of the tasted traffic carried out with a closing order with a price limit (fixed level), – on loss: an order with the PKC activation limit at closing	– profitable: a multiple of the tasted performed with an order for the next session (rolling level), – on loss: an order with the activation limit for the next session

* The activation limit for the next session is determined and based on the closing rate from the previous day increased or decreased by the appropriate multiple of movements. For example, for purchase transactions, if the closing price meets the following condition: purchase rate +25 points. ≤ closing rate ≤ buy rate + 50 points, the activation limit for the next session is set at the purchase rate level of +25 points. In the absence of activation of the order and after exceeding the level of purchase rate + 50 points, the activation limit is raised by another 25 points (length of movement in which the strategy is based). Such a structure secures the earned profit in case of a correction, but it does not limit profits. Therefore, on each profitable transaction a multiple of the assumed movement is realized.

** The closing of a loss transaction is executed on the basis of an order with an activation limit, for which the activation limit is defined as the opening price of ± 25 points (depending on the type of open position: buy or sell). However, the limit of the exercise price is referred to as PKC. The order is issued with the expiration date at closure. Such a design of the order guarantees its implementation in case of an unfavourable price change and protects against further losses on subsequent sessions. However, it does not secure the level of maximum loss on the current session and hence the final for each transaction varies.

Source: author's own work.

Each of the above variants generated a different number of transactions and had different effectiveness and rate of return. Transactions that were generated in the individual variants are presented in tables 2–4.

All tested variants based on a movement length of 25 points, generated profits at the gross and net level in the analysed period, at the same time each of them generated a relatively high level of losses (Table 5). Such a high level of losses, as well as a large number of missed transactions, especially in option III, indicates some system deficiencies. It is suggested to refrain from the decision to close the position close to the time that the session is closed.

Table 2. Generated transactions for variant I
(in the period from 3rd January 2012 to 29th June 2018)

No.	Pos.	Opening		Closing		Result (points)	Pos.	Opening		Closing		Result (points)
		date	price	date	price			date	price	date	price	
1.	buy	03.01	2,472	09.01	2,547	+75	sell	14.03	2,335	20.03	2,260	+75
2.	sell	09.01	2,547	11.01	2,522	+25	buy	20.03	2,260	22.03	2,310	+50
3.	buy	11.01	2,522	16.01	2,547	+25	sell	22.03	2,310	26.03	2,260	+50
4.	sell	16.01	2,547	16.01	2,596	–49	buy	26.03	2,260	28.03	2,109	–51
5.	buy	16.01	2,596	23.01	2,621	+25	sell	28.03	2,109	03.04	2,241	–32
6.	sell	23.01	2,621	01.02	2,571	+50	buy	03.04	2,241	11.04	2,266	+50
7.	buy	01.02	2,571	01.02	2,535	–36	sell	11.04	2,266	12.04	2,307	–59
8.	sell	01.02	2,535	07.02	2,435	+100	buy	12.04	2,307	24.04	2,277	–30
9.	buy	07.02	2,435	09.02	2,391	–44	sell	24.04	2,277	08.05	2,227	+50
10.	sell	09.02	2,391	12.02	2,421	–30	buy	08.05	2,227	14.05	2,327	+100
11.	buy	12.02	2,421	14.02	2,446	+25	sell	14.05	2,327	24.05	2,277	+100
12.	sell	14.02	2,446	19.02	2,421	+25	buy	24.05	2,277	25.05	2,197	–30
13.	buy	19.02	2,421	28.02	2,360	**–61**	sell	25.05	2,197	30.05	2,172	+25
14.	sell	28.02	2,360	05.03	2,310	+50	buy	30.05	2,172	06.06	2,247	+75
15.	buy	05.03	2,310	08.03	2,335	+25	sell	06.06	2,247	20.06	2,097	**+150**
16.	sell	08.03	2,335	12.03	2,378	–43	buy	20.06	2,097	25.06	2,122	+25
17.	buy	12.03	2,378	14.03	2,335	–43	sell	25.06	2,122	29.06	2,072	+50

Source: authors' own work.

Table 3. Generated transactions for variant II
(in the period from 3rd January 2018 to 29th June 2018)

No.	Pos.	Opening		Closing		Result (points)
		date	price	date	price	
1.	buy	03.01	2,472	08.01	2,459	+77
2.	sell	08.01	2,459	16.01	2,596	–47
3.	buy	16.01	2,596	31.01	2,561	–35
4.	sell	31.01	2,561	06.02	2,415	**+146**
5.	buy	06.02	2,415	28.02	2,360	–55
6.	sell	28.02	2,360	19.03	2,250	+110
7.	buy	19.03	2,250	28.03	2,209	–41
8.	sell	28.03	2,209	03.04	2,241	–32
9.	buy	03.04	2,241	04.04	2,207	–34
10.	sell	04.04	2,207	05.04	2,241	–34
11.	buy	05.04	2,241	19.04	2,324	+83
12.	sell	19.04	2,324	04.05	2,240	+84
13.	buy	04.05	2,240	11.05	2,331	+91
14.	sell	11.05	2,331	18.05	2,231	+100
15.	buy	18.05	2,231	29.05	2,195	–36
16.	sell	29.05	2,195	05.06	2,249	–54
17.	buy	05.06	2,249	15.06	2,175	**–74**
18.	sell	15.06	2,175	19.06	2,803	+92
19.	buy	19.06	2,803	28.06	2,057	–26

Source: authors' own work.

Table 4. Generated transactions for variant III
(in the period from 3rd January 2018 to 29th June 2018)

No.	Pos.	Opening		Closing		Result (points)		Pos.	Opening		Closing		Result (points)
		date	price	date	price				date	price	date	price	
1.	buy	03.01	2,472	09.01	2,547	+75		buy	06.04	2,272	09.04	2,247	–25
2.	sell	09.01	2,547	16.01	2,572	–25		sell	09.04	2,247	10.04	2,272	–25
3.	buy	16.01	2,572	23.01	2,622	+50		buy	10.04	2,272	20.04	2,322	+50
4.	sell	23.01	2,622	31.01	2,572	+50		sell	20.04	2,322	26.04	2,272	+50
5.	buy	31.01	2,572	01.02	2,547	–25		buy	26.04	2,272	04.05	2,247	–25
6.	sell	01.02	2,547	07.02	2,422	**+125**		sell	04.05	2,247	09.05	2,272	–25
7.	buy	07.02	2,422	09.02	2,397	–25		buy	09.05	2,272	14.05	2,322	+50
8.	sell	09.02	2,397	12.02	2,422	–25		sell	14.05	2,322	18.05	2,272	+50
9.	buy	12.02	2,422	20.02	2,397	–25		buy	18.05	2,272	21.05	2,247	–25
10.	sell	20.02	2,397	23.02	2,422	–25		sell	21.05	2,247	22.05	2,272	–25
11.	buy	23.02	2,422	28.02	2,397	–25		buy	22.05	2,272	24.05	2,247	–25
12.	sell	28.02	2,397	02.03	2,322	+75		sell	24.05	2,247	29.05	2,197	+50
13.	buy	02.03	2,322	05.03	2,297	–25		buy	29.05	2,197	30.05	2,172	–25
14.	sell	05.03	2,297	05.03	2,322	–25		sell	30.05	2,172	05.06	2,197	–25
15.	buy	05.03	2,322	13.03	2,372	+50		buy	05.06	2,197	08.06	2,247	+50
16.	sell	13.03	2,372	20.03	2,272	+100		sell	08.06	2,247	18.06	2,170	+77
17.	buy	20.03	2,272	23.03	2,247	–25		buy	18.06	2,170	19.06	2,077	**–93**
18.	sell	23.03	2,247	26.03	2,272	–25		sell	19.06	2,077	20.06	2,102	–25
19.	buy	26.03	2,272	27.03	2,247	–25		buy	20.06	2,102	28.06	2,077	–25
20.	sell	27.03	2,247	06.04	2,272	–25							

Source: authors' own work.

Table 5. Collective results of the three best variants of the strategy tested

	Variant I	Variant II	Variant III
Gross profit in points	1,225	783	902
Gross loss in points	508	468	693
Net profit in points	717	315	209
Number of all transactions	34	19	39
Number of profitable transactions	22 (64.7%)	8 (42.1%)	**14 (35.89%)**
Number of lossy transactions	12 (35.3%)	11 (57.9%)	25 (64.11%)
Highest profit	150	146	125
Highest loss	61	74	93 (all others are 25 each)
Average profit	55.68	97.87	64.43
Average loss	42.33	42.54	27.72
Average profit to average loss ratio	1.31	2.30	2.32

Source: authors' own work.

Taking into consideration the size of the average commission in brokerage offices for the WIG20 futures contracts, the final effect of the parameterized trade for the analysed period (6 months) is still very high. For variant I, the total commission cost should not exceed 68 points,

which ultimately gives a profit of 652 points. At an exchange rate of PLN 10, on an initial investment of PLN 2,106.44 (deposit 8.52%) this amounts to PLN 6,520. For variant II and variant III, this is respectively 277 points and 131 points. In the audited period the results from the passive strategy, i.e. the sale of the contract (there was a downward trend on the market) at the opening of the first session and closing at the close of the last session would be 387 points. However, it would be necessary to properly predict the direction of the price movement.

Regarding other variants tested, they gave negative results during the period considered.

Conclusions

All of the tested variants presented above generated profits at the gross and net levels and at the same time each of them generated a relatively high level of losses, as well as a large number of missed transactions. For variant II and III, the effectiveness of the strategy (percentage of profitable transactions) was well below 50%, and yet it still generated profits. As it seems, the low effectiveness in these variants is a result of a relatively small exchange rate in the analysed period, which in combination with a fairly long minimum price movement (50 or 75 points) necessary to realize the profit at the assumed level gives just such an effect. Such behaviour of the strategy indicates its high functionality of use, both in clear trends (with long movements regardless of their direction) and in periods of consolidation. However, it should be remembered not to use too high ratio of loss to profit – in side trends with a small range of price movements too high a level of minimal profit will cause frequent closing of the position on the loss.

The presented studies cover only one instrument and over a relatively short period of time, but as historical data for the WIG20 futures contract shows, each of these three variants generated profits each year. It indicates that at least on this instrument, parameterization can be efficient and effective.

An undoubted advantage of this type of trade is that it is not by any means based on forecasting, using indicators or any models. In this case, colloquially speaking, it is about "getting into the market" and the use of relatively close levels of defence (loss closure) is to correct the position without generating excessive losses. Therefore, as it seems, this is an interesting concept to be verified on other instruments and markets. At the same time, if the above results were confirmed on other instruments,[4] it would mean that the moment of entering the market is not as important as it has been believed to be.

[4] The instruments can only be either derivative or those for which there is a so-called short sale – this is a necessary condition resulting from the first rule of the strategy: there is always an open long or short position (always on the market).

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