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## Taking investment decisions on the futures contracts market with the application of Bat harmonic pattern : the increased efficiency of investment

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**TAKING INVESTMENT DECISIONS ON THE FUTURES CONTRACTS MARKET  
WITH THE APPLICATION OF BAT HARMONIC PATTERN  
– THE INCREASED EFFICIENCY OF INVESTMENT**

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### **Abstract**

The Bat harmonic pattern presented in the article shows that transactions made thanks to it on the contract market are characterized by an above-average rate of return (206.43% within 27 days) while accepting the initial risk ( $R$ ). The use of the potential reversal zone (PRZ) calculated thanks to the Fibonacci retracements (internal and external retracements as well as pricing projections) makes profits that arise in such a short time to be considered impressive. This article presents also one of the simple methods of profits protection which involves exceeding the local maximum (for a short position) or the local minimum (for a long position), modified by the degree of the accepted risk ( $R$ ).

It is worth noting that the POO can be calculated for several hours (days, weeks, months – depending on the time interval) before the actual transaction is concluded. In this, among other things, the harmonic trading with XABCD pattern differs from many other investment methods. This is a decision making based on the data available up to the last bar in the chart of what is likely to happen after this last bar. You could even say that POO is buying fear when prices are falling heavily and selling greed when prices are rising rapidly.

**Keywords:** Bat, retracements, internal price retracements, external price retracements, the potential reversal zone, harmonic pattern, Fibonacci, Fibonacci's numbers.

**JEL classification:** C53, C65, G11, G17, G24.

*It would be difficult to expect that someone without proper skill and talent could be a good violin player. The same is with analysing chart<sup>1</sup>.*  
J.D. Schwager

## Introduction

Investment on the capital market always involves taking decisions and requires certain skill and talent, as J.D. Schwager claims. Such activity can be approached as any other business where decisions are not always optimal and where there is a considerable risk in cooperation with potential contractors. Nevertheless, application of certain strategies enables “survival” both on the competitive market and on the capital market (especially where there is leverage, as for example in the futures contracts trade).

While planning a transaction, an investor has the following data:

- information (macroeconomic information, data from financial reports, other),
- a record of previous quotations in the form of a graph.

However, it should be remembered that no method of fundamental analysis or technical analysis is 100% sure. This is due to the fact that inevitable elements of investment are also emotions which usually influence investment decisions. While with fundamental analysis it is relatively easy to identify which financial instrument should be bought (or sold), investment with technical analysis is always done on the right (blank) side of the chart, after the last known column. Thus, it is necessary to seek occasions where the intended scenario of events is highly probable.

Among many methods of taking investment decisions, there is a growing focus on Fibonacci price retracements<sup>2</sup> which are available in almost all software for technical analysis. Moreover, the practice of harmonic investment, which uses Fibonacci ratios in the form of specific price structures, becomes increasingly widespread. Therefore, the goal of the article is:

- to present the Bat harmonic pattern, described with particular Fibonacci ratios, and
- to present efficiency of investment with the application of this pattern in real investments on the contract market. It will be used to specify the moment of the transaction initiating, owing to identification of the potential reversal zone<sup>3</sup> (PRZ) many hours (days) earlier. Furthermore, a certain technique of leaving the market (closing positions) will be presented, taking into account the initial risk ( $R$ ) accepted by the investor.

Practical application of harmonic patterns in investment and the use of stop-loss order confirms that, owing to this strategy, the started transactions are characterized by relatively low risk (accepted by the investor), and at the same time by increased efficiency.

The article contains a number of charts from AmiBroker: a professional stock-market software used by the author in real investments. The observation method is used to present the material (the analysis of stock-market quotations using intraday data at 1-hour intervals and end-of-day data), as well as the method of comparison with models (the comparison with the postulated features).

## 1. Fibonacci sequence and resulting ratios

In mathematics, a sequence is a series of consecutive numbers, linked by a specific relation. The presented sequence is as follows: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233 (...)<sup>4</sup>. It is structured in such a way that each subsequent number is a sum of two previous numbers, that is: 5 = 3 + 2; 233 = 144 + 89, etc. The discussed sequence exhibits a number of qualities. The most important are the proportions, where the relation of a selected number to the following one equals ca 0.618, while the relation of a selected number to the previous one is approximately 1.618. Between the numbers separated by two positions, these relations are respectively: 0.382 and 2.618. This feature is especially precise for a quotient of larger numbers in the sequence, e.g. 34/55 = 0.618 or 55/34 = 1.618<sup>5</sup>. The quantity 0.618 is called *phi* ( $\varphi$ ).

The presented ratios, and specifically the proportions related to them, are regarded as the classic model of beauty. With the development of civilization, especially arts, the notion of “golden ratio” (or: “golden section”, “golden cut”) became recognized. According to the encyclopaedia<sup>6</sup>, it is the division of a quantity  $a$  into such two parts, i.e.  $x$  and  $a - x$ , that the ratio of the whole sum to the larger part  $x$  is equal to the ratio of the larger part to the smaller one  $a - x$ , that is:

$$\frac{a}{x} = \frac{x}{a-x}.$$

Consequently, it follows that:

- the larger part equals:  $x = \frac{\sqrt{5}-1}{2} \cdot a$ ,
- the smaller part equals:  $a - x = \frac{3-\sqrt{5}}{2} \cdot a$ .

These ratios are presented graphically in Figure 1.

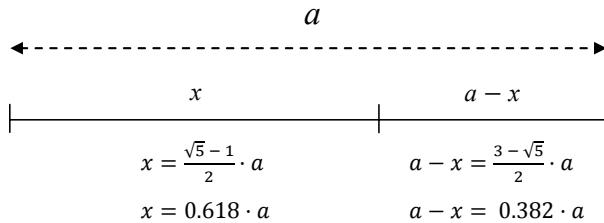


Fig. 1. Golden ratio (golden section, golden cut)

Source: prepared by the author and: Bednarz (2011), p. 205.

The features of the presented sequence are also connected with other quantities, referred to as “Fibonacci ratios”. They are presented in Table 1.

Table 1. Fibonacci ratios obtained from raising the numbers: 0.382; 0.618 and 1.618 to the appropriate exponent

Number	Exponent								
	4	3.5	3	2.5	2	1	0.5	0.25	0
0.382					0.146	0.382	0.618	0.786	1
0.618	0.146	0.186	0.236	0.3	0.382	0.618	0.786	0.886	1
1.618	6.854		4.236		2.618	1.618	1.272	1.128	1
Fibonacci ratios									

Source: own calculation.

## 2. Bat pattern – presentation

In his “Technical Analysis of Financial Markets”, John J.Murphy explains the notion of patterns. According to him, these are “certain shapes or models which appear on charts with prices of shares or goods. Patterns can be divided into separate categories and used to predict future movement of prices”<sup>7</sup>. Such models (shapes) include also harmonic structures of prices, where the relations between particular waves are described with the above-mentioned Fibonacci ratios. One of them is Bat pattern shown in Figure 2. Harmonic patters are also referred to as XABCD<sup>8</sup> structures (shapes).

S. Carney describes this harmonic structure by means of Fibonacci ratios which “retrace” (correct) the earlier wave:

- 1) AB wave constitutes from 0.382 to 0.5 of the range of XA wave (retraces between 38.2% and 50% of XA wave: this is an internal retracement of XA wave), that is:  $AB = 0.382 \text{ XA}$  (maximum:  $AB = 0.5 \text{ XA}$ );
- 2) BC wave constitutes from 0.382 to 0.886 of the range of AB wave (retraces between 38.2% and 88.6% of AB wave, that is:  $BC = 0.382 \text{ AB}$  (maximum:  $BC = 0.886 \text{ AB}$ );
- 3) CD wave constitutes an external retracement<sup>9</sup> of BC wave; it retraces between 161.8% and 261.8% of BC wave, that is:  $CD = 1.618 \text{ BC}$  (maximum:  $CD = 2.618 \text{ BC}$ );
- 4) Sequence of waves: ABCD constitutes 0.886 of the range of XA wave (retraces 88.6% of XA wave), that is:  $AD = 0.886 \text{ XA}$ ; this is an internal retracement of XA wave,
- 5) Point D is a projection (a calculated, probable future quantity, ending the pattern); this is a convenient position to enter the market in the direction consistent with XA wave.

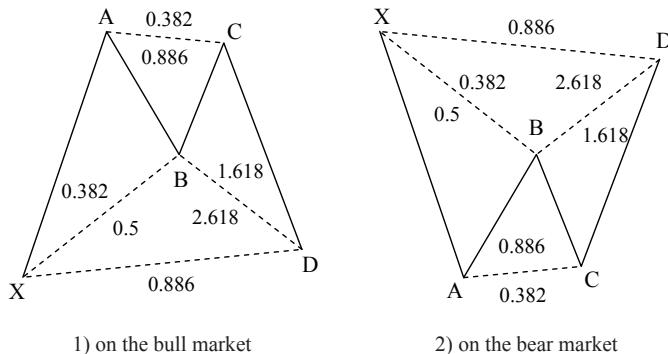


Fig. 2. Bat harmonic pattern

Source: Carney (2010), pp. 72, 83.

While discussing harmonic structures it should be remembered that in each XABCD pattern, out of 5 points (vertices) only 4 are known (that is: X, A, B, C). Point D is specified much earlier (many months, weeks, days, hours, minutes – depending on the time interval used in graphs) before it actually appears in stock market quotations. It is possible only after the vertex C is formed.

The proximity of the internal retracement of 88.6% XA wave and D point projection (measured as external retracement of BC wave ranging from 161.8% to 261.8%) indicates harmony and unanimity. In this area, the potential reversal zone<sup>10</sup> (PRZ) is outlined. Based on experience, in this zone it is highly probable that the tendency specified by XA wave will be continued. Therefore, outlining of PRZ is very important when using harmonic patterns to make investment decisions. “Owing to these zones, entering the market is less risky and enables generation of profit from investments with high rate of return”<sup>11</sup>.

### **3. Application of Bat harmonic pattern in real transactions on the futures market – efficiency of investments**

#### **3.1. Methodology of transaction – entry level, stop-loss order, exit level**

In order to present investment efficiency (the second research goal in the introduction) by means of the Bat harmonic pattern, a futures contract for WIG20 index with completion date in March (FW20H12) will be used. The “life” of the instrument is from 21.03.2011 to 16.03.2012.

In the presented way of opening the positions, entry on the market is planned in the middle of PRZ using intra-day data (in one case the end-of-day information is used). This will be the first order initiating the transaction. The second is SL an order which should definitely be placed just after entering the market. It is worth noticing that various methods of determining SL value are applied in the investment practice. The long-term moving average is frequently used. Axial points (upper and lower) are an interesting idea as well<sup>12</sup>. In the presented investment method another frequent manner of determining SL is applied. However, it is modified here by the degree of the accepted risk ( $R$ ). Thus, SL is presented as follows:

- $SL_{(WE)}$  – this is the first SL connected with the entry on the market, which is placed directly after opening of the position; its value is equal to the accepted risk which, in this case, is 14 points (that is 140 PLN, which accounts for approximately 10% of the margin value; thus  $SL_{(WE)} = R$ ;
- $SL_{(2a)}$ ,  $SL_{(2b)}$ ,  $SL_{(2c)}$  – these are the next values of SL which are modified in relation to the previous local maximum (for a short futures position) and local minimum (for a long futures position). To these values,  $0.5 R$  will be respectively added/subtracted; modification of local extremes seems necessary, because SL orders of other investors are usually placed around them.

The presented transactions are shown in charts at 1-hour and 1-day intervals. However, it is impossible to present all the existing patterns. Therefore, out of necessity, only these patterns will be shown which are the most corresponding to Bat structure. It is worth adding that in the quotations of the discussed financial instrument there are a number of other harmonic structures, such as: Gartley 222, Butterfly, Crab, AB = CD, which, however, have not been presented.

### 3.2. Bat patterns noticed in quotations of FW20H12 futures contract

The first visible Bat pattern in the hourly graph is presented in Figure 3a which depicts particular internal and external retracements and the projection of the target point, that is the D vertex as the place of opening a long futures position.

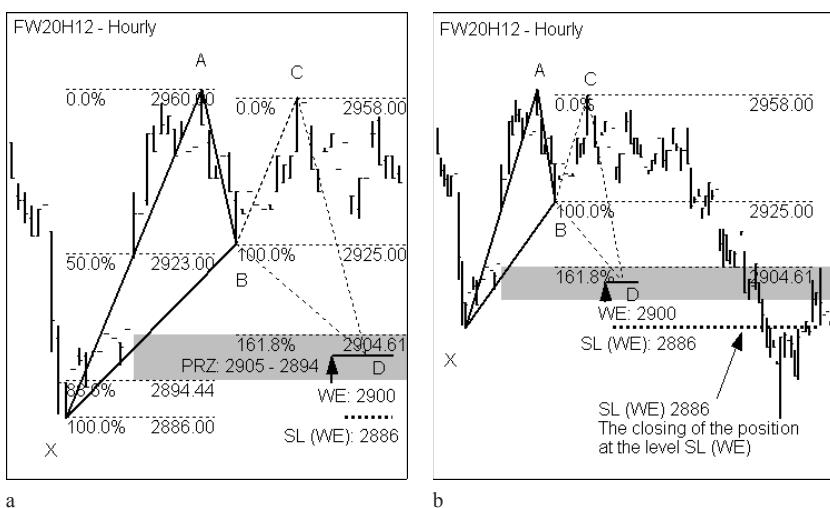


Fig. 3. FW20H12 (hourly, long futures position) – pattern 1  
Source: prepared by the author with AmiBroker software.

Description 1 of a potential Bat pattern, Figure 3a

- 1) AB wave stopped 2 points above 50% retrace of XA wave at the level of 2925; full 50% retrace equals 2923 [ $2923 = 2960 - (74 \cdot 50\%)$ ];
- 2) the following BC wave rose 2 points above 88.6% retrace of the previous AB wave and stopped at the level of 2958; 88.6% retrace for AB wave equals precisely 2956.01 [ $2956.01 = 2925 + (35 \cdot 88.6\%)$ ];

- 3) the shorter external retrace of BC wave is at the level of 2904.61 [2904.61 = 2958 – (33 · 161.8%)];
- 4) the close proximity of 88.6% internal retrace of XA wave which equals 2894.44 [2894.44 = 2960 – (74 · 88.6%)] and the external retrace of BC wave described with 161.8% quotient (as above) enable identification of PRZ (the potential reversal zone) between 2905 and 2894 (approximated values); in the graph PRZ is marked in grey colour;
- 5) in case that the change in the rate reaches PRZ, the long futures position will be opened in the middle of it, which in the presented case equals  $WE_{(LONG)} = 2900$  [ $2900 = [(2905 - 2894)/2] + 2894$ ];  $SL_{(WE)}$  for such an opened position is 2886 [ $2886 = 2900 - R$ ].

Finally, after five hours of quotation, the position is closed at the  $SL_{(WE)}$  level. The loss amounts to 140 PLN and is equal to the accepted initial risk  $R$ .

The second Bat pattern in the hourly graph is presented in Figure 4a. In this case, a convenient moment to initiate a short futures position will be sought. It is worth paying attention to the gap (indicated by the arrow). In the transaction practice, Fibonacci retracements are very often identified in relation to gaps.

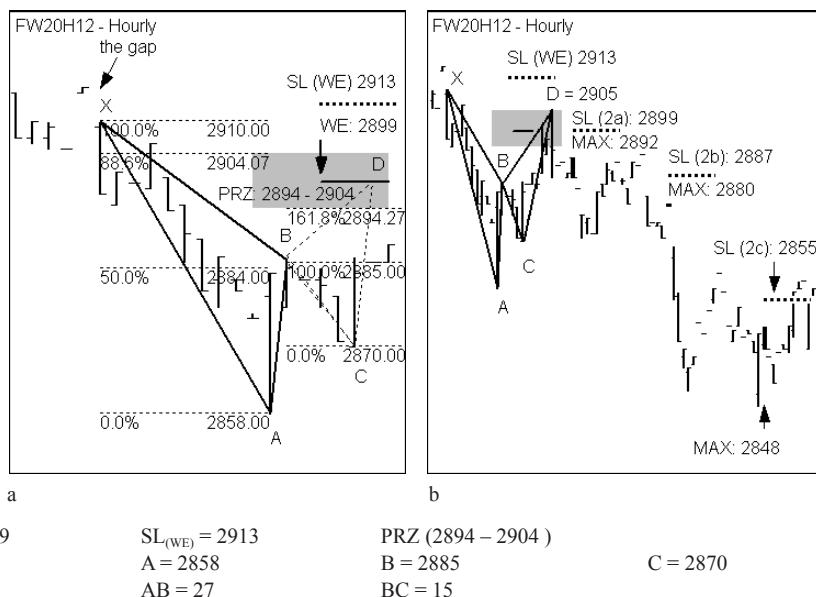


Fig. 4. FW20H12 (hourly, short futures position) – pattern 2

Source: prepared by the author with AmiBroker software.

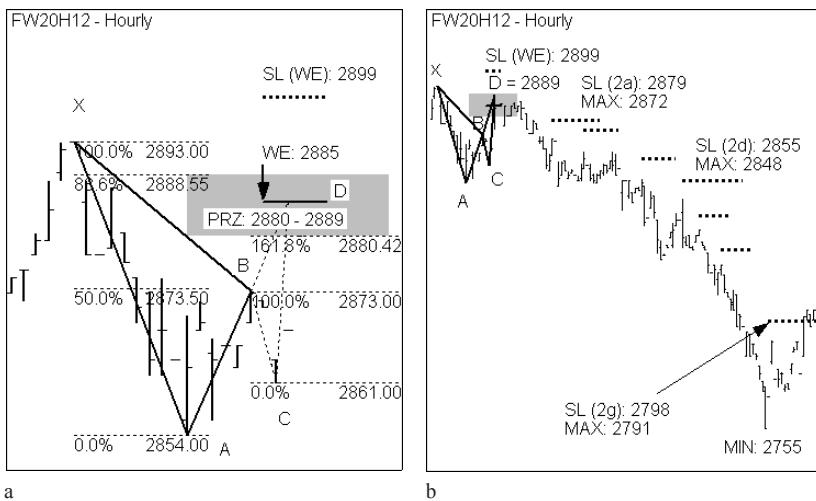
Description 2 of a potential Bat pattern, Figure 4a

- 1) AB wave stopped 1 point above 50% retracement of XA wave at the level of 2885; full 50% retracement equals 2884 [ $2884 = 2910 - (52 \cdot 50\%)$ ];
- 2) the following BC wave stopped almost exactly in the middle of the previous AB wave at the level of 2870; 50% retracement for AB wave equals precisely 2871.5 [ $2871.5 = 2885 - (27 \cdot 50\%)$ ];
- 3) shorter external retracement of BC wave equals 2894.27 [ $2894.27 = 2870 + (15 \cdot 161.8\%)$ ];
- 4) PRZ covers the range of (2894 – 2904) which is marked in grey colour in the graph; number 2904 is the internal retracement of XA wave with the quotient at 88.6%;
- 5) in case that change in the rate reaches PRZ, the short futures position will be opened in the middle of it, which in the presented case equals:  $WE_{(SHORT)} = 2899$  [ $2899 = [(2904 - 2894)/2] + 2894$ ];  $SL_{(WE)}$  for such an opened position is 2913 [ $2913 = 2899 + R$ ].

Finally, the opening of a short futures position occurred at the calculated level of 2899, after which change in the rate rose precisely to the level of 88.6% internal retracement of XA wave, that is only by 6 points (60 PLN) more than the initiated transaction. Closing of the position occurred as a result of moving stop-loss order at the level  $SL_{(2c)} = 2855$ . Profit from the position was 44 points, that is 440 PLN [ $44 = 2899 - 2855$ ], which accounts for 31.43% within 6 days.

The third Bat pattern in the hourly graph is presented in Figure 5a. It can be described as follows:

- 1) AB wave stopped 0.5 point below 50% retracement of XA wave at the level 2873; full 50% retracement equals precisely 2873.5 [ $2873.5 = 2854 + (39 \cdot 50\%)$ ];
- 2) the following BC wave corrected the previous AB by 61.8% and stopped at the level of 2861 [ $2861.2 = 2873 - (19 \cdot 61.8\%)$ ];
- 3) shorter external retracement of BC wave equals 2880.42 [ $2880.42 = 2861 + (12 \cdot 161.8\%)$ ];
- 4) PRZ covers the range of (2880 – 2889) which is marked in grey colour in the graph;
- 5) in case that change in rate reaches PRZ, the short futures position will be opened in the middle of it, which in the presented case equals:  $WE_{(SHORT)} = 2885$  [ $2884.5 = [(2889 - 2880)/2] + 2880$ ];  $SL_{(WE)}$  for such an opened position is 2899 [ $2899 = 2885 + R$ ].



$WE = 2885$        $SL_{(WE)} = 2899$        $PRZ (2880 - 2889)$   
 $X = 2893$        $A = 2854$        $B = 2873$        $C = 2861$        $D = ?$   
 $XA = 39$        $AB = 19$        $BC = 12$

Fig. 5. FW20H12 (hourly, short futures position) – pattern 3

Source: prepared by the author with AmiBroker software.

Opening of the transaction occurred in accordance with the calculated value (2885), after which the change in the rate rose by 4 points to the level of 2889, that is to 88.6% of the internal retracement of the XA wave [ $2888.5 = 2854 + (39 \cdot 88.6\%)$ ]. Closing of the position occurred as a result of moving stop-loss order at the level  $SL_{(2g)} = 2798$  [ $2798 = 2791 + 7$ ]. The dotted line in Figure 5b presents the levels of local maxima, increased by the half of the accepted risk  $R$ . Finally, the profit from the position was 87 points, that is 870 PLN [ $87 = 2885 - 2798$ ], which accounts for 62.14% within 9 days. It is worth noticing that in minimum quotations (2755) the rate of return from such an opened investment was 92.86% [ $2885 - 2755 = 130$  points = 1300 PLN;  $1300 : 1400 = 92.86\%$ ].

The fourth Bat pattern in the hourly graph is presented in Figure 6a. As before, a convenient moment to initiate a transaction – short sale – will be sought.

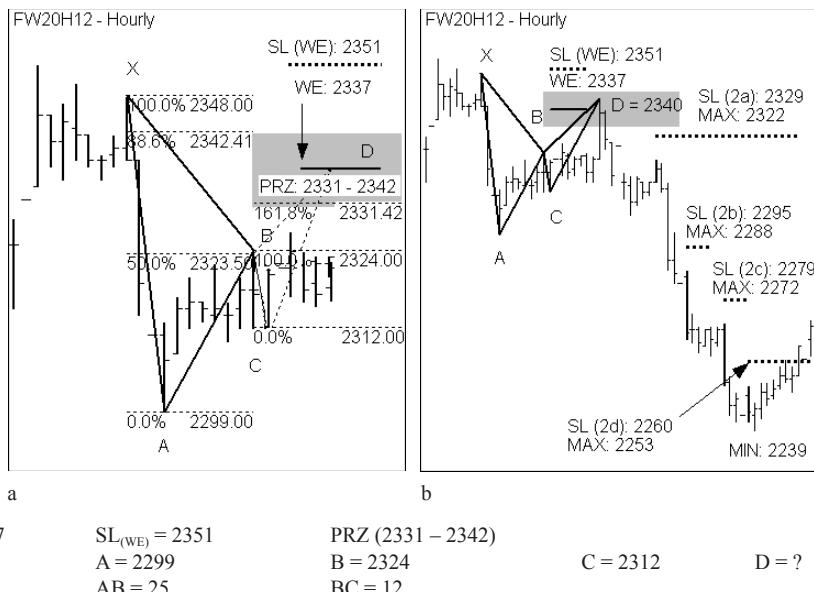


Fig. 6. FW20H12 (hourly, short futures position) – pattern 4

Source: prepared by the author with AmiBroker software.

#### Description 4 of a potential Bat pattern, Figure 6a

- 1) the AB wave stopped in the middle of 50% retracement of the XA wave at the level of 2324; full 50% retracement equals precisely 2323.5 [ $2323.5 = 2299 + (49 \cdot 50\%)$ ];
- 2) the following BC wave corrected the previous AB wave by 50% and stopped at the level of 2312 [ $2311.5 = 2324 - (25 \cdot 50\%)$ ];
- 3) shorter external retrace of the BC wave equals 2331.42 [ $2331.42 = 2312 + (12 \cdot 161.8\%)$ ];
- 4) PRZ covers the range of (2331 – 2342), which is marked in grey colour in the graph;
- 5) in case of the change in the rate reaching PRZ, the short futures position will be opened in the middle of it, which in the presented case equals:  $WE_{(SHORT)} = 2337$  [ $2337 = [(2342 - 2331)/2] + 2331$ ];  $SL_{(WE)}$  for such an opened position is 2351 [ $2351 = 2337 + R$ ].

Concluding of the transaction occurred in accordance with the calculated value (2337), after which the change of the rate rose by 3 points to the level of 2340, that is almost to 88.6% of the internal retrace of the XA wave [ $2342.41 = 2299 + (49 \cdot 88.6\%)$ ]. Closing of the position occurred as a result of moving stop-loss order at the level  $SL_{(2d)} = 2260$  [ $2260 = 2253 + 7$ ]. Finally, the profit from the position was 77 points, that is 770 PLN [ $77 = 2337 - 2260$ ], which accounts

for 55% within 3 days. In the minimum of quotations (2239) the rate of return from such an opened investment was 70% [2337 – 2239 = 98 points = 980 PLN; 980 : 1400 = 70%].

Harmonic structures occur also at other time intervals. In the next graph (Figure 7) the Bat pattern is shown in daily quotations. PRZ, entry level and SL are calculated on the basis of the end-of-day data.

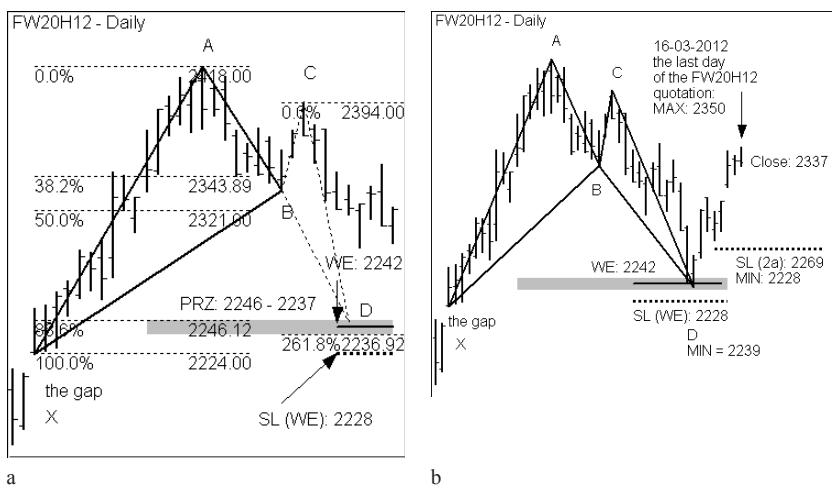


Fig. 7. FW20H12 (daily, long position) – pattern 5

Source: prepared by the author with AmiBroker software.

Description 5 of a potential Bat pattern, Figure 7a

- 1) the AB wave corrected the previous XA wave by 43.3% and stopped at the level of 2334 [ $2334 = 2418 - (194 \cdot 43.3\%)$ ]; 43.3% retracement falls within the retracements accepted for the XA wave;
- 2) the following BC wave corrected the previous AB wave by 71.43% and stopped at the level of 2394 [ $2394 = 2334 + (84 \cdot 71.43\%)$ ], 71.43% retracement falls within the retracements accepted for the AB wave;
- 3) the longer external retracement of the BC wave equals 2236.92 [ $2236.92 = 2394 - (60 \cdot 261.8\%)$ ];
- 4) PRZ covers the range of (2246 – 2237), which in the graph is marked with grey colour;

5) if the change in the rate reaches PRZ, a long futures position will be opened in the middle of it:  $WE_{(LONG)} = 2242$  [ $2242 = [(2246 - 2237) / 2] + 2237$ ];  $SL_{(WE)}$  for such an opened position is 2228 [ $2228 = 2242 - R$ ].

Opening of a long futures position occurred in accordance with the calculated value (2242) on 6.03.2012 and at the same time it was the lowest value of quotations on this day. On the next day (7.03.2012) the opening was at the level of 2250 (not indicated in the picture), after which, in relation to the minimum price from the previous day, the price decreased by almost 161.8% (without two points) to the level of 2239 [ $2237.06 = 2250 - (2250 - 2242) \cdot 161.8\%$ ]. Finally, the profit from the position was 95 points, that is 950 PLN [ $95 = 2337 - 2242$ ], which accounts for 67.86% within 8 days. In the maximum of quotations (2350) the rate of return from such an opened investment was 70% [ $2350 - 2242 = 108$  points = 1080 PLN;  $1080 : 1400 = 7714\%$ ]. However, for the calculation of profit from the position the settlement price (2337) of a contract from this series was adopted, because the day of 16.03.2012 was the last day of quoting of the futures contract marked as FW20H12 on WIG20.

#### **4. Summary of investment efficiency carried out with the application of the harmonic Bat pattern**

The transactions initiated in PRZ turned out to be very profitable, as it is shown in Table 2. Thus, the second research goal has been achieved. Even if not all of the transactions resulted in profit, their total rate of return equalled 206.43% during only 27 days of their presence on the market. A stop-loss order enabled closing a loss-making position (the Bat pattern 1) at the level

Table 2. Presentation of investment efficiency of Bat harmonic patterns margin  
(investment value) = 1400 PLN

initial risk accepted by the investor  $R = 140$  PLN (14 points, 10 per cent of the margin)

BAT pattern	Position			Profit/loss (PLN)	Rate of return (%)	Time of investment	Profit against $R$
	position	open	close				
A	B	C	D	E	F	G	H
1	long	2900	2886	-140	-10.00	5 hrs	-1,00
2	short	2899	2855	440	31.43	6 days	3,14
3	short	2885	2798	870	62.14	9 days	6,21
4	short	2337	2260	770	55.00	3 days	5,50
5	long	2242	2337	950	67.86	8 days	6,79
Total				2890	206.43	≈27 days	20.64

Source: prepared by the author.

of accepted risk at 140 PLN (i.e. 14 points). Moreover, the column H shows how much money (in PLN) was generated for each risked 1 PLN ( $R = 140$  PLN) in particular investments (opened positions).

The results of Table 2 prove that investments made with the application of the harmonic Bat pattern are very profitable (e.g. 67.86% within 8 days: the fifth Bat pattern).

## Notes

<sup>1</sup> Schwager (2002), p. 148.

<sup>2</sup> Boroden (2008), p. 9.

<sup>3</sup> Carney (2010), p. 39.

<sup>4</sup> Carney (2010), p. 11; Frost, Prechter (2005), p. 105; Boroden (2008), p. 1.

<sup>5</sup> Bednarz (2011), p. 206.

<sup>6</sup> *Encyklopedia powszechna* (1997), p. 1035.

<sup>7</sup> Murphy (2008), p. 88.

<sup>8</sup> Carney (2010), pp. 72–96 (Bat pattern), pp. 99–120 (Gartley 222 pattern), pp. 123–148 (Crab pattern), pp. 150–169 (Butterfly pattern).

<sup>9</sup> Boroden (2008), pp. 29–30.

<sup>10</sup> Carney (2010), p. 39.

<sup>11</sup> Bednarz (2011), p. 211.

<sup>12</sup> Lebeau, Lucas (1998), pp. 226–227; Axial points on the futures contracts market in Poland, in: Bednarz (2011), pp. 213–214.

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