THE APPLICATION FEATURES OF SEASONAL-CYCLIC PATTERNS IN INTERNATIONAL FINANCIAL MARKETS

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ABSTRACT

The paper deals with the topical issue of studying cyclic patterns in the economy and their practical application for the forecasts on the development of financial markets.

The work aims to establish the features of the seasonal-cyclic patterns "The January barometer" and "The first five days of January" in the international financial markets in current conditions and to develop recommendations for the practical application of these patterns in the investment activities.

The US stock market as an integral part of the World financial market was chosen as a basis for research. The research was conducted by statistical processing of data on the values of the broad market index Standard & Poor's-500 for the period from 1950 to 2019.

The study showed that the formation of forecasts about the annual growth or decline of the stock market index using the seasonal-cyclic patterns "The January barometer" and "The first five days of January" can show a high result in cases where the growth of the Standard & Poor's-500 index by the results of both the first five days of January and the results of the entire month of January of this year is a positive value. Otherwise, forecasting based on these instruments is not advisable. The best results (the forecast efficiency was 93.3%) were achieved with the joint application of both cyclic patterns.

The practical application of the research results makes it possible to improve the efficiency of investment activities in international financial markets.

Keywords: Seasonality, Cyclicality, Financial Market, Index, Standard & Poor's-500, Forecasting.

INTRODUCTION

The presence of cyclic patterns in the development of society is a recognized and confirmed fact. The cyclical nature of the economy was hypothesised by William Herschel as early as 1801, when he suggested the existence of a relationship between the cycles of sunspots and the weather, which he believed could affect the price of the crop and, ultimately, the economy as a whole (Schwager, 1996). Since that time, many scientists have dealt with the issues of cyclicality in the economy, and a large number of scientific works are devoted to this problem. However, cycle theory is still more developed at the theoretical than at the practical level (Sardak, 2016; Sardak & Sukhoteplyi, 2013).

The financial market, as an integral part of the global socio-economic system, also has a cyclical nature, so the knowledge and understanding of the cyclic laws, their practical use for the formation of forecasts on the direction of market movement can bring significant profits to entities engaged in investment activities (Afonin et al., 2008; Poletaev & Savel'eva, 1993). Therefore, applied research in this area is up-and-coming.

Study Objectives

This research aims to achieve the following objectives: establishing the features of the seasonal-cyclic patterns "The January barometer" (further in the text - "JB") and "The first five days of January" (further in the text - "FFDJ") in the international financial markets in new conditions; developing recommendations for the practical application of these patterns in the implementation of investment activities.

LITERATURE REVIEW

The first works devoted to the study of the cyclical nature of financial markets are the works of Kitchin cycle found the presence of a repeating cycle of 40 months when analysing the history of quotations of commercial bills in circulation in New York. The Dow Theory and the follower William Peter Hamilton described the cyclical nature of financial markets (Colby, 2000). Questions of seasonal cyclicity were dealt with by Kaeppel (2009); Katz & McCormick, who developed and in 1990 published a chart of calendar effects a set of tables and a graph that shows the relationship of the behaviour of the Standard & Poor's-500 index with the current calendar date (Katz, 1990). According to this chart, the market shows a general uptrend from January to September, followed by declining to October, 24 and the market usually reaches its intra-year low. Then there is a fairly sharp increase until the end of the year. According to research (Katz & McCormick, 1997), trading the Standard & Poor's-500 index, based on this pattern in the period from January 03, 1986 to November 08, 1996 brought a total income of 732% (excluding brokerage fees).

Hanula in the process of his successful stock trading used cyclic patterns lying in the fact that the shares most rapidly grow at the beginning of each month, and the "January effect" whereby stocks tend to increase in January (Hanula, 1991).

Interesting, from a practical point of view, are the works of Kaim, who found that if the shares of small-capitalisation companies grow more than the shares of large capitalisation in January, then the annual growth of the stock index is likely to be positive. If the growth of shares of small-capitalisation companies lags behind the growth of shares of large-capitalisation companies in January, the stock market indices are likely to show negative growth at the end of the year (Sincere, 2019).

In 1972, Hirsch and Yale developed a seasonal-cyclic indicator now known as "The January barometer" ("JB") (Hirsch, 2006, 2012). The meaning of this indicator is that the dynamics of the Standard & Poor's-500 stock market index in January determines whether the whole year will end with positive or negative index growth. According to the calculations of M. Sincere, the accuracy of this indicator between 1950 and 2009 is 78.3% (Sincere, 2019). This accuracy value is high enough for any empirical indicator.

The seasonal, cyclical relationship "The first five days of January" ("FFDJ") was also discovered by Yale Hirsch. The paper by Colby and Meyers describes the correlation between

what happens in the stock market during the first five days of January and throughout the year (Colby, 2000). If the Standard & Poor's-500 stock market index rises in the first five days, it will also tend to rise during the year. If the market crashed in the first five days of the year, then at the end it is likely to decline below the level of the beginning of the year. Thus, following the identified by Y. Hirsch cyclic patterns, it becomes possible to form forecasts regarding the growth or crash of the stock market in the coming year. But, despite this, these seasonal-cyclic patterns are still poorly studied and popularized in the scientific community. Besides, almost fifty years have passed since their detection, so the relevance of the existence of these seasonal-cyclic patterns in financial markets requires verification on current data.

RESEARCH METHODOLOGY AND RESULTS

The US stock market was chosen as the research base. This choice was made, firstly, because of the simplicity of collecting the necessary statistical material, and secondly, because it is the largest stock market, on the state of which the situation largely depends, in almost all world financial markets.

For this purpose, the statistical data of Hirsch was used on the rise/fall of the Standard & Poor's-500 index in January and for the year in the period from 1950 to 2005 (Hirsch, 2006), and data from statistical directories and financial information sources for the period from 2006 to 2019 (Hirsch, 2015-2018; Bloomberg, 2019). The results of the studies are shown in Table 1.

Table 1 THE EFFECTIVENESS OF THE SEASONAL INDICATORS "THE JANUARY BAROMETER" ("JB") AND "THE FIRST FIVE DAYS OF JANUARY" ("FFDJ")									
No.	Year	Index value as at 31 December of the preceding year	Year-end index change, %	Index value as of January 31 of the current year	Index change for the period 01.01-31.01, %	Mark about indicator not working	Index value on the 5th day of January of current year	Index change for the first 5 days of January, %	Mark about indicator not working
		I		II – "JB"			III – "FFDJ"		
1	1950	16.76	21.8	17.05	1.7		17.09	2.0	
2	1951	20.41	16.5	21.66	6.1		20.88	2.3	
3	1952	23.77	11.8	24.14	1.6		23.91	0.6	
4	1953	26.57	-6.6	26.38	-0.7		26.33	-0.9	
5	1954	24.81	45.0	26.08	5.1		24.93	0.5	
6	1955	35.98	26.4	36.63	1.8		35.33	-1.8	X
7	1956	45.49	2.6	43.82	-3.6	F	44.51	-2.1	F
8	1957	46.67	-14.3	44.72	-4.2		46.25	-0.9	
9	1958	39.99	38.1	41.70	4.3		40.99	2.5	
10	1959	55.21	8.5	55.42	0.4		55.40	0.3	
11	1960	59.89	-3.0	55.61	-7.1	F	59.50	-0.7	F
12	1961	58.11	23.1	61.78	6.3		58.81	1.2	
13	1962	71.55	-11.8	68.84	-3.8		69.12	-3.4	
14	1963	63.10	18.9	66.20	4.9		64.74	2.6	
15	1964	75.02	13.0	77.04	2.7		76.00	1.3	
16	1965	84.75	9.1	87.56	3.3		85.37	0.7	
17	1966	92.43	-13.1	92.88	0.5	X	93.14	0.8	X
18	1967	80.33	20.1	86.61	7.8		82.81	3.1	
19	1968	96.47	7.7	92.24	-4.4	X	96.62	0.2	

			Table 1						
			THE EFFECTIVENESS OF THE SEASONAL INDICATORS "THE JANUARY BAROMETER" ("JB")						
			AND "THE FIRST FIVE DAYS OF JANUARY" ("FFDJ")						
20	1969	103.86	-11.4	103.01	-0.8		100.80	-2.9	
21	1970	92.06	0.1	85.02	-7.6	F	92.68	0.7	F
22	1971	92.15	10.8	95.88	4.0		92.12	0.04	
23	1972	102.09	15.6	103.94	1.8		103.47	1.4	
24	1973	118.05	-17.4	116.03	-1.7		119.85	1.5	X
25	1974	97.55	-29.7	96.57	-1.0		96.12	-1.5	
26	1975	68.56	31.5	76.98	12.3		70.04	2.2	
27	1976	90.19	19.1	100.86	11.8		94.58	4.9	
28	1977	107.46	-11.5	102.03	-5.1		105.01	-2.3	
29	1978	95.10	1.1	89.25	-6.2	F	90.64	-4.7	F
30	1979	96.11	12.3	99.93	4.0		98.80	2.8	
31	1980	107.94	25.8	114.16	5.8		108.95	0.9	
32	1981	135.76	-9.7	129.55	-4.6		133.06	-2.0	
33	1982	122.55	14.8	120.40	-1.8	X	119.55	-2.4	X
34	1983	140.64	17.3	145.30	3.3		145.23	3.3	
35	1984	164.93	1.4	163.41	-0.9	F	168.90	2.4	F
36	1985	167.24	26.3	179.63	7.4		163.99	-1.9	X
37	1986	211.28	14.6	211.78	0.2		207.97	-1.6	X
38	1987	242.17	2.0	274.08	13.2	F	257.28	6.2	F
39	1988	247.08	12.4	257.07	4.0		243.40	-1.5	X
40	1989	277.72	27.3	297.47	7.1		280.98	1.2	
41	1990	353.40	-6.6	329.08	-6.9		353.79	0.1	X
42	1991	330.22	26.3	343.93	4.2		314.90	-4.6	X
43	1992	417.09	4.5	408.79	-2.0	X	418.10	0.2	
44	1993	435.71	7.1	438.78	0.7		429.05	-1.5	X
45	1994	466.45	-1.5	481.61	3.3	F	469.90	0.7	F
46	1995	459.27	34.1	470.42	2.4		460.83	0.3	
47	1996	615.93	20.3	636.02	3.3		618.46	0.4	
48	1997	740.74	31.0	786.16	6.1		748.41	1.0	
49	1998	970.43	26.7	980.28	1.0		956.04	-1.5	X
50	1999	1229.23	19.5	1279.64	4.1		1275.09	3.4	
51	2000	1469.25	-10.1	1394.46	-5.1		1441.46	-1.9	
52	2001	1320.28	-13.0	1366.01	3.5	X	1295.86	-1.8	
53	2002	1148.08	-23.4	1130.20	-1.6		1160.71	1.1	X
54	2003	879.82	26.4	855.70	-2.7	X	909.93	3.4	
55	2004	1111.92	9.0	1131.13	1.7		1131.91	1.8	
56	2005	1211.92	3.0	1181.27	-2.5	F	1186.19	-2.1	F
57	2006	1248.29	13.6	1280.08	2.5		1290.15	3.4	
58	2007	1418.30	3.5	1438.24	1.4		1412.11	-0.4	X
59	2008	1468.36	-38.5	1378.55	-6.1		1390.19	-5.3	
60	2009	903.25	23.5	825.88	-8.6	X	909.73	0.7	
61	2010	1115.10	12.8	1073.87	-3.7	X	1144.98	2.7	
62	2011	1257.64	-0.0	1286.12	2.3	F	1271.5	1.1	F
63	2012	1257.60	13.4	1312.41	4.4		1280.7	1.8	
64	2013	1426.19	29.6	1498.11	5.0		1457.15	2.2	
65	2014	1848.36	11.4	1782.59	-3.6	X	1837.49	-0.6	X
66	2015	2058.90	-0.7	1995.00	-3.1	F	2021.0	-1.8	F
67	2016	2044.00	10.2	1940.00	-5.1	X	2016.80	-1.3	X
68	2017	2251.7	18.7	2278.9	1.2		2269.0	0.77	
69	2018	2673.7	-6.2	2823.7	5.6	X	2743.1	2.6	X

Table 1									
THE EFFECTIVENESS OF THE SEASONAL INDICATORS "THE JANUARY BAROMETER" ("JB") AND "THE FIRST FIVE DAYS OF JANUARY" ("FFDJ")									
70	2019	2507.0	?	2704.0	7.9	?	2532.0	1.0	?

Source: compiled based on statistical material contained in the works (Hirsch, 2006, 2012-2018, available at Bloomberg.com) and on the authors' research.

The table highlights three sectors: in Sector I, the following data are presented: column 1 - observation number; column 2 - year; column 3 - values of the Standard & Poor's-500 index at the close of December 31 of the previous year; column 4 - values of the Standard & Poor's-500 index at the end of the trading session on December 31 of the current year, and its percentage change for the year.

Sector II "JB" presents the values of the Standard & Poor's-500 index at the close of January 31 of the current year (column 5); the percentage change in the Standard & Poor's-500 index for the period from 01 to 31 January of the current year (column 6), and the mark of the failure of the indicator "JB" (column 7).

It should be noted that in the literature the seasonal-cyclic patterns "JB" and "FFDJ" are often called indicators. In this case, we consider such a replacement of concepts to be entirely correct, since, as will be shown below, the proper use of these cyclic patterns can indeed generate signals of high accuracy about the direction of change of the Standard & Poor's-500 index by the end of the year for which the study is conducted.

Sector III "FFDJ" presents the values of the Standard & Poor's-500 index at the close on the fifth day of January of the year in question (column 8); the percentage change in the Standard & Poor's-500 index for the first five days of January (column 9), and the mark on the failure of the indicator "FFDJ" (column 10).

The table has 70 lines corresponding to the number of observations. Thus, the 70th line is not filled up to the end since at the time of writing the authors were not able to calculate this line because for all calculations it is necessary to have the value of the index Standard & Poor's-500 at the close of the trading session 31.12.2019. Accordingly, the calculation of the data required to fill the 70th line will be possible only after 31.12.2019. Thus, all estimates given in this paper were based on 69 observations.

Analysis I and II sectors of the table shows that of the 69 observations in 11 cases (marked in the table with "X") indicator "JB" has not worked, i.e. incorrectly predicted the change sign of the index value for the year (positive or negative). For example, in 1966, the index Standard & Poor's-500 in January rose from 92,43 points as of 31.12.1965 (line 17 of Table 1) to 92 and 88 points at the close of the trading session 31.01.1966 (i.e., increased by 0.4875, in the table rounded to 0.5%). In accordance with the interpretation of the indicator "JB", a positive change in the index Standard & Poor's-500 in the period from 01 to 31 January of the year signals a definite increase in the index Standard & Poor's-500 for the year, i.e., 31.12.1966 should have been recorded a positive change in the index Standard & Poor's-500 compared to its value 31.12.1965. But, as can be seen from the table, on 31.12.1966, the Standard & Poor's-500 index had a value of 80.33 (line 18, Table 1), that is, instead of the expected rise, the index showed a fall of 13.091% (in Table 1 rounded to 13.1%). So, the indicator "JB" showed an incorrect forecast, or "did not work". Thus, in this case, in column 7, the symbol "X" is put down.

Further, in 10 observations, the index showed a slight increase or decrease (in cases where the annual change in the value of the index was less than or equal to 3.0%, the table was marked "F", an abbreviation of "Flat market", or the market without a clear trend). These are, for

example, such cases as those presented in lines 7, 11, 21 of Table 1 (the change in the Standard & Poor's-500 index for the year amounted to, respectively, 2.6%, 3.0%, 0.1%) and others. We considered it expedient to exclude such observations from the calculations of the effectiveness of the indicators "JB" and "FFDJ".

Thus, the processing of the table showed that in 11 of 59 observations (from the total number of 69 we subtracted ten observations marked with the "F" icon when the annual change in the Standard & Poor's-500 index was insignificant), the "JB" indicator worked incorrectly, which is 18.6%. Thus, the accuracy of this indicator, or the efficiency of the indicator is 81.4% (100% - 18.6% = 81.4%). This figure agreed well with the result of Michael Sincere, for the period from 1950 to 2009 and was to 78.3% (Sincere, 2019).

Impressive results are obtained if we consider the readings of the "JB" indicator separately for negative and positive values of the growth of the Standard & Poor's-500 index at the end of January. Thus, out of 59 observations, the Standard & Poor's-500 index in January increased in 39 cases and 20 cases - decreased (results of processing of column 4 of Table 1).

Of the 39 observations (the years of increase of the Standard & Poor's-500 index in January), the indicator "JB" incorrectly predicted the annual results only in three cases (1966, 2001 and 2018 - lines 17, 52 and 69 of Table 1), which is 7.7%. Accordingly, the efficiency of the indicator for the entire observation period is 92.3%. Such efficiency is high and characterise this indicator as a sufficiently useful forecasting tool. The figures are well agreed with the results of studies conducted earlier and published in (Dzhusov, 2013).

Further, as a result of data processing of columns 4 and 6 of Table 1 for the entire observation period, it turned out that in 20 cases, when the Standard & Poor's-500 index fell by the results of January, "JB" indicator generated incorrect signals about the direction of movement of the Standard & Poor's-500 index in 8 cases (marked with an "X" in column 7 of Table 1), i.e., in 40.0% of cases, the indicator did not work. Accordingly, in this case, it can be stated that the efficiency of the indicator was not more than 60.0%. Obviously, such value of the efficiency is not high enough and, therefore, unacceptable for forecasting purposes.

Thus, testing of the indicator "JB" in current market-conditions showed that it is useful to apply it in cases where the growth of the Standard & Poor's-500 index at the end of January is a positive value. In cases where the Standard & Poor's-500 index shows a fall in January, the indicator is not advisable to use.

As mentioned above, the seasonal-cyclic pattern of "FFDJ" was also discovered by Yale Hirsch. In the paper by Colby & Meyers (2000) the results of the observations of the period from 1950 to 1985 for the rise or decline of the market in the first five days of January predicted the subsequent events in the stock market. It was found that with the growth of Standard & Poor's-500 index in the first five days of January the indicator "FFDJ" more effectively predicted future development than with the index fall for the same time. Since 1950, of the 22 years that started with growth, only two years ended with a final market decline. Consequently, the accuracy of the signals given by the growth of the Standard & Poor's-500 index in the first five days of January is 91.0% (Colby, 2000). According to the same studies, the signals given by the fall of the index at the beginning of the year were not as accurate - only 62.0% of them were correct. Of the 13 cases in which the index showed a decline in the first five days of January, only eight years ended with a final market decline.

The given value of the effectiveness of forecasts (especially for cases of increase in the index Standard & Poor's-500 in the first five days of January) are quite high; therefore, this indicator deserves no less attention than the above and requires additional research on new data.

For this purpose, the statistical data was used of Colby and Meyers about the rise/fall Standard & Poor's-500 index in the first five days of January and for the year for the period from 1950 to 1985 (Colby, 2000), and data statistical compendia and sources of financial information for the period from 1986 to 2019 (Hirsch, 2006; 2015-2018; Bloomberg). The results are shown in Table 1, sectors I and III.

Just as with the studies described above, the 70th line of the table currently (November, 2019) is not possible to fill until the end. Besides, ten observations are characterised by a slight change in the index Standard & Poor's-500 for the year (marked in column 10 of Table 1 with "F"), and on this basis, we have excluded these observations from consideration. Thus, all subsequent calculations were based on 59 observations.

Analysis of the data in columns 4 and 9 of Table 1 shows that out of 59 observations conducted in the period from 1950 to 2018, in 16 cases (marked in column 10 of Table 1 with "X"), the indicator did not work, i.e. incorrectly predicted the direction of change of the Standard & Poor's-500 index for the year, which is 27.1%. Accordingly, the accuracy of this indicator, or the efficiency of the indicator "FFDJ" for the entire period of observation is 72.9%.

Impressive results are obtained if we consider the results of the indicator separately for the negative and positive values of the growth of the Standard & Poor's-500 index. Thus, out of 59 observations, the Standard & Poor's-500 index in the first five days of January increased in 38 cases, and in 21 cases decreased (column 9 of Table 1).

Of the 38 observations (the years of increase in the Standard & Poor's-500 index for the first five days of January), the indicator "FFDJ" incorrectly predicted the annual results only in 5 cases (1966, 1973, 1990, 2002 and 2018 - marked with an "X" in column 10 of Table 1), which is 13.2%. Consequently, the efficiency of the indicator for the entire observation period is 86.8%. This value agrees good with the data of early studies (91.0%) and characterises the indicator "FFDJ" as a reasonably useful forecasting tool (Dzhusov, 2013).

Further, out of 21 observations (the years of the Standard & Poor's-500 index decline in the first five days of January), the indicator worked incorrectly in 11 cases (marked with the "X" icon in column 10 of Table 1), which is 52.4% (respectively, the efficiency of the indicator: 47.6%). The effectiveness of 47.6% is unsatisfactory and, therefore, unacceptable for forecasting and use in practice.

Thus, testing of the indicator "FFDJ" in current conditions showed that it is adequate to apply it in cases where the increase of the Standard & Poor's-500 index in the first five days of January is a positive value. In cases where the index for the first five days of January indicates a decrease, the indicator is not appropriate to apply.

As can be seen, the effectiveness of the indicators "JB" and "FFDJ" are quite close in value. In connection with this observation, it was decided to test a forecasting system based on the joint application of both seasonal indicators. For this purpose, all cases where indicators predicted an incorrect result were selected from Table 1. These data are summarised in Table 2.

No.	Year	S&P-500 index change for the first five days of January, %	S&P-500 index change for the period 01.01-31.01, %	Year-end S&P-500 index change, %
**Table 2**				
**COMPARISON OF FAILURES OF SEASONAL INDICATORS "THE FIRST FIVE DAYS OF JANUARY" ("FFDJ") AND "THE JANUARY BAROMETER" ("JB")**				
1	1955	-1.8 (x) *)	1.8	26,4
2	1966	0.8 (x)	0.5 (x)	-13.1

		Table 2		
		COMPARISON OF FAILURES OF SEASONAL INDICATORS "THE FIRST FIVE DAYS OF		
		JANUARY" ("FFDJ") AND "THE JANUARY BAROMETER" ("JB")		
3	1968	0.2	-4.4 (x)	7.7
4	1973	1.5 (x)	-1.7	-17.4
5	1982	-2.4 (x)	-1.8 (x)	14.8
6	1985	-1.9 (x)	7.4	26.3
7	1986	-1.6 (x)	0.2	14.6
8	1988	-1.5 (x)	4.0	12.4
9	1990	0.1 (x)	-6.9	-6.6
10	1991	-4.6 (x)	4.2	26.3
11	1993	-1.5 (x)	0.7	7.1
12	1998	-1.5 (x)	1.0	26.7
13	2001	-1.8	3.5 (x)	-13.0
14	2002	1.1 (x)	-1.6	-23.4
15	2003	3.4	-2.7 (x)	26.4
16	2007	-0.4 (x)	1.4	3.5
17	2009	0.7	-8.6 (x)	23.5
18	2010	2.7	-3.7 (x)	12.8
19	2014	-0.6 (x)	-3.6 (x)	11.4
20	2016	-1.3 (x)	-5.1 (x)	10.2
21	2018	2.6 (x)	5.6 (x)	-6.2

Note: The icon *(x)* in the table marks false signals of the indicator. Source: compiled on the authors' research.

Following the results of the studies presented above, it was concluded that by using both "FFDJ" indicator and "JB" indicator should ignore cases when the Standard & Poor's-500 index indicates a negative increase over the monitoring period (either in the first five days of January, or at the end of the entire month of January). It is possible to form forecasts based on positive index growth. In this regard, under the condition of the joint application of indicators and decision making only based on the concurrence of the signals of both indicators with the positive Standard & Poor's-500 index change over the monitoring period, 19 of the 21 observations in Table 2 should be ignored.

As can be seen from Table 2, in 19 observations, one of the two observed increases in the Standard & Poor's-500 index indicates a negative value. Only in two cases, in 1966 and 2018 (lines 2 and 21 of Table 2, marked in bold italics) were recorded cases when the Standard & Poor's-500 index had a positive increase both in the first five days of January and for the entire month of January, but despite this, the index decreased at the end of the year. According to the conclusions mentioned above, only these two observations can be considered cases of failure of seasonal indicators "FFDJ" and "JB" when applied jointly.

Thus, 19 cases of 59 observations given in Table 1 (from 1950 to 2018), should be excluded from consideration when it is not advisable to make a forecast based on the indicators values. Of the remaining 40 observations 12 more should be excluded, because despite the fact that in these ten cases the forecast was correct (under a negative value of the index increase in January, a negative year-end index increase was also observed -1953, 1957, 1962, 1969, 1973, 1974, 1977, 1981, 1990, 2000, 2002). These observations could not be used in forecasting due to a negative index increase in the January periods.

Remains 30 observations, when it would be possible to generate a forecast for the annual increase of the Standard & Poor's-500 index (1950-1952, 1954, 1958, 1959, 1961, 1963-1967, 1971, 1972, 1975, 1976, 1979, 1980, 1983, 1989, 1995-1997, 1999, 2004, 2006, 2012, 2013,

2017 and 2018). In all these years, by the end of January, there were all conditions to generate a forecast of index value changes by year-end: the Standard & Poor's-500 index indicated an increase, both in the first five days of January and for the entire month of January. Only in two cases of these 30 observations (in 1966 and 2018, lines 2 and 21 of Table 2) the indicator worked incorrectly, which is 6.7% of failures (thus, when applying both indicators jointly the forecasting efficiency is 93.3%).

Therefore, the studies suggest that both seasonal-cyclic indicators "JB" and "FFDJ" are quite promising to forecast the change in the value of the Standard & Poor's-500 stock index at the end of the coming year. The use of these indicators, according to the algorithm outlined above, can ensure the accuracy of forecasts at 93.3%.

The results of the studies presented in this paper are summarised in Table 3, which shows the efficiency values of indicators for different options of their application.

Table 3
THE EFFICIENCY OF THE INDICATORS "THE JANUARY BAROMETER" ("JB") AND "THE FIRST FIVE DAYS OF JANUARY" ("FFDJ") FOR DIFFERENT OPTIONS OF THEIR APPLICATION

The individual or joint application option of indicators	Value, %
Working with "JB" indicator by the method proposed by Yale Hirsch	81.4
The application efficiency of "JB" indicator only in case of a positive increase in the Standard & Poor's-500 index at the end of January for the period from 1950 to 2018	92.3
The application efficiency of "JB" indicator only in case of a negative increase in the Standard & Poor's-500 index at the end of January for the period from 1950 to 2018	60.0
Working with "FFDJ" indicator by the method proposed by Yale Hirsch	72.9
The application of "FFDJ" indicator only in case of a positive increase in the Standard & Poor's-500 index at the end of the first five days of January for the period from 1950 to 2018	86.8
The application of "FFDJ" indicator only in case of a negative increase in the Standard & Poor's-500 index at the end of the first five days of January	47.6
The joint application of both indicators. For the forecast, only cases of the positive increase of the Standard & Poor's-500 index are considered both in the first five days of January and for the entire month for the period from 1950 to 2018	93.3

Source: compiled on the authors' research

CONCLUSION AND RECOMMENDATIONS

Seasonal-cyclic indicators "The January barometer" and "The first five days of January" are quite useful tools for forecasting the prevailing movement direction of the stock market for the coming year.

The joint application of the seasonal-cyclic indicators "The January barometer" and "The first five days of January" is quite promising to forecast the change in the value of the Standard & Poor's-500 stock index at the end of the coming year. If the generation of forecasts to consider only those cases when a positive increase of the Standard & Poor was's-500 index recorded both in the first five days of January and at the end of the whole month, the efficiency of forecasts can reach 93.3%.

Prospects for further research in the field of studying the features of the application of the seasonal-cyclic patterns in international financial markets can be similar studies for European and Asian financial markets, as well as the identification and study of other cyclic patterns in international financial markets to develop applied investment mechanisms that increase the efficiency of investment performance.

REFERENCES

Afonin, E.A., Bandurka, O.M., & Martynov, A.Y. (2008). *Sotsial'ni tsykly: istoryko-sotsiolohichnyj pidkhid [Social Cycles: A Historical-Sociological Approach]*. Kharkiv: Tytul [in Ukrainian].

Bloomberg, The Company & Its Products (2019). Retrieved from https://bloomberg.com/markets/stocks.

Colby, R.W., & Meyers, T.A. (2002). *The Encyclopedia of Technical Market Indicators (Second Edition)*. Chicago: McGraw-Hill.

Dzhusov, O.A. (2013). *Investuvannia na mizhnarodnomu rinku aktsyi: aspect upravlinnya [Investing in the International Stock Market: The Aspect of Management]*. Dnipropetrovsk: Dnipropetrovsk National University Publishing.

Hanula, H. (1991). The Seasonal Cycle. *Technical Analysis of Stocks & Commodities*, *11*, 65-68.

Hirsch, J.A. & Hirsch, Y. (2012). *Stock Trader's Almanac 2012*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hirsch, J.A. & Hirsch, Y. (2015). *Stock Trader's Almanac 2015*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hirsch, J.A. & Hirsch, Y. (2016). *Stock Trader's Almanac 2016*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hirsch, J.A. & Hirsch, Y. (2017). *Stock Trader's Almanac 2017*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hirsch, J.A. & Hirsch, Y. (2018). *Stock Trader's Almanac 2018*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Hirsch, J.A. & Brown, T.J. (2006). *The Almanac Investor. Profit from Market History and Seasonal Trends*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Kaeppel, J. (2009). *Seasonal Stock Market Trends. The Definitive Guide to Calendar-Based Stock Market Trading*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Katz, J.O. & McCormik, D.L. (1990). *Calendar Effects Chart*. New York: Scientific Consultant Services.

Katz, J.O., &. McCormik, D.L. (1997). Seasonality and Trading. *Technical Analysis of Stocks & Commodities*, *4*, 50-61.

Katz, J.O., & McCormik, D.L. (1997). Lunar cycles and trading. *Technical Analysis of Stocks & Commodities*, *6*, 38-46.

Poletaev, A.V., & Savel'eva, I.M. (1993). *Cikly Kondrat'eva i razvitie kapitalizma (opyt mezhdisciplinarnogo issledovanija) [Kondratiev Cycles and the Development of Capitalism (The Interdisciplinary Research Experience)]*. Moscow: Nauka [in Russian].

Sardak, S. (2016). The life cycle of social and economic systems. *Marketing and Management of Innovations*, *1*, 157-169.

Sardak, S., & Sukhoteplyi, V. (2013). Periodization and forecast of global dynamics of human resources development. *Economic Annals-XXI*, *3-4*(1), 3-6.

Schwager, J.D. (1996). *Technical Analysis*. New York: John Wiley & Sons, Inc.

Sincere, M. (2019). How to Follow Stock-Market Money Flows. Retrieved from https://michaelsincere.com/what-is-the-market-telling-us.

Sincere, M. (2019). Three Holiday Indicators to Bring you Cheer. Retrieved from https://michaelsincere.com/three-holiday-indicators-to-bring-you-cheer.