BIASED JUDGEMENTS ON WHAT MOVES STOCK PRICES

How Financial Analysts Perceive Macroeconomic, Political News and Technical Analysis Signals

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ABSTRACT

The paper describes how 40 Polish financial analysts associate various kinds of economic, political news and technical analysis signals with the future stock prices. The financial analysts and dealers employed by various Polish capital market institutions were asked to mark a score to each item of the questionnaire, depending on how they estimated the impact of the item for the future behavior of stock prices. The principal axis method of factor analysis yielded 4 factors (including economic, political and "technical" measures) on which stock prices would depend explaining as much as 45% of total variance:

- The growth of foreign and domestic investments in stock market;
- The withdrawal of foreign and domestic investments from stock market;
- Unfavorable macroeconomic and political signals;
- Positive financial and macroeconomic signals.

The cluster analysis revealed that the participants marked most of items as strongly affecting future stock prices regardless if their nature was economic, political or "technical".

Considering many esoteric signals, indicated by respondents as responsible for stock market movements, the financial analysts seem to be subject to some psychological biases, which have big impact on their judgements.

INTRODUCTION

There is an evidence that stock prices are meaningful in the sense of reflecting some real economic variables. (Lorie, 1985) For the accurate prophecy of future stock prices, an identification of the factors leading stock market is needed. However, research shows that only a fraction of return variation can be explained by publicly known news. (Cutler, 1989), (Fama, 1981) The level of real dividends payments, industrial production, real money supply, interest rates, CPI inflation rate and market volatility can explain some fraction of share price movements. The most of variation in returns cannot be explained using readily available measures of new information. In spite of a long list of publications proving that market movement is random (Cootner, 1964) or at least very difficult to predict (Lo, 1999), a lot of effort is made in order to foresee future prices (Bernstein, 1992). Stock movements might be random but correlated with some (also randomly occurring) economic or political news. What more, the precise market prediction based on public news is much more difficult than the post hoc linking of major market movements to the release of economic or other information.

Research carried out by De Bondt and Thaler (1990) shows that stock prices changes forecasted by students were too extreme to be considered rational. Similar pattern of overreaction found in the predictions of naive undergraduates was replicated in the predictions of stock market professionals. The authors' inference from the research is to take seriously behavioral explanations of anomalous financial market outcomes.

As Cray and Haines (1992) noticed that the portfolio management, in spite of several normative models existence, was not well understood in a purely descriptive sense. Cray and Haines's work concentrated on verbal descriptions about how financial managers really make investment decisions.

The present research shows how financial analysts associate various kinds of news and technical analysis signals with the future stock prices. 60-item questionnaires were presented to 40 Polish financial analysts. All questionnaire participants managed funds at Warsaw Stock Exchange (WSE) in 1990's.

The Warsaw Stock Exchange is the principal institution of Poland's capital market. The first stock exchange in Warsaw opened in 1817. The World War II and the subsequent decades of

communism interrupted exchange operations. The Warsaw Stock Exchange commenced the activity in its present form in 1991, with electronic paperless trading and regulations based on the modern international standards. Following a review of several contemporary markets, a system based on French experience was adopted and implemented. In October 1994, the Warsaw Stock Exchange was admitted as a full member to the International Federation of Stock Exchanges.

Transactions are concluded in two systems: single-price auction and the continuous trading. All companies are traded in the single-price auction system. Shares of the most liquid companies of the main market are also traded in the continuous quotation system. Company shares may be listed on the Exchange in three different markets: the main, parallel and free market. Disclosure requirements are the same for all companies, regardless of their quotation market. The quotation market is indicative of the liquidity and risk level resulting from a company size as well as its history and the financial results achieved in the past.

Table 1 shows some basic statistics of the Warsaw Stock Exchange for the last few years.

	1998	1997	1996	1995	1994	1993	1992	1991
Number of investment accounts at the end of period	**1 262 212**	1 181 000	894 144	807 593	831 366	281 006	162 222	53885
SINGLE PRICE AUCTION, MAIN MARKET								
Number of listed companies (end of period)	**117**	96	66	53	36	21	16	9
Capitalisation at year-end (PLN mln)	**68 082**	38 107	23 036	10 902	7 149	5 803	351	161
WIG (end of period)	**12 795,6**	14 668,0	14 342,8	7 585,9	7 473,1	12 439,0	1 040,7	919,1
PLN return on the WIG index (%)	**-12,8**	2,3	89,1	1,5	-39,9	1 095,3	13,2	---
Average P/E ratio	**12,6**	14,9	12,3	7,8	16,4	13,3	3,4	4,1
Average P/BV ratio	**1,51**	1,85	1,91	1,47	3,43	2,14	0,60	0,47
Dividend yield at the end of period (%)	**0,9**	1,5	1,2	2,3	0,4	0,4	5,5	0,0
Number of orders per session	**29 506**	30 106	25 704	26 475	52 974	17 323	3 119	1 423
Average buy order value (PLN)	**21 098**	23 598	23 580	11 559	6 797	6 170	2 640	1 370
Average sell order value (PLN)	**12 552**	12 070	9 851	5 347	5 452	7 540	2 060	1 080
Number of transactions per session	**9 766**	9 891	8 074	7 164	24 594	9 832	1 233	877
Average value of transaction (PLN)	**16 044**	14 633	12 688	6 814	4 895	5 180	1 852	926
Turnover value per session (PLN mln)	**156,7**	144,7	102,4	49,0	120,4	51,0	2,3	0,8
Total turnover value (PLN mln)	**39 170**	36 038	25 611	12 200	22 640	7 750	230	30

Table 1 Basic historical statistics of the main market single price auction at the Warsaw Stock Exchange. (www.wse.com.pl)

METHOD

The main material was presented as a 60-item questionnaire. 4 items were deleted from the analysis due to their specific character referring to particular kind of stocks, instead of the whole market. The cover page of the questionnaire stated that the survey was designed to better understand the opinions of experts in order to prepare a new questionnaire examining the financial knowledge of Poles. This remark allowed the participants to feel more like experts whose opinion is needed for some further research rather then the persons examined. Respondents were assured of confidentiality. Demographic information was collected on the participants' age, educational level, sex, and employment status. All 40 participants were financial analysts or dealers employed by banks and Polish capital market institutions. The questionnaire was carried out in Warsaw in June 1999 during one of financial analysts meetings. Each participant was responding the questionnaire without consulting it with others. The procedure took 30-45 minutes.

The items of the questionnaire were derived from commentaries in Polish economic newspapers, especially the financial newspaper: Parkiet. The authors of those commentaries had used them as explanations of a past stock prices drop or rise as well as for predictions of near future market movements, so all items listed in the questionnaire represented real events.

Three kinds of items were included: economic, political and from technical analysis.

The participants of the questionnaire were asked to mark a score –3, -2, -1, 0, +1, +2 or +3 to each item, depending on how they estimated the impact of the item for the future (within a few weeks) behavior of stock prices (WIG index). The examined analysts were asked on what market movement they would expect if certain event (or a technical analysis signal) occurred.

The higher the score the stronger positive impact of the item on a stock prices rise. Thus –3 meant that the item was expected to evoke a strong stock prices drop, while +3: a strong rise. 0 meant, that the item was regarded by the participant as a neutral measure.

WIG is the main Polish stock exchange index; a total-return index encompassing all shares listed on the main market, calculated since 1991.

Statistical analysis of the questionnaire was done with the use of the StatSoft computer program Statistica.

Additionnaly each respondent received a 10 – item questionnaire concerning general signals used in technical analysis. The participants were asked how they perceive each of 10 technical signals in relation to its predictive power. The possible answers were: predictive value, no predictive value, no opinion.

RESULTS

Which questionnaire measures are grouped in financial analysts' minds?

In order to determine which of the 56 questionnaire measures listed in Table 1 go together in participants' minds a factor analysis was conducted. Due to the small number of respondents in relation to the number of items a correlation matrix was used for further analysis. The principal axis method of varimax normalised rotation factor analysis yielded 4 factors explaining as much as 45% of total variance. The results are presented in Table 1.

	Measure	Factor 1	Factor 2	Factor 3	Factor 4
1.	Dramatic rise in the value of a buy order	**0,88**	0,13	0,11	0,01
2.	High volume in blue chips after a long, horizontal trend	**0,84**	-0,29	0,17	0,04
3.	Reduction of interest rates	**0,82**	-0,04	-0,02	0,02
4.	After an index fall, a big overbalance of demand	**0,81**	-0,03	-0,03	0,04
5.	Dramatic WIG index rise after a horizontal trend	**0,80**	-0,22	0,05	0,02
6.	The beginning of an index rise accompanied with high volume after a long horizontal trend	**0,80**	-0,04	0,04	0,03
7.	Bullish situation on the world stock market	**0,77**	0,15	-0,06	0,23
8.	Continuous overdemand	**0,75**	-0,18	0,13	0,19
9.	The rise of foreign investment in Polish economy	**0,67**	0,16	-0,16	0,16
10.	New foreign investors joining Polish market	**0,63**	-0,10	-0,23	0,12
11.	Diminishing inflation	**0,61**	0,19	0,22	0,23
12.	New domestic institutional investors on the market	**0,60**	0,03	-0,13	0,02
13.	Diminishing in amplitude of fluctuations after a long horizontal trend	**0,56**	0,03	-0,01	0,31

14.	Right wing nationalist political parties win parliamentary election	**-0,40**	0,25	-0,10	0,21
15.	Dramatic WIG index drop after a horizontal trend	**-0,37**	0,27	-0,33	0,22
16.	Rising WIG index breaks strong psychological barriers	**0,33**	-0,05	0,17	0,21

	Measure	Factor 1	**Factor 2**	Factor 3	Factor 4
17.	After a big rise, WIG index creates a “head and shoulders” formation	0,08	**0,73**	0,10	0,22
18.	After a stock price rise, a big overbalance of supply	-0,09	**0,69**	0,03	0,05
19.	Moving averages trajectory (13 and 55 weeks) characteristic for bearish market	-0,03	**0,62**	0,04	-0,10
20.	WIG index fails to surpass former peaks	-0,14	**0,58**	-0,09	-0,24
21.	Observable selling of large amounts of stocks	0,19	**0,52**	-0,03	-0,16
22.	Drop in oil prices	-0,08	**-0,52**	0,11	0,37
23.	White candle (a kind of Japanese technical analysis)	-0,02	**0,50**	0,04	0,01
24.	Moving averages trajectory (13 and 55 weeks) characteristic for bullish market	0,47	**-0,49**	0,12	0,28
25.	Continuous oversupply	-0,31	**0,43**	-0,12	0,06
26.	Positive reports of Polish market by foreign rating agencies	0,47	**-0,42**	0,04	0,26
27.	Populist political forces win parliamentary election	-0,08	**0,42**	0,21	-0,02
28.	Dramatic rise in the value of a sell order	-0,03	**0,42**	-0,16	0,07

29.	A rise in the total numbers of orders on a bullish market	0,29	**0,41**	-0,07	-0,28
30.	The threat of break up of the present Polish coalition government	-0,16	**-0,39**	0,14	-0,13
31.	Diminishing dynamics of a rise in blue chips	-0,13	**0,38**	-0,06	0,09
32.	Street demonstrations	0,05	**-0,36**	0,36	-0,17
33.	Falling WIG breaks strong psychological barriers	-0,02	**0,28**	-0,12	0,06

	Measure	Factor 1	Factor 2	**Factor 3**	Factor 4
34.	Unstable financial situation on emerging markets	0,11	0,42	**0,69**	-0,09
35.	Unstable economic and political situation in Russia	-0,07	0,09	**0,63**	-0,06
36.	High level domestic political affairs	0,30	-0,38	**0,60**	0,00
37.	High level foreign political affairs	-0,45	-0,30	**0,53**	-0,14
38.	Unstable political situation in Russia	0,21	-0,07	**0,48**	-0,03
39.	Post-communist and socialist forces win parliamentary election	0,00	0,05	**0,47**	-0,06
40.	Big stock emissions	0,23	0,37	**-0,46**	-0,01
41.	Drop in the dynamics of economic growth	0,10	-0,01	**0,40**	-0,36
42.	WIG breaks its main rising trend line	0,19	-0,27	**-0,39**	0,05
43.	Diminishing unemployment	0,47	0,21	**-0,38**	0,37
44.	Drop in zloty to US dollar rate	0,32	-0,11	**0,33**	-0,17
45.	The beginning of recession	-0,04	-0,04	**0,25**	-0,17

	Measure	Factor 1	Factor 2	Factor 3	**Factor 4**
46.	Increase in dynamics of the indebtedness of the national state sector	-0,29	-0,23	-0,07	**-0,75**
47.	Increase in balance-of-payment	-0,10	0,01	0,28	**-0,72**
48.	Increase in income tax	0,03	-0,02	0,25	**-0,65**
49.	Increase in budget deficit	-0,13	0,12	0,11	**-0,60**
50.	Increase in corporate tax	-0,25	0,05	-0,02	**-0,59**
51.	Increase in the dynamics of privatisation	0,30	0,03	-0,35	**0,56**
52.	Industrial production decline	0,08	0,23	0,27	**-0,45**
53.	Increase in dividend tax	-0,10	-0,28	-0,17	**-0,44**
54.	Rise in coal prices	-0,37	-0,20	0,28	**-0,43**
55.	Diminishing foreign currencies reserves	-0,02	0,34	0,27	**-0,43**
56.	Drop in blue-chips prices	-0,17	0,28	0,09	**-0,34**

Table 1. Varimax normalised factor loadings. Negative value of a factor loading means that the item was perceived as having a reverse impact on the future stock prices in comparison to positive value items.

Factor 1 can be interpreted as:

The growth of foreign and domestic investments in the Polish stock market.

Reliability results for the 10 highest loadings (absolute values) of items belonging to the factor:

Cronbach's Alpha =0,93

Factor 2:

The withdrawal of foreign and domestic investments from stock market.

Reliability results for the 10 highest loadings (absolute values) of items belonging to the factor:

Cronbach's alpha =0.75

Factor 3:

Unfavorable macroeconomic and political signals.

Reliability results for the 5 highest loadings (absolute values) of items belonging to the factor:

Cronbach's alpha =0.57

Factor 4

Positive financial and macroeconomic signals.

Reliability results for the 5 highest loadings (absolute values) of items belonging to the factor:

Cronbach's alpha =0.79

Actually two groups of factors can be derived. Factors 1 and 2 constitute the first group. Factors 3 and 4 – the second group. Each group represents one "mind construction". The factors inside each group have effects in opposite directions. It can be concluded that factors are not based on the nature of the items. Economic, political and technical analysis signals go together, especially in factor 1 and 2. High Cronbach's alpha coefficient indicates reliability of the factor structure.

Which questionnaire items were perceived as highly influencing market movements?

In order to examine which of the 56 items received highest, lowest and medium marks, indicating respondents' opinions on their power to affect stock prices, a cluster analysis was carried out. The cluster analysis was conducted in two stages. A horizontal hierarchical tree plot and a graph of amalgamation schedule (Ward's method amalgamation rule, Euclidean distances) indicated 3 main clusters. K-means clustering (constant intervals) divided all 56 items into 3 clusters.

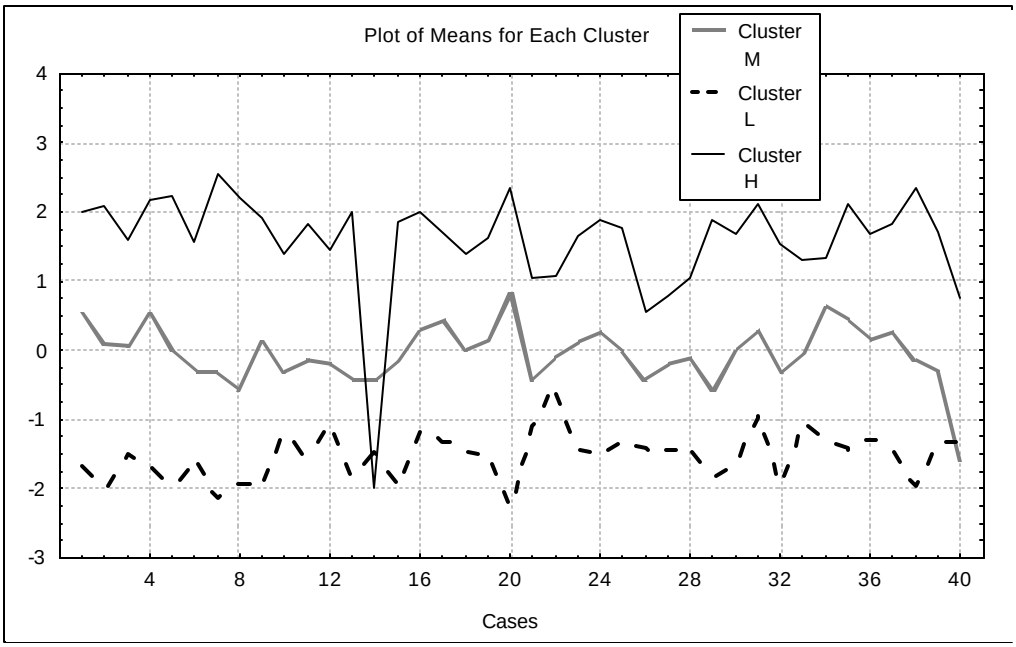


Fig. 1 The plot of the means for each of 3 clusters. Cases represent the questionnaire participants.

Cluster L consists of 31 items – including unfavorable economic, financial and political situation in Poland, negative technical signals.

Cluster M consists of 7 items (Drop in oil prices, Rise in coal prices, Street demonstrations, Big stock emissions, Post-communist and socialist forces win parliamentary election, WIG breaks its main rising trend line, a rise in the total numbers of orders on a bullish market) which according to participants opinion have small or none impact on future stock prices.

Cluster H consists of 18 items – including favorable economic, financial and political news accompanied by the technical signals of bull market.

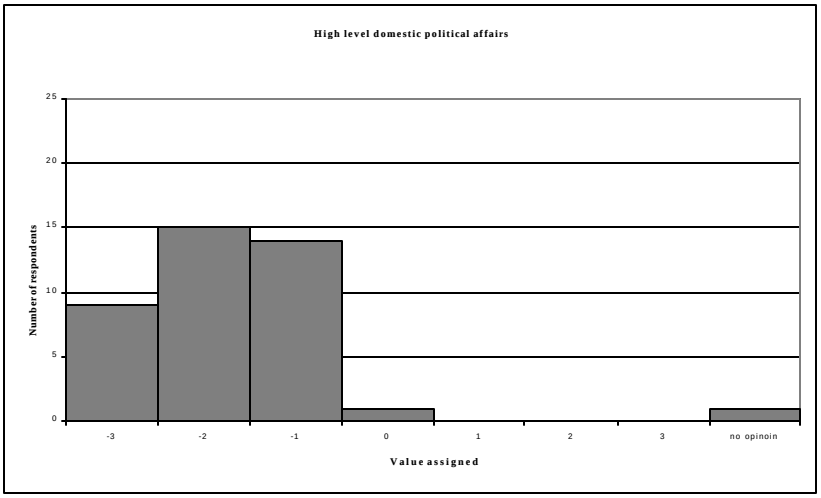
The participants marked 49 items as strongly affecting future stock prices (positively: cluster H; negatively: cluster L) regardless if their nature was economic, political or "technical".

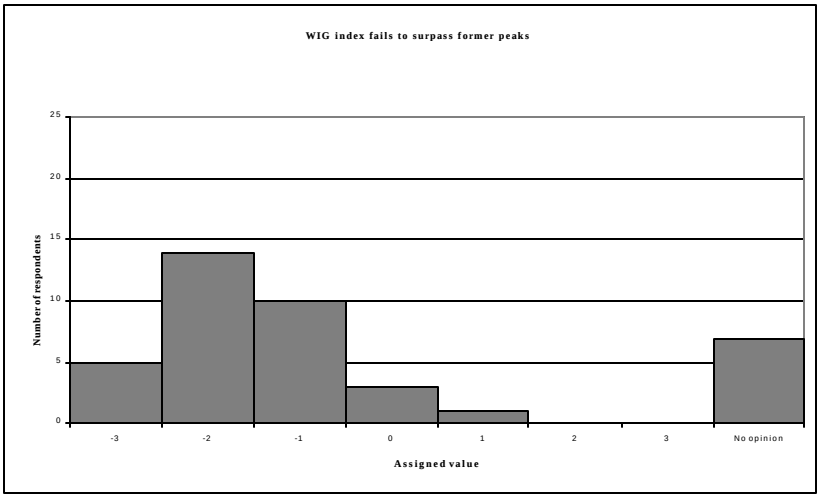
The questionnaire participants opinion is that a great majority of items demonstrate rather strong impact on the future market movements, which is not conformable with the results of the analytical research (Cutler, 1989), (Fama, 1981), showing that only a small part of stock return variation can be explained by publicly known news.

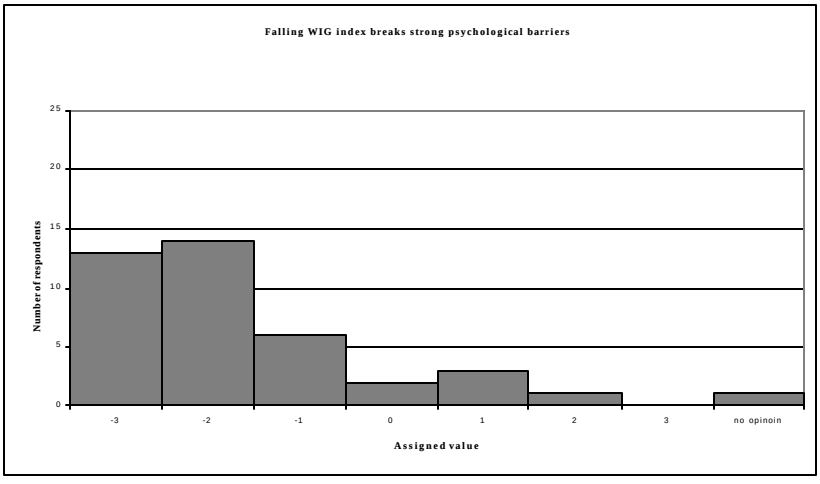
Inter-judge agreement

Below 5 examples of histograms showing the distribution of scores are presented. It can be seen that the great majority of the participants were unanimous about what impact a particular measure has on the future stock prices.

Demographic features of the participants did not correlate in any way with their responses.




WIG index fails to surpass former peaks
Number of respondents
25
20
15
10
5
0
-3
-2
-1
0
1
2
3
No opinion
Assigned value


Falling WIG index breaks strong psychological barriers
Number of respondents
25
20
15
10
5
0
-3
-2
-1
0
1
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3
no opinoin
Assigned value

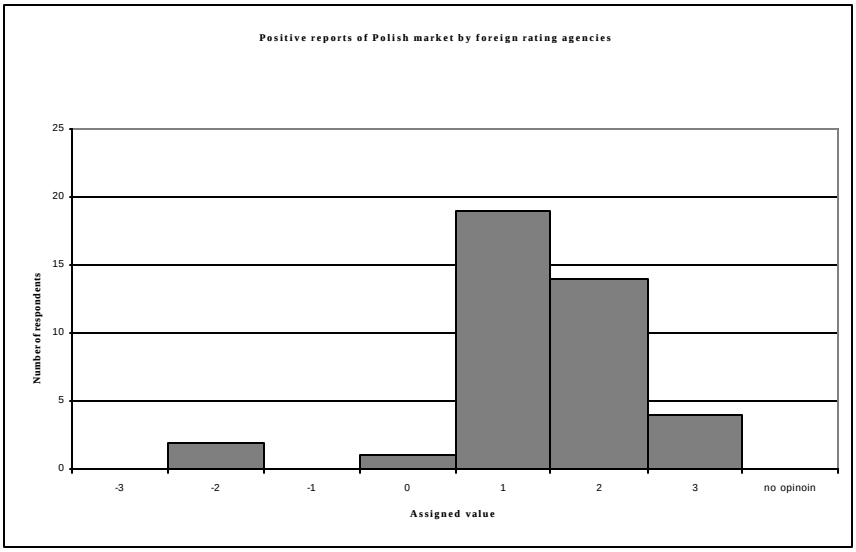

Fig. 2 Histograms of the values assigned to 4 items of the questionnaire. The participants were asked to mark a score –3, -2, -1, 0, +1, +2 or +3 to each item, depending on how they estimated an impact of the item on the future behavior of stock prices (WIG index).

QUESTIONNAIRE ITEM	MEAN SCORE	STANDARD DEVIATION
A/. High level domestic political affairs.	-1,8	O,82
B/. WIG index fails to surpass former peaks.	-1,7	1,33

C/. Falling WIG index breaks strong psychological barriers.	**-1,6**	**0,97**
D/. Dramatic rise in the value of the buy order.	**1,8**	**1,12**

Technical analysis signals

As the second 10-item part of the questionnaire (devoted exclusively to techical analysis signals) show,

the participants regard most general technical signals as valid for market movements predictions. More than 60% of the respondents market the following technical signals as having the predictive value: MACD, RSI, Ultimate, ROC, Eliott waves and Fibonacci proporsions.

DISCUSSION

I. The examined group of financial analysts distinguishes 4 factors (including economic, political and "technical" measures) on which stock prices depend:

- The growth of foreign and domestic investments in Polish stock market;
- The withdrawal of foreign and domestic investments from stock market;
- Unfavorable macroeconomic and political signals;
- Positive financial and macroeconomic signals.

Thus, their cognitive structure is not based on the nature of the signals, perceived as economic, political, or technical measures. The factors reflect two major mind constructs of questionnaire participants: macroeconomic conditions and the capital flow. The first construct reflects the state of Polish economy and the second one describes the will of Polish and foreign market participants to invest in Polish stocks.

II. As other research demonstrated (Cutler, 1989), there are a few economic measures, which had certain impact on stock prices behavior. However making the precise stock price predictions based on them seems to be too risky. On the other hand there are many measures which impact is completely "esoteric". Evidently the questionnaire respondents do not make any distinguish between these two groups of measures. Technical analysis persists in participants' minds and its signals are treated equally to macroeconomic and political news in spite of the lack of any creditable evidence (Alexander, 1961), (Roberts, 1959) of its effectiveness. What more, as the cluster analysis demonstrated, the respondents give a strong predictive value to a great majority of items listed in the questionnaire.

The second 10-item part of the questionnaire demonstrated that many technical analysis signals are generally appreciated by the participants and believed to have a predictive value.

III. The question arises as to why the well educated financial analysts regard so many unproven measures as being strong influences on stock prices. This can be explained by one of at laest three reasons:

a/. they were taught to take these items as such,

b/. they have a strong motivational impulse to believe it,

c/. they subject to some psychological inclinations.

ad a/. There are many financial handbooks listing without any empirical evidence a lot of signals allegedly determining future market movements. Some people including financial analysts take these statements for granted and believe them.

ad b/. According to the famous behavior-attitude relationship, discovered by Leon Festinger people strive to have their attitudes, beliefs and behaviors support one another. When these components come into conflict, a person becomes uncomfortable and experiences a state of cognitive dissonance. To relieve this dissonance, the person will try to change the cognitions so that they will again be in agreement. Financial analysts must have to strive to predict market movements and put a lost of effort in it. If they were convinced about the randomness of stock prices movements, they would hold two cognitions: (1) they work hard to predict X, and (2) the X is random. Because they cannot change the fact that they work hard, they can reduce their dissonance by changing their attitude about X. They can come to believe that X is predictable. (Worchel, 1995)

ad c/. Cognitive psychologist discovered dozens of psychological inclinations, which have big impact on human judgements. Some of them financial analysts seem to subject to. These inclinations are responsible for a long list of purely esoteric items chosen by questionnaire respondents as allegedly important in relation to future stock behavior. Particularly interesting is the phenomenon that almost all the esoteric measures received the very high absolute scores both in cluster "H" and "L". This indicates how overwhelming those psychological inclinations could be. Table 2 presents the esoteric questionnaire items ascribed to the following psychological inclinations.

1/. Group thinking and group behavior. People often represent group thinking and behavior, overestimate views shared by others and thus subject to panic and euphoria.

2/. Anchoring effect (Slovic, 1971) Decision makers (investors) overestimate a recently quoted price level and this value serves as an anchor for further probability assessments.

3/. Creating ad hoc, intuitive theories, noticing false correlations (Jennings, 1982),

4/. "Law of small numbers" (Kahneman, 1982), (Tversky, 1971). People exaggerate how closely a small sample will resemble the parent population from which a sample is drawn. When the underlying probability distribution generating observed sequences is uncertain, the law of small numbers will lead people to over-infer the probability distribution from short sequences. This tendency to over-infer from short sequences leads in turn to misperception of regression to mean.

5/. Ignoring the "regression to average" law. (Tversky, 1974) Misunderstanding regression to mean gives rise to some spurious explanations for observed regression. One of the implications of this inclination is that people expect too few lengthy streaks in sequences of random events, they tend to generate spurious explanations for long streaks that are determined by chance. (Rabin, 1998)

No	**Psychological bias**	**Questionnaire items**
1.	Decision makers are inclined to group thinking and group behavior and thus subject to panic and euphoria.	Rising WIG index breaks strong psychological barriers
		Falling WIG index breaks strong psychological barriers
		The beginning of an index rise accompanied with high volume after a long horizontal trend
		Dramatic rise in the value of a buy order
		Dramatic rise in the value of a sell order
2.	Anchoring effect (Slovic, 1971) - decision makers (investors) overestimate a recently quoted price level and this value serves as an anchor for further probability assessments.	WIG index fails to surpass former peaks

3.	Ignoring the "regression to average" law. (Tversky, 1974)	Moving averages trajectory (13 and 55 weeks) characteristic for bearish market Moving averages trajectory (13 and 55 weeks) characteristic for bullish market
		WIG index breaks its main rising trend line
4.	Creating ad hoc, intuitive theories, noticing false correlations (Jennings, 1982), "law of small numbers" (Kahneman, 1982), (Tversky, 1971).	High level domestic political affairs
		Unstable political situation in Russia
		The threat of break up of the present Polish coalition government

Table 2. A list of psychological biases and the questionnaire measures referring to them.

There is no proof that the questionnaire items listed in the Table 2 have any predictive meaning. The respondents marked them as having such. Why? Besides the conitive dissonance phenomenon, whose impact is able to explain this bahavior, in the case of the items listed above additional effect can play a role: psychological inclinations and rules of thumb. One cannot conclude that the questionnaire items such as: "Increase in the dynamics of privatisation" or "Industrial production decline" say something about the psychology of the market. On the contrary, the items like: "WIG index fails to surpass former peaks", "Moving averages trajectory (13 and 55 weeks) characteristic for bearish market" or "WIG index breaks its main rising trend line" seem to represent certain common psychological biases.

Fischer Black noticed that the noise is a major reason for the use of rules of thumb.

> "Even highly trained people seem to make certain kinds of errors consistently. There is a strong tendency in looking at data to assume that when two events frequently happen together, one causes the other. There is even stronger tendency to assume that the one that occurs first causes the one that occurs second. These tendencies are easy to resist in the simplest cases. But they seem to creep back in when econometrics studies become more complex." (Black, 1986)

As research done by Kahneman and Tversky (1982) shows, even experience, expertise and learning do not virtually eliminate psychological biases. The biases may appear as well in the behavior of highly trained professionals.

IV. There are many economic, political or technical signals occurring simultaneously. In spite that the analysts are almost unanimous about how a certain event affects the market, they are not unanimous about which of the item is crucial at the moment. This causes the randomness of stock prices movements. On the other hand the unanimity among investors in treating a particular event as a valid signal of future stock price changes simultaneously may lead to a self-fulfilling prophecy on the market. The self-fulfilling prophecy might be evoked not only by a strong common opinion on validity of some fundamental news but also by a common belief in a strong predictive power of esoteric measures.

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