

Marcin Czupryna

Elżbieta Kubińska

**Department of Financial Markets
Cracow University of Economics, Poland**

Łukasz Markiewicz

**Department of Economic Psychology
Kozminski University, Poland**

WHAT MAKES TECHNICAL ANALYSIS POPULAR?

Abstract

According to the Efficient Market Hypothesis, investors cannot achieve above-average returns by using technical analysis tools. This paper attempts to answer the question as to what makes technical analysis popular, regardless of the efficiency of capital markets. The objective is to verify whether investors have certain cognitive inclinations that make them more likely to believe in the efficiency of technical analysis models. We postulate a positive relationship between different forms of overconfidence and faith in the effectiveness of technical analysis methods. This relationship was confirmed only in the case of the “better than average” effect. The two other examined forms of overconfidence, namely, overprecision and illusion of control, did not yield statistically significant results. However, the lack of confirmation by all three forms of overconfidence is in line with the results presented in the literature, namely, that there are no significant relationships between different forms of overconfidence.

Keywords: technical analysis, efficient market hypothesis, overconfidence, “better than average” effect.

1. Introduction

Technical analysis is the methodology employed to forecast the future values of security prices based on the study of available historical market data: price and volume. It is based on three assumptions: (1) market action discounts everything; (2) prices move in trends; (3) history tends to repeat

itself (Murphy 1999). The debate on the effectiveness of technical analysis has been of continuous interest to both academic researchers and investors since the 1970s. In one of the first studies of technical analysis methods, Fama and Blume (1966) showed that the strategy based on filtering proposed by Alexander (1961) was no more profitable than the alternative buy and hold strategy. In particular, they found that filtering does not produce significant profits when bid and ask prices are considered. Recent studies, however, have supplied empirical evidence for the contrary view that technical analysis methods are profitable. Schulmeister (2009) examined the efficiency of more than one thousand different moving average and momentum models in the period of 30 years before the 2007 financial crisis (i.e. 1976–2007) for the yen/dollar exchange rate and found that technical analysis trading rules were profitable.

Investors' beliefs about the efficiency of technical analysis models are influenced by the Efficient Market Hypothesis (EMH), which is one of the dominant theories in finance (Fama 1970). EMH states that a security's market price incorporates all relevant information instantaneously. It implies that returns on securities are unpredictable, which means that an investor cannot earn systematic profits above the market rate of return by using only technical analysis – or by using any other single investment method. Recent studies have provided evidence of the profitability of technical analysis based on the existence of patterns in the time series of returns. Charlebois and Sapp (2007), for example, state: “Although the foreign exchange market is believed to be one of the most efficient financial markets in the world, there is significant evidence that technical analysis is profitable in this market” (p. 443). Other empirical evidence against EMH can be found in Malkiel (2003). One of the first theoretical arguments against EMH was raised by Grossman and Stiglitz (1980). Theoretical arguments against EMH have also come from market microstructure considerations on information asymmetry and information processing. Phenomena such as herd behaviour, anchoring, overconfidence, or investors' attention also support this argument.

The Adaptive Market Hypothesis (AMH), as proposed by Lo (2004), attempts to marry the findings of behavioural finance with classical theories based on EMH in such a way that the anomalies listed by behaviourists do not contradict the theory of market efficiency. AMH states that the effectiveness of investment strategies depends on the environment, which means that some strategies can be profitable in one segment of the market and not in another. AMH also addresses the relationship between risk and reward, stating that while this does indeed exist, it is unlikely to remain

stable over time. According to AMH, and contrary to classical EMH, arbitrage possibilities do exist from time to time. Innovation in investment strategies gives competitive advantage to traders, which means that market participants must adapt to changing investment conditions. AMH states that the main objective of market participants is to survive; maximising profits or minimising risk are secondary objectives. The profitability of technical analysis methods, which contradict the assumptions of EMH in all of its forms, is not an anomaly in the light of AMH, which asserts that the effectiveness of investment strategies depends on the environment. In this way, technical analysis can be profitable in the foreign exchange market but not on the stock exchange. Alternative theories that can explain the impact of technical analysis tools on asset prices have been proposed by Barberis, Shleifer and Vishny (1998) and by Daniel, Hirshleifer and Subrahmanyam (2001). These models emphasise the role of biased information processing and its influence on the price formation process.

Many arguments against technical analysis have been raised in the economic literature. Their thrust is that technical analysis operates as a self-fulfilling prophecy and that the positive evidence for the efficiency of technical analysis can be explained by data-mining-bias. The use of technical analysis is treated as a sign of irrational behaviour. In this view, rational investors, who assume that financial markets are efficient, should not take account of information from technical analysis models when making investment decisions. The main objective of the present study is to examine the relationships between some of the psychological inclinations of investors and their attitude towards technical analysis. This idea has been investigated in two works by Zielonka (2002, 2004), who stated that the popularity of technical analysis is related to the presence of cognitive biases and the heuristics that lie behind them. He focused on four cognitive biases: gambler's fallacy, misperception of regression to the mean, the anchoring effect, and herd behaviour. The present paper investigates the relationship between different forms of overconfidence and attitudes towards technical analysis models. The aim is to verify whether some forms of overconfidence induce investors to believe in the effectiveness of technical analysis models and to disregard EMH. This issue is important because of the growing role of technical analysis among professional market participants (Menkhoff & Taylor 2007) and because of a desire to diminish the scepticism of academics.

2. The Overconfidence Effect and Technical Analysis

The approach of academics to the determination of stock prices is moving away from the dominance of the EMH towards considerations of the psychological and behavioural elements involved. One form of irrational behaviour that is very common among investors is the overconfidence effect (Tyszka & Zielonka 2002; Tetlock 2001; Kubińska & Markiewicz 2013; Markiewicz & Weber 2013). One of the forms it takes is the “better than average” effect, which is a tendency to consider oneself more skilled than the average individual. It was documented by the Swedish researcher Svenson (1981), who found that nearly all drivers questioned said that their driving skills were above average. The other well-known forms of the overconfidence effect are miscalibration (Lichtenstein, Fischhoff & Phillips 1982), which is also known as overprecision or overplacement depending on the context (Moore & Healy 2008), and the illusion of control (Langer 1975). Overprecision is the tendency to overestimate the accuracy of one’s judgments compared to the true conditions, while overplacement involves the conviction that our knowledge or skills are of a higher order than is truly the case. The illusion of control, meanwhile, is the belief that one has control when this is not really true. Some interpret the illusion of control as a special form of overplacement (Moore & Cain 2007; Moore & Healy 2008). The overconfidence effect can be linked to faith in the effectiveness of technical analysis methods and to faith in the EMH (Fama 1970). If the market is efficient, then it is assumed that investors cannot “beat the market”, that is, that they cannot permanently achieve better results than the market. Where an investor feels able to beat the market and succeeds in earning profits systematically, we are dealing with an instance of the “better than average” effect, which is one form of overconfidence. This kind of investor will tend to seek and use methods that promise better than market results, such as technical analysis. The other forms of overconfidence, overprecision, and the illusion of control, may also be related to faith in the effectiveness of technical analysis. If an investor believes in the predictive value of technical analysis when making investment decisions, there may be a tendency to overestimate the accuracy of judgments compared to the true conditions and to overestimate the probability of success when compared to the objective probabilities. We suspect that there is a positive relationship between overconfidence and faith in the effectiveness of technical analysis methods, which is one form of market inefficiency.

3. Method

The experiment was conducted in December 2012 during an examination in technical analysis taken by second-year undergraduates on the Capital Markets course in the Faculty of Finance at the Cracow University of Economics. The majority of the students were male (21 of a group of 31), and the average age was approximately 21 years ($M = 21.22$; $SD = 0.88$).

The students were asked to prepare a computerised technical trading system based on any selected technical analysis indicators, e.g. moving averages, channels or stochastic oscillators. They were evaluated based on the system's design and consistency, but not on the rate of return generated by the system for the data provided by the lecturer on the day of the exam. The system was tested on two stocks, one showing an upward trend and the other showing a downward trend. In this way, factors such as how many technical analysis indicators they used, what parameterisation they introduced, or what logical rule was used for making the final signal were all important for the students' evaluation. Two weeks before the exam, that is, before the presentation of the trading system, a questionnaire was distributed that asked students about the anticipated rate of return of their system in terms of a point estimator and 90% confidence interval – the latter being a typical measure of overconfidence in the form of overprecision. As a typical measure of overconfidence in the form of the “better than average” effect, the students were also asked to assess their result compared with their colleagues. Finally, the students had to express their degree of agreement or disagreement with a set of statements (on a scale from 1 – strongly disagree to 4 – strongly agree). The answers produced two scales: Faith in Technical Analysis and Illusion of Control. The detailed statistics for the measures are provided in the next section.

4. Results

4.1. Measures of Faith in the Efficiency of Technical Analysis Models and Some Forms of Overconfidence

We examined the relationships between the faith in technical analysis models and different forms of overconfidence. The Faith in Technical Analysis and Illusion of Control measures were derived by Principal Components Analysis (PCA), which was applied to the correlations among the eight statements from the questionnaire. The results are shown in

Table 1 (Goodness of fit chi-square = 9.057; $df = 13, p = 0.769$)¹. Two factors were found: Illusion of Control and Faith in Technical Analysis.

Table 1. Structure Matrix for Scales: Illusion of Control and Faith in Technical Analysis

Statements	Factor 1: Illusion of Control	Factor 2: Faith in Technical Analysis
I always know the status of my finances	0.838	–
I control my personal finances	0.992	–
I control and am fully responsible for the results of my financial decisions	0.675	–
Technical analysis indices are able to generate above-average returns	–	0.918
Chart analysis (e.g. trend lines, support, and resistance line) allows me to achieve superior returns	–	0.997
Methods and tools of technical analysis are derived from empirical observation of the market and are therefore effective	–	0.729
Technical analysis is a more effective method of investing in financial markets than fundamental analysis	–	0.599
I am interested in technical analysis to an extent that exceeds the scope defined in the lecture	–	0.607

Source: prepared by the authors on the basis of the results of the experiment conducted among students.

The variables representing Illusion of Control and Faith in Technical Analysis were calculated as the means of the answers given to the items classified within each factor that are presented in Table 1. With Cronbach Alpha values of 0.867 and 0.865, respectively, these two scales have relatively high internal consistency. There is no statistically significant difference between male and female groups with respect to the Illusion of Control factor. Table 3, however, shows a significant gender difference with respect to Faith in Technical Analysis: that men have a stronger belief than women in the effectiveness of technical analysis.

¹ The PCA extraction method was maximum likelihood and, because the initial statements were correlated, the rotation method was oblimin with Kaiser Normalisation. For more details of exploratory factor analysis, see Field (2005, pp. 619–79).

The “better than average” effect was measured by the question that asked students to compare the rate of return obtained by using their own trading system with the average rate of return to be achieved by their colleagues during the exam. This question was posed two weeks before the exam, when the students had not yet prepared their systems (Variable BTA_0), just before the exam (Variable BTA_1), and just after the exam (Variable BTA_2). The distributions of the answers are presented in Table 2.

The influence of the experiment involving the preparation and evaluation of the trading system had the effect of decreasing the level of overconfidence in the form of the “better than average” effect. The students were less convinced that they would achieve above average results than they were before the experiment (Friedman Test, $N = 27$, chi-square = 16.906, $df = 2$, p -value < 0.001). There was also a statistically significant difference between the groups of men and women at the first measurement, with more men rating themselves as better than average (Table 3).

To measure the next form of overconfidence, which was overprecision, five questions about the future values of stock exchange indexes (WIG, DAX, CAC40, DJIA, and NIKKEI) were posed. The students were asked to predict future values based on the previous month’s quotations and the time series of the relevant index was presented in graphical form. The students were asked to give the median value and the lower and upper limits of the 90% confidence interval for the distribution of each index value one month ahead. A traditional measure of overprecision was used, namely the width of the confidence interval (the variables were WIG_spread, DAX_spread, CAC40_spread, DJIA_spread, NIKKEI_spread). A variable representing the average width of the confidence interval was also created (Mean_spread_index). Before calculating the mean value of the five indexes for each respondent, the width of the confidence intervals was modified. The new value was a percentage of the maximum width of the confidence interval given by all of the students for the relevant index. This modification acted as a standardisation procedure, as the average of the original widths of the confidence intervals would be biased by the index with the highest values (WIG_spread). After applying the standardisation procedure, all five indexes had a similar share in the final result of the average. The statistical results for the overprecision measures are presented in Table 3. The diversity of the values for the width of the confidence intervals is primarily determined by the value levels of the market indexes.

Table 2. Distributions of the Measure of the “Better than Average” Effect Two Weeks before the Exam (BTA_0), Just before the Exam (BTA_1), and Just after the Exam (BTA_2)

Compare the rate of return obtained using your own trading system with the average rate of return to be achieved by your colleagues during the exam	Frequency BTA_0	Percent BTA_0	Frequency BTA_1	Percent BTA_1	Frequency BTA_2	Percent BTA_2
Definitely Lower	0	0	0	0	2	6.5
Lower	5	16.1	9	29.0	14	45.2
Comparable	18	58.1	15	48.4	9	29.0
Higher	7	22.6	7	22.6	2	6.5
Definitely Higher	1	3.2	0	0	0	0
Total	31	100.0	31	100.0	27	87.1

Source: prepared by the authors on the basis of the results of the experiment conducted among students.

Table 3. Descriptive Statistics for Different Measures of Overconfidence and Faith in Technical Analysis Models for the Entire Group and for Men and Women Separately

Variable	Total Sample		Male		Female		T test
	M	SD	M	SD	M	SD	
Overprecision							
WIG_spread	1498.46	675.80	1395.50	499.30	1841.67	1073.51	-1.45
DAX_spread	430.00	142.41	422.50	134.63	455.00	177.62	-0.48
CAC40_spread	197.08	78.02	199.70	82.92	188.33	64.70	0.31
DJIA_spread	885.77	319.00	858.00	303.24	978.33	382.12	-0.80
NIKKEI_spread	428.08	152.60	429.00	159.63	425.00	139.96	0.06
Mean_spread_index	0.41	0.26	0.40	0.26	0.52	0.20	-1.16
Better than Average (Overplacement)							
BTA_O	3.13	0.718	3.33	0.66	2.70	0.67	2.48**
Illusion of Control							
	10.52	1.84	10.57	1.75	10.40	2.12	0.24
Faith in Technical Analysis							
	12.03	3.32	12.86	3.71	10.30	1.16	2.88**
Result Generated by the Autotrading System (Annual Return)							
PEKAO	0.1%	15.9%	0.16%	18%	-0.12%	10%	.044
AGORA	-5.6%	16.8%	-2.61%	19%	-11.75%	10%	1.443

Note: * $p < 0.10$, ** $p < 0.05$.

Source: prepared by the authors on the basis of the results of the experiment conducted among students.

The returns generated by the students' trading systems during the exam are also presented in Table 3. Each trading system was applied to the time series of two different stock quotations: PEKAO, which was in an upward trend, and AGORA, which was in a downward trend during the period concerned. The results returned by the male group did not differ significantly from those of the female group, but the male students nevertheless believed they were much better than their female peers.

The correlations between the separate forms of overconfidence were calculated and the results are presented in Table 4.

Table 4. Correlation Matrix for Measures of Three Forms of Overconfidence

Variable	Overprecision Mean_spread_index		Better than average (BTA_0)	
	Spearman Correlation	Significance Level (Two-tailed)	Spearman Correlation	Significance Level (Two-tailed)
BTA_0	-0.24	0.2393	–	–
Illusion of Control	0.48	0.0122	0.11	0.5639

Source: prepared by the authors on the basis of the results of the experiment conducted among students.

Based on the results presented in Table 4, there is a strong positive correlation between overconfidence in the form of overprecision (mean width of confidence intervals) and the Illusion of Control. This relationship is statistically significant. The narrower are the confidence intervals investors give, the more they think that they have control or an impact on random phenomena. Two other correlations involving the “better than average” effect, that is, those with overprecision and Illusion of Control, were not statistically significant. This lack of substantial correlations between different measures of overconfidence is consistent with the findings of Moore, who pointed out that different operationalisations of overconfidence are not interchangeable measures of the same construct (Moore 2007; Moore & Healy 2008). The correlation coefficients between the width of the confidence intervals for different market indexes were statistically significant (ranging from 0.482 to 0.863), which shows that overprecision is a stable personal feature.

4.2. The Relationship between the Overconfidence Effect and Attitudes towards Technical Analysis

The hypothesis states that three forms of overconfidence – “better than average”, overprecision, and the illusion of control – are positively related to faith in the effectiveness of technical analysis methods. The correlation coefficients are presented in Table 5.

Table 5. Correlation Coefficients between Faith in Technical Analysis and Different Measures of Overconfidence ($N = 31$)

Variable	Spearman Correlation	Significance Level (Two-tailed)
Illusion of control	0.041	0.828
BTA_0	0.487	0.005
Mean_spread_indexes	0.118	0.527
WIG_spread	-0.196	0.336
DAX_spread	-0.131	0.524
CAC40_spread	0.175	0.392
DJIA_spread	-0.130	0.527
NIKKEI_spread	-0.120	0.560

Source: prepared by the authors on the basis of the results of the experiment conducted among students.

There is a positive relationship between overconfidence in the form of the “better than average” effect and faith in the effectiveness of technical analysis. The more investors believe in the profitability of technical analysis tools, the greater is the faith they have in achieving above-average returns. There were no significant relationships between faith in the effectiveness of technical analysis methods and the other forms of overconfidence: the illusion of control and overprecision. This reason for the lack of significant relationships may be that the questions about the width of the confidence intervals (a measure of overprecision), and the questions within the illusion of control scale, were not directly related to using technical analysis tools. It could also be due to the characteristics of the sample, which was a relatively small group of students ($N = 31$). Undergraduates studying Capital Markets in the Faculty of Finance have a good deal of knowledge of how financial markets function, but they do not have professional experience. It is almost certain that experience of losses on the financial markets when investing their own money would have affected the level of overconfidence in some of

its forms. In addition, the sample was relatively small; a larger sample size would have had an effect on the statistical significance of the results.

5. Conclusion

The relationship between overconfidence and faith in the effectiveness of technical analysis methods, which is a form of market inefficiency, was confirmed only in the case of the “better than average” effect, which is sometimes called overplacement (Moore 2007; Moore & Healy 2008). The empirical results did not confirm this relationship between two other forms of overconfidence: overprecision, which is the general tendency to decrease the width of confidence intervals, and illusion of control, which is the tendency to increase the probability of predicted values. If respondents were asked to give the 90% confidence interval for future values of a stock market index using selected tools of technical analysis and, at the same time, were also asked how strongly they believed in the effectiveness of the method they applied, it is possible that the relationship postulated in the hypothesis could be observed. The results suggest relating questions that measure overconfidence (in the form of illusion of control and overprecision) to the use of certain technical analysis models. Since we analysed only students’ behaviour and declarations, it would be of particular interest to include professional traders in future research.

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Abstract

Co wpływa na popularność analizy technicznej?

Zgodnie z hipotezą efektywności rynków inwestorzy stosujący narzędzia analizy technicznej nie mogą osiągać ponadprzeciętnych stóp zwrotu. Artykuł jest próbą odpowiedzi na pytanie dotyczące dużej popularności analizy technicznej, pomimo braku jej efektywności w świetle hipotezy efektywności rynków. Celem pracy jest weryfikacja, czy pewne inklinacje poznawcze sprawiają, że inwestorzy bardziej wierzą w efektywność modeli analizy technicznej. Postulujemy pozytywną zależność między różnymi formami nadmiernej pewności siebie a wiarą w efektywność metod analizy technicznej. Relacja ta została potwierdzona jedynie w wypadku efektu „lepszy niż średnia”. W przypadku dwóch kolejnych form – nadmiernej pewności siebie, miscalibracji oraz iluzji kontroli nie zanotowano statystycznie istotnych wyników. Brak potwierdzenia postulowanej zależności przez wszystkie trzy formy nadmiernej pewności siebie jest zgodny z wynikami dotychczas opublikowanymi w literaturze, mówiącymi o braku istotnych związków między różnymi formami nadmiernej pewności siebie.

Słowa kluczowe: analiza techniczna, hipoteza efektywności rynków, nadmierna pewność siebie, efekt „lepszy niż średnia”.