

THE APPLICATION OF FUNDAMENTAL ANALYSIS AND TECHNICAL ANALYSIS IN THE ATHENS DERIVATIVES EXCHANGE (ADEX)

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ABSTRACT

Derivatives Market in Greece is under development and investors have a clear lack of advising upon this market. Analysts may say that derivatives have low risk, however investing on them does not always return profits. That is why financial analysis is useful, to inform investors. In this paper we try to apply a financial analysis on derivatives market through two different approaches. The fundamental analysis (FA) investigates a firm's performance through its financial statements and the technical analysis (TA) takes into consideration the past closing prices of the security. The FA will be set through five different kinds of financial ratios for the last five years and TA through five technical indicators for the last three years. Evaluating the results of each method, we try to find whether there is relation with their sector, index, size, establishment date and import date to ASE or not. Our findings show that in both methods there is no strong correlation between the performance and the five different factors, so stock performance is depending on preferences of the investors and not on the directive factors.

Key Words: derivatives, fundamental analysis, technical analysis, performance, Greece

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INTRODUCTION

Derivatives are contracts whose payoff depends on the price and on the performance of the underlying asset (i.e. a currency, an interest rate, a stock or a commodity). Since the 1980s the number of organized derivative exchanges has increased rapidly. These tools provide the investors with specific advantages such as risk transference and minimisation, lower transaction costs and provision of accurate information that render the underlying market more efficiently (Tsetsekos and Varangis 2000). According to Arnoldi (2004), derivatives trading reduce the volatility of the spot market, but despite the reduction of the volatility, derivatives do not guarantee that investors will gain profits. So, it is useful to apply a financial analysis before deciding to invest on a specific security.

Financial analysis may be fundamental (FA) or technical (TA). FA is based upon the study of all publicly available financial information in order to validate a share's intrinsic value by calculating specific financial ratios (efficiency, profitability, liquidity, gearing, investment), so as to receive a comprehensive view on the performance of a company (Fisher 1984, Frankel 1995). These ratios show whether companies are undervalued or overvalued. Possible changes in inventories, gross margins, effective tax rates may become trading signals and may cause movements of the stock price (Lam 2004). On the other hand, TA takes into account only the price movements and totally ignores the fundamental factors. Examining the daily prices, investors can extract different kinds of indicators such as MA, RSI, Momentum, PO and MV in order to conclude whether the specific security presents any kind of trend (Thomsett 1999). The important factor is not only the detection of a possible trend, but also its directional movement and strength. Finally, several buy and sell signals can be extracted studying these indicators and make investors' choices more accurate and safer.

The purpose of this paper is to highlight whether derivatives returns are related to the results of FA and TA and compare the kind of information provided by these two methods to the investors. We also study the relation between SEC, IND, SIZ, EST and IMP within the FA and TA results. In order to highlight these issues, this paper is divided in three parts. In the first part we review past research. In the second part we review the theory about financial ratios and in the third part we present findings from our research.

For better accuracy, we apply the financial analysis to the underlying market and not to derivatives, because derivatives market depends on premium and discounts of the contracts. That is the closing price is used to calculate the every day premium or discount

(depends on yesterday price) in relation to the clearance price. It is important to mention that derivatives perform almost the same as the underlying asset they come from.

LITERATURE REVIEW

Nowadays, that more and more people are interested about stock exchange's performance, financial analysis prevents them from investing their capital on wrong securities and bear the bias they introduce (Martinez 2004). Diachronically, academics are applying different kinds of financial analysis. Others give emphasis to the performance of the company (FA), others to the stock performance (TA) and others to both of them. We present the corresponding background research on FA and TA analysis in the next paragraphs.

Ming (1984) researched how both FA and TA affected stock prices. HKSE in the 1980s was an emerging market as ASE is today. He concluded that FA produced good results while TA was used as a supplementary tool. He mentioned that following trends or indicators blindly is like playing in a casino. He concluded that signals and forecasts from FA based on firms' performance are essential for a successful investment.

Lee (1987) studied the reaction of 120 companies listed in NYSE and in AMEX from July 1978 until the December of 1981 to the FA. The hypothesis tested whether buy and sell signals in favourable and unfavourable analysis respectively, would lead investors to hold a long position in favourable stocks or short position in unfavourable stocks. He came to a conclusion that market reacts to the signals of the fundamental analysis and its performance is closely connected with the results of accounting statements. The relation of FA and stock market performance drew the attention of several academics around the world and not only in US. Mukherji, Dhatt and Kim (1997), applied a FA of Korean stock returns during the period 1982 and 1993. They constructed six ratios (Beta, D/E, E/P, B/M, MVE and S/P). They concluded that FA is positively correlated with B/M, S/P and D/E and negatively correlated with E/P and Beta. These results are coherent with findings of recent studies in several international markets (Park 2005, Fatemi, Desai and Katz 2003). Also, B/M and S/P are more reliable indicators of fundamental value than E/P. These findings indicate that greater leverage and smaller size result in greater returns. Choi (1995) applied a comparative FA of US and Japan stock prices, by constructing five financial ratios (P/E, P/CF, P/BV, Capital Gains and Dividend Yield) for the period 1974 to 1989. P/E ratio is 2.5 times higher in Japan than in US while P/BV and P/CF are also higher in Japan. According to French and Poterba (1991), higher ratios in Japan, are based

on different accounting practices (Japanese firms report earnings only for the parent company while US firms report consolidated earnings). Also dividend payments are lower in Japan than in US, but stock prices increases are higher and so capital gains are higher. Lam (2002), tried to find out whether firm size, B/M and P/E ratio are related with stock returns in HKSE. The data consists of 100 listed firms in HKSE for the period July 1980 till June 1997. The results showed that the above accounting variables were able to define the cross sectional variation in average returns over the period.

Wong, Manzur and Chew (2003), tried to clarify the role of technical analysis in SSE. They examined the daily closing prices for the period 1 January 1974 until 31 December 1994 by applying two different technical indicators, MA and RSI. They concluded that technical indicators can create useful buy and sell signals and members of SSE can gain effective profits. It is important to mention that SSE members have their own trading team that its results are based on technical analysis. TA is also efficient for foreign exchange markets. Specifically, Papadamou and Tsopoglou (2001) examined the performance of different technical indicators on daily spot exchange rates for USD/DM and USD/GBP for the period 3/1/1989 to 31/12/1996. They used three different indicators, MA, Momentum and MACD, to get out the appropriate buy and sell signals. All signals proved to be successful and reliable. Also, the weakness of FA to provide reliable signals for exchange rates lead analysts to use TA (Papadamou and Tsopoglou 2001). Furthermore, TA has applicability to currency emerging markets. Specifically, Ahmed, Beck and Goldreyer (2005) tested currency spot rates for Mexico, Chile, Thailand, Indonesia, South Korea and the Philippines during the period 2 January 1990 until 10 November 2000. They used VMA and they found substantial returns through buy and sell signals, even when the currency market fell. Past research and results from this study detect that technical trading rules in emerging markets perform significant profits. Zenker (2003) studied the performance of TA applied to the airline industry. The basis point was the 11/9/2001 and the pre and post performance of the airlines industries. Applying ten different technical indicators, he concluded that TA can predict future movements, but it is difficult to make 100% accurate predictions.

DATA AND METHODOLOGY

All data, accounting statements and daily closing prices, come from the ASE database. We use accounting statements for listed companies in the indexes which derivatives are traded in (Ftse-20, Ftse-40 and Eps-50) from 2001 to 2005. For daily closing prices, we use the three indexes above and all underlying assets that derivatives (futures and options) come from, for the period of 4 August 2003 until 8 August 2006 because during that period ASE recovered from the big downfall coming from the prices' explosion in 1999.

The methodology is based on Samaras, Matsatsinis and Zopunidis (2005). Specifically, in order to execute the FA, we apply a financial analysis of listed companies through the financial ratios method. As mentioned above, in order to execute FA and TA for derivatives, it is essential to apply the FA and TA to the underlying asset. So, listed companies in the three indexes (Ftse-20, Ftse-40 and Eps-50) are divided into three categories according to their main business, banks, industrial and insurance companies. The appropriate financial ratios for each company are created in order to classify the firms into three categories by their performance: good, fair and not good. This classification arises from the calculation of the 18 ratios and their ranking in 0 for not available, 1 for bad, 2 for fair and 3 for good. So aggregating the ranking of all ratios, firms are classified in the above three categories.

TA is based upon the daily closing prices of the three indexes above and the stocks on which derivatives' products have been created. Using the appropriate software (Metastock Professional 9.0), we calculate three ratios (trade efficiency, Risk Reward ratio and Profit Loss ratio) and we classify these ratios in three ranks, 0 for bad (negative returns), 1 for fair (returns in the 0%-50% range) and 2 for good (returns in the 50%-100% range). So aggregating these three ratios, we calculate each stock's performance, which is divided into three classes, bad, fair and good.

The results of FA and TA are connected with SEC, IND, SIZ, EST and IMP in order to conclude whether the performance is correlated with each of these factors or not. Finally, the results will be based on the underlying market but the application to derivatives is efficient because these two markets follow the same trend, upward or downward.

FINANCIAL RATIOS

The FA is based on the calculation and the evaluation of financial ratios. They provide analysts with elements about the efficiency and the performance of a company or even specific sectors of a firm. But ratios on their own are just numbers and only by comparing them with ratios of past years or with ratios of other departmental firms, can someone understand their significance (Niarchos 1989). According to Ming (1984), in order to draw a clear view of a firm's performance, there should be calculated five different kinds of ratios, efficiency, profitability, liquidity, gearing and investment. The most common used ratios are illustrated in Table 1.

Table 1. Industrial and Banking Financial Ratios

Ratio	Method of Computation	Ratio
	Efficiency	Efficiency
ASPD	$S/D = \text{xxx}, 360 / \text{xxx} = \text{days}$	OP/CRA
ASPC	$COS/C = \text{xxx}, 360 / \text{xxx} = \text{days}$	TOE/CRA
STP	$COS/ST = \text{xxx}, 360 / \text{xxx} = \text{days}$	PBT/CRA
	Profitability	Income
GPM	GP/S	IE/IR
NPM	NP/S	PBT/IP
CS	COS/S	NP/TIP
ROSF	NPT/SC	
ROA	NP/CA	
	Liquidity	Liquidity
CR	CA/CL	F+NS/OTS
ATR	CA-ST/CL	LA/TS
	Gearing	
SCC	SC/CLA	
LC	TL/CLA	
SCL	SC/TL	
LLSL	LTL/STL	
	Investment	Investment
PPS	NP/NOS	NST/TS
DPS	T/ NOS	TST/TS
DY	DPS/SP*	TA/TS
NPD	NP/TD	
BV	SC/NOS	
PBV	SP*/BV	
PER	SP*/ EPS	

*SP is the average price of the last 30 days.

Banking ratios are differentiated from the others because all their financial statements are based on the banking accounting plan. In the banking balance sheet major role play the savings which belong to the claims. These savings are used by the banks to fund their allowances, their cash and their placements on securities. The difference between the average savings' interest and the average allowances' interest is the so called spread which comprises the basic revenue source. According to this thought, in Table 1 there are presented the ratios for banking institution.

EMPIRICAL FINDINGS

The results of the financial ratios' calculation and examination for the industrial firms indicated that most of the companies' performance is not correlated with SEC, IND, SIZ, EST and IMP in ASE (Table 2). Specifically, only the correlation with IND is positive ($p=0.271$), while all the other correlations are slightly negative. But may the correlation give the relation between variables the so called partial correlation is a more reliable statistic measure as it shows the relation of two variables without ignoring the other variables but taking them into account. Specifically, calculating partial correlations, we realised that the connection between the performance and the independent variables became a little stronger. This measurements show the true relation between dependent and independent variables. Also, may the performance depend on financial ratios, but some of them have a more severe impact on it. Specifically, investment and profitability ratios are stronger correlated with performance ($p=0.6$ and $p=0.42$ respectively).

Table 2. Industrial Firm's Performance Correlated with Index, Sector, Size, Establishment Date and Import Date

		Performance Perf	Sector	SEC	Index IND	Size SIZ	EstDate EST	ImpDate IMP
Performance Perf	Pearson Correlation	1		-.092	.271(*)	-.054	-.183	-.018
	Sig. (2-tailed)			.466	.029	.669	.149	.885
	N	65		65	65	65	64	65

The most common used statistic measure is the regression. We ran a regression using the performance as a dependent variable and the above five variables as independent. As

shown in Table 3, the sig. is 0.091, so the model is applicable to a 90% confidence interval. The R= 0.384 shows the relationship between the dependent and independent variables. The R²= 0.148 coefficient shows that only 14.8% of the variability of the prices are explained by the regression model. As a result, in Table 4, we notice that only IND coefficient is reliable (sig.= 0.014). In Table 4, the F statistic tests whether the independent variables explain the variability of the dependent variable's prices. The number 2.010 is low and the probability of error is high.

Table 3. Regression ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	473.587	5	94.717	2.010	.091(a)
	Residual	2732.850	58	47.118		
	Total	3206.438	63			

a Predictors: (Constant), IntDate INT, Index IND, Sector SEC, EstDate EST, Size SIZ

b Dependent Variable: Performance Perf

Table 4. Regression ANOVA

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	131.832	78.821		1.673	.100
	EstDate EST	-.052	.040	-.161	-1.295	.201
	IntDate INT	.002	.008	.040	.311	.757
	Sector SEC	-.140	.199	-.091	-.704	.484
	Index IND	1.973	.779	.317	2.531	.014
	Size SIZ	-.066	1.174	-.007	-.056	.955

Using the t- test, we check whether the mean performance is the same in different IND, SEC and SIZ. We found that the average performance is unequal in different IND (sig.= 0.029), while the mean performance is the same in different SEC (sig.= 0.655) and in different SIZ (sig.= 0.243).

We did not mention above the banks, because we calculated different financial ratios according to the banking accounting plan. Studying these ratios we concluded that the correlation between the performance and IND, SIZ, EST and IMP is weak (Table 5). Specifically, the correlation with IND is negative while with the other here variables are weakly positive. In order to provide a more accurate view of the relation between the variables, we calculated the partial correlation which mentioned stronger correlation. Also we ran a regression but the results were disappointing because F statistic was only 0.409 which underlines that the independent variables can not explain possible variability in performance's prices.

Table 5. Banks' Performance Correlated with Index, Size, Establishment Date and Import Date

		Performance PERF	Index IND	Size SIZ	EstDate EST	IntDate INT
Performance e PERF	Pearson Correlation	1	-.047	.162	.139	.193
	Sig. (2-tailed)		.905	.678	.721	.618
	N	9	9	9	9	9

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

After the examination of FA, we applied a TA through five different technical indicators, DM, MACD, Momentum, RSI and TrA. We calculated three ratios to test TRE, the R/R and the P/L. We examined the correlation between the performance and the different variables, SEC, IND, SIZ, EST and IMP. In Table 6 there are summarised the correlations. In none of the indicators' results, the correlation is strong or even semi strong. They are all close to zero (no correlation), other positive and other negative. Again, by applying the partial correlation, we notice that the correlation are becoming little stronger but they still remain weak.

We ran a regression for the results of different indicator and the only which produced primary reliable results was the DM. Specifically, the sig.= 0.030 mentions that results are reliable for a 95% confidence interval, but the F statistic= 2.653 is low and probability of error is possible (Table 7). Also, the size and sector coefficients produce reliable results. Using the t- test, we examined the relationship of mean performance and the different SEC, IND, SIZ, EST and IMP. We found that the mean performance is the same for all

variables from each indicator except from the size from MACD which mean performance was different in different firm size (sig.= 0.049). Finally, we examined whether the performance of different indicators is independent using the Chi-Square test. We found that all variables are independent (Table 8).

Table 6. Stocks' Performance Correlated with Sector, Index, Size, Establishment Date and Import Date

		Sector SEC	Index IND	Size SIZ	EstDate EST	ImpDate IMP
Performnace1	Pearson Correlation	.221	.050	-.151	-.221	-.200
	Sig. (2-tailed)	.059	.670	.198	.059	.088
	N	74	74	74	74	74
Performance2	Pearson Correlation	-.138	.164	-.255(*)	.054	.039
	Sig. (2-tailed)	.240	.164	.029	.645	.744
	N	74	74	74	74	74
Performnace3	Pearson Correlation	-.076	.035	.025	-.090	-.073
	Sig. (2-tailed)	.518	.765	.832	.446	.538
	N	74	74	74	74	74
Performance4	Pearson Correlation	.129	.094	.014	.008	.040
	Sig. (2-tailed)	.273	.426	.904	.944	.737
	N	74	74	74	74	74
Performance5	Pearson Correlation	.069	.102	-.029	.213	.179
	Sig. (2-tailed)	.559	.386	.806	.068	.128
	N	74	74	74	74	74

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 7. Regression ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.406	5	10.281	2.653	.030(a)
	Residual	263.473	68	3.875		
	Total	314.878	73			

a Predictors: (Constant), ImpDate IMP, Index IND, Sector SEC, Size SIZ, EstDate ES

Table 8. Check of Independency using the Chi- Square

	Perform1	Perform2	Perform3	Perform4	Perform5	Index IND
Chi-Square(a,b)	56.541	59.459	37.243	36.270	169.243	27.351
df	5	5	5	5	5	4
Asymp. Sig.	.000	.000	.000	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 12.3.

b 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 14.8.

The performance as said in the methodology is depending on the three ratios. But applying a correlation of each performance with its corresponding ratios, we found that performance is strongly correlated first with R/R, second with P/L and last with TRE, which correlation is a lot weaker than the other two. Also, trying a correlation test between the performances isolate, we did not confirm any strong correlation or even semi strong. The relationship between them was minimal, almost zero.

CONCLUSIONS

In this paper, we applied FA and TA on derivatives. We calculated eighteen different financial ratios for all the listed companies in Fste-20, Ftse-40 and Eps-50 and we found out whether there are any special relations between firms' performance and SEC, IND, SIZ, EST and IMP. Based on our results, there is very weak correlation between these variables. The FA performance is mostly affected by profitability and investment ratios and less by the other kind of ratios. We examined banks according to the banking accounting plan and we calculated eleven financial ratios. The results are equal to industrial firms' results and their performance is not depending exclusively on any of the above factors. Regarding TA, the five different indicators produced three ratios which again as in FA did not mention any special relation between dependent and independent variables. Also examining the performance of FA and the five different TAs, we do not find any special relation, that is FA and TA behave in different ways. So, FA and TA results mention that stock performance is not getting affected by variables connected with the specific stock but it is a matter of demand and supply of the investors' preferences. The stocks are not behaving the same as other stocks which have some equal characteristics, but the movements (upward or downward) depend on the specific attributes of the particularly stock.

In this paper everything evolved around stocks and not around derivatives products. This happened because the stock market from which derivatives are created is the base for derivatives progress and performance. That is, derivatives tend to behave the same as the underlying asset, either upward or downward. So the above results stand also for derivatives and we can conclude that derivatives products of the same SEC, IND, SIZ, EST, IMP are not behaving equally, but each contract follows a different route according to the demand and supply of the investors.

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APPENDIX

Table 9. Abbreviations

Name	Abbreviation	Name	Abbreviation
Acid Test Ratio	ATR	Investment	INV
Agrotiki	AGRO	Liabilities divided by claims	LCLA
Alpha	ALP	Liquid Asset	LA
American Exchange	AMEX	Long Term Liabilities	LTL
Athens Derivatives Exchange	ADEX	Long Term Liabilities divided by Short term Liabilities	LLSL
Athens Stock Exchange	ASE	Marfin Bank	MRF
Attika	ATTIK	Market Volatility	MV
Attikis Bank	ATT	Mass Media	MM
Average Directional Movement Index	ADX	Mitilinaios	MITIL
Average Settlement Period for Creditors	ASPC	Moving Average	MA
Average Settlement Period for Debtors	ASPD	Market Value of Equity	MVE
Banks	BAN	Moving Average Convergence- Divergence	MACD
Book- Market Ratio	B/M	National Stocks	NST
Book Value	BV	Net Profit Margin	NPM
British Pound	BP	Net Profits	NP
Chemism	CHE	Net Profits Before Taxes	NPBT
Claims	CLA	Net Profits divided by Dividends	NPD
Coca Cola	EEEK	Number of Shares	NOS
Commercial	COM	New York Stock Exchange	NYSE
Constructive	CON	Oil & Gas	OG
Correlation	p	Opap	PAP
Cosmote	COSM	Operating Profits	OP
Cost of Sales	COS	Ote	OTE
Covariance	cov	Out of Time Savings	OTS
Credit Assets	CRA	Price- Cash Flow	P/CF
Creditors	C	Price-Earnings Ratio	P/E
Current Assets	CA	Peiraios	PEIR
Current Liabilities	CL	Personal & Domestic Goods	PDG
Current Ratio	CR	Price Divided by Book Value	PBV
Debt- Equity Ratio	D/E	Price Oscillator	PO
Debtors	D	Profit Loss Ratio	P/L
Dei	DEI	Profit per Share	PPS
Deutsch Mark	DM	Profits Before Taxes	PBT
Directional Indicator	DI	Public Utility	PU
Directional Movements	DM	Raw Materials	RM
Dividend per Share	DPS	Relative Strength Index	RSI
Dividend Yield	DY	Return on Ordinary Assets	ROA
Earnings- Price Ratio	E/P	Return on Ordinary Shareholders Funds	ROSF
Ellinika Chrimatistria	ECHAE	Risk Reward Ratio	R/R
Elliniki Technodomiki	ELTECH	Sales- Price Ratio	S/P
Emporiki Bank	EMP	Sales	ST
EPS-50	Eps-50	Sector	SEC
Establishment Date	EST	Share Capital	SC
Ethniki Bank	ETE	Share Capital Divided by Claims	SCCLA
Eurobank	EVROB	Share Capital divided by	SCL

Table 9. Abbreviations (Continued)

Name	Abbreviation	Name	Abbreviation
Financial Services	FS	Short Term Liabilities	STL
Food & Drink	FD	Singapore Stock Exchange	SSE
FTSE-20	Ftse-20	Size	SIZ
FTSE-40	Ftse-40	Stock Price	SP
Fundamental Analysis	FA	Stocks	ST
Funds	F	Technical Analysis	TA
Gek	GEK	Technology	TEC
Geniki Bank	GEN	Telecommunication	TC
Germanos	GERM	Titan	TIT
Gross Profit Margin	GPM	Total Allowances	TAL
Health	HEA	Total Dividends	TD
Hong Kong Stock Exchange	HKSE	Total Instrumental Profits	TIP
Hyatt Regency	HYA	Total Liabilities	TL
Import Date	IMP	Total Operating Expenses	TOE
Index	IND	Total Savings	TS
Industrial	IND	Total Stocks	TST
Instrumental Expenses	IE	Trade Efficiency	TRE
Instrumental Profits	IP	Travel & Refreshment	TR
Instrumental Revenues	IR	Trend Analysis	TrA
Intacom	INTKA	US Dollar	USD
Intralot	INLOT		