DOI 10.2478/sbe-2020-0030

SBE no. 15(2) 2020

SELECTIVITY AND MARKET TIMING SKILLS IN EMERGING GREEK EQUITY MUTUAL FUNDS DURING THE SOVEREIGN DEBT CRISIS

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Abstract:

This paper evaluates the performance of seventeen Greek equity mutual funds before and after the sovereign debt crisis. By being based on the Capital Asset Pricing Model (CAPM), the selectivity and market timing skills of these funds are under scrutiny. This takes place by assigning a linear form to the Beta coefficient and transforming the traditional CAPM equation into a second order polynomial. Results provide evidence of an improvement in selectivity and market timing skills for the majority of these emerging funds after the outburst of the debt crisis and the adoption of measures by Troika. Thereby, the potential of excess profit-making possibilities for capable fund managers in the Greek fund market is enhanced during non-conventional periods in comparison to normal times, even though the Efficient Markets Hypothesis (EMH) still holds.

Key words: Sovereign debt crisis; Stock selectivity; Market timing; Greek equity mutual funds

1. Introduction

Selectivity of mutual funds as well as market-timing abilities have been two of the central subjects of examination in finance since the onset of asset pricing and performance measurement. A great and increasing bulk of academic work on evaluating the performance of mutual funds has emerged in the last decades, providing a significant

amount of theoretical knowledge and empirical findings. Notably, these have helped market practitioners to develop better market timing skills and render more capable of selecting the proper action taking in mutual fund management. This paper fills a gap in related literature by examining whether there were excess profit-making possibilities concerning seventeen emerging Greek mutual funds before and after the outburst of the sovereign debt crisis and how performance of managers has been influenced by crises in a general perspective. For the purposes of this study, the year of the Greek sovereign debt crisis outburst (2010) is employed as the benchmark separating the two periods under examination. Therefore, this analysis of the Greek fund market crisis adopts a comparative character and provides a more general perspective on the dynamics of investments before the crisis in comparison to after the outburst of the crisis. A voluminous bulk of studies have investigated influence of crisis on financial markets and the real economy, such as Szczerbowicz (2015), Kyriazis (2017) and Papadamou et al. (2019a, 2019b).

Notably, our main motivation for this study is to enlighten the interested researcher to the best possible extent about how market timing skills and mutual fund performance in the Greek market were afflicted by the European sovereign debt crisis. Special emphasis is attributed on differences between the performance of managers before and after the outburst of the crisis. The purpose of this study is to provide a roadmap for interested researchers in order to better ascertain the consequences of crises on investment perspectives in a global context. Our paper strengthens the view that during the global financial and the sovereign debt crises, out of the ordinary action taking has led to the possibility of excess profit-making. The special character of Greece being the workhorse of these highly stressed times renders the study of the Greek financial market for thorough examination and in-depth understanding of the crisis. Our focus is on investigating the alterations in fund managers' performance before and after the Greek debt crisis, providing feedback for investment opportunities in a wider extent.

In this study, we test the following hypotheses: a) whether Greek debt crises increase uncertainty in estimations about management skills and b) whether fund managers render less able to outperform the market after the burst of a sovereign crisis.

Our estimations being based on an innovative modification of the highly-influential CAPM model for performance measurement, gives credence to empirical findings of this paper. An important difference of this paper from earlier findings is that it could help investors and policymakers to better address financial crises when acting in a distressed economic environment, as evidence for eligibility in investing decisions is found in a much larger extent than previous work. This leads to the conclusion that Greek mutual funds' managers could be based on selectivity but also market-timing skills in times of high uncertainty for exploiting second-order dynamics of funds' performance. Nevertheless, this is not permanent, because the Efficient Markets Hypothesis as expressed by Fama (1970) is found to hold.

The remainder of this paper is structured as follows: Section 2 provides the literature review concerning the selectivity and market-timing abilities of mutual fund managers in a global as well as in a Greek context. Section 3 presents the data and methodology employed for econometric estimations. Section 4 analyzes the empirical evidence and outlines the theoretical underpinnings of results. Finally, Section 5 concludes.

2. Literature review

Selectivity and market-timing ability constitute matters of primary importance when examining overall performance in financial markets as well as more specifically, in the domain of equity mutual funds. It should be highlighted that the majority of empirical bibliography up to now provide evidence for a weak or non-existing selectivity or market-timing phenomenon of funds. The main models on which numerous relevant academic studies have focused are the Treynor and Mazuy (1966) and the Henriksson and Merton (1981) ones. Moreover, the most popular specification for estimating risk and return in capital markets has been the Capital Asset Pricing Model (CAPM), developed by Jack Treynor, William F. Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) independently, based on the earlier work of Harry Markowitz concerning diversification and modern portfolio theory.

2.1. Studies presenting low funds' performance

2.1.1. Studies focusing on advanced economies

In their seminal paper, Treynor and Mazuy (1966) by relying on the S&P Composite Price Index and employing data for 57 open-end mutual funds find that skillful management is based on a fund manager's ability to identify underpriced companies rather than his ability to outguess the market. More specifically, only one of the 57 funds' managers was found to be able to achieve curvature in returns function, thereby being capable of outguessing the market. When it comes to Chen et al. (1992), they investigate selectivity and timing ability of a selected group of fund managers with a wide range of objectives and find diverse outcomes, as other exhibit superior performance and others do not. Moreover, assumptions about the investment horizon, the sample size, and the time period are found to affect results. Henriksson (1984) evaluates the market-timing performance of 116 open-ended mutual funds by employing the parametric and non-parametric techniques of Henriksson and Merton (1981) for the period 1968 to 1980. He finds that only a very small portion of funds present statistically significant market-timing abilities. Intriguingly, Carhart (1997) finds that no skilled or informed managers of mutual funds exist. Merton (1981) argues that the pattern of returns from successful market timing has an isomorphic correspondence to the pattern of returns from following specific option investment strategies. According to Malkiel (1995), the securities markets are found to be remarkably efficient and although there are capable fund managers that can outperform the market, they are not numerous. Additionally, higher performance does not compensate for management fees.

Cuthbertson et al. (2010) by making use of non-parametric estimations find that only 1.5% of UK funds have a positive market timing ability, while 10-20% a negative one, thereby most fund managers do not have timing skills. Furthermore, successful market timers rely on private market timing signals due to their abilities, and not on public information. Moreover, Cuthbertson and Nitzsche (2013) employ a Fama-French three-factor model in order to examine the German equity funds. They find that less than 1% of funds have positive selection skills, approximately 27% have negative ones, while most of funds have zero selection abilities. Notably, Papadamou et al. (2017) argue that Japanese

mutual funds managers in a monetary easing environment do not contribute significantly to adding value to the mutual fund performance. By their own perspective, Peltomäki and Peltomäki (2017) argue that the incorporation of the Carhart four-factor model for analyzing market timing skill lowers the percentage of market timing results.

2.1.2. Studies focusing on emerging economies

İmişiker and Özlale (2008) provide only weak evidence about selection ability and only some evidence revealing superior market timing for mutual funds in the Turkish economy. When it comes to Rahman et al. (2012), they examine over 15 growth-oriented mutual funds in the Dhaka Stock Exchange in Bangladesh and support that they have not achieved better performance in terms of total risk. They also do not offer advantages of diversification and professionalism to investors. Consequently, such funds cannot outperform the market. El Amri and Hamza (2017) provide evidence that no long run relationship exists between the Islamic indices and their conventional counterparts' performance. This is not found to hold for the Islamic emerging markets indices. Moreover, Giri and Joshi (2017) by employing Vector Error Correction Model (VECM) methodologies argue that there is short run and long run unidirectional causal linkages running from economic growth and FDI to stock prices in India.

2.2. Studies presenting high funds' performance

2.2.1. Studies focusing on advanced economies

Interestingly enough, there is also a considerable bulk of academic work where results indicate that fund managers are able to outperform the market. Papadamou and Syriopoulos (2004) argue that the American no-load equity mutual funds investing in European stocks that performed well in a five-month valuation period, continued generating superior performance in the next four months.

In the same line of highlighting risk, Chen and Liang (2007) by employing a sample of 221 market timing US funds during 1994-2005 propose a new measure for timing return and volatility jointly that connects returns to the squared Sharpe ratio of the market portfolio. They provide evidence that timing ability is somewhat powerful in bear and volatile times in markets. However, young managers with higher Scholastic Assessment Test (SAT) scores are found to perform better.

Fama and French (2010) by conducting tests on net returns find that few funds from 1984 to 2006 are managed skillfully enough to cover costs, whereas the extreme right tail suggests that some managers are successful in achieving this. Cuthbertson et al. (2012) look into the performance of German equity mutual funds over 20 years. By employing the Fama-French three factor model with no market timing, they provide evidence that no more than 0.5% of funds have truly positive alpha performance and approximately 27% have truly negative alpha performance. Interestingly though, market timing measures increase these values by much. Simutin (2013) by examining data from 608 closed-end funds argues that cost-minimizing managers carry more abnormal cash and perform better than managers with no such good decisions. This happens by reinvesting the revenues from share sales immediately or by inefficient transactions. According to Chen et al. (2013), there is an abnormally high probability of growth-timing skill for superior performing growth-oriented fund managers, who invest mainly in growth

stocks. There is though no evidence that these managers possess market timing, size timing, or momentum timing skill.

Ang et al. (2014) analyze market-timing skills of Socially Responsible Investment (SRI) fund managers in US, Canada, and Europe during 2001-2011. They support that market timing skills are evident in these regions and that SRI funds are highly demanded. Nevertheless, they argue that fund managers from North America present higher abilities in selecting stock and in market-timing.

Recently a number of studies focus on hedge funds performance. Chincarini and Nakao (2011) employ a sample of 3348 equity funds from January 1994 to June 2009, in order to measure the multi-factor timing ability of equity hedge funds. They argue that standard market timing tests may lead to the conclusion that a manager has no timing ability when in fact he does. They find that equity hedge funds are poor market timers, but some have the ability to time the size and value. Kacperczyk et al. (2014) argue that stock selection is dominant in booms in the US, whereas market timing is more popular in recessions. Bali et al. (2014) support that macroeconomic risk highly affects cross-sectional differences in hedge fund returns. Furthermore, the positive relation between uncertainty betas and future hedge funds returns is significant. Moreover, Metzger and Shenai (2018) use the Hedge Index database with over 9500 hedge funds to conduct an analysis of the performance of ten major strategies, during and after the financial crisis. The analysis is made using correlations, the Carhart's four factor model, persistence of performance, and reward-risk ratios. Findings provide evidence that some hedge fund strategies with persistent performances manage to outperform the benchmark in some periods. In the period before the crisis all strategies are found to have achieved better results than the S&P500 index.

2.2.2. Studies focusing on emerging economies

Kim-Lian et al. (2004) employ the quadratic and dual-beta market models with GARCH(1,1) specification for examining the selectivity and market timing performance of 36 unit trusts in Malaysia. Despite evidence that there is no market timing ability before or after the crisis, balanced funds are found to have performed better than growth funds in both periods. Chu and McKenzie (2008) by looking into the performance and market timing ability of the equity funds at the Hong Kong, argue that US equity funds underperform relative to the market. Nevertheless, this is in contrast to other funds' performance (Filippas & Psoma, 2001). Nicolosi et al. (2009) find that trading quality improves with higher experience, thereby stock investors ameliorate their investment performance as their investment history gets larger. Only some managers have adequate skills and are able to outperform the market.

By examining China's open-ended fund industry from 2005 to 2012 Qian et al. (2014) argue that individual rather than institutional investors have higher probability of being deceived by manipulative behavior. Das and Barai (2016) examine the effects of size, value and momentum on the cross-sectional nexus between risk and expected returns concerning Indian stocks. By adopting the conditional Carhart four factor model, they find that the expected returns are sensitive to the Small minus Big (SMB) and High minus Low (HML) factors.

3. Data and Methodology

The data employed in this study are about seventeen Greek equity mutual funds. In order to adequately capture the impact of sovereign debt crisis on mutual funds managers' performance, data is divided into two subsequent time intervals. Notably, the data set spans from the 1st January 2005 until 30th April 2010 in the first sub-period (pre-crisis period), whereas from 1st May 2010 until 30th December 2016 in the second sub-period (post-crisis set-off period). All data are extracted from the Bloomberg database and total observations amount to 1681. The identification of the seventeen Greek equity mutual funds under scrutiny in this study is performed in Table 1. It is easily observed that mutual funds of commercial banks as well as similar-type funds of insurance companies are taken into consideration, in order to better understand how the core of financial products in Greece has fluctuated. Abiding by our intentions for higher representativeness of the Greek financial system, selection criteria have been formed on the grounds of the highly bank-based and insurance-fed character of the system.

Table 1. List of seventeen Greek Equity Mutual Funds.

	Mutual Equity Fund
1	ALPHA Equity Fund
2	ATTICA Equity Fund
3	CPB Equity Fund
4	EUROBANK Greek Equities
5	INTERAMERICAN Equity Fund
6	INTERAMERICAN Dynamic Equity Fund
7	3K Domestic Equity Fund
8	MetLife Alico Equity Fund
9	THETIS Equity Fund
10	TRITON Equity Fund
11	DELOS Small Cap Equity Fund
12	DELOS Blue Chips Equity Fund
13	ERMIS Equity Fund
14	EUROPEAN RELIANCE Equity Fund
15	PIRAEUS Equity Fund
16	ALLIANZ Equity Fund
17	ALLIANZ Domestic Equity Fund

Returns of equity mutual funds and the overall Greek Stock Exchange Index are used for econometric estimations. The data employed are in a daily frequency for better representing the highly volatile character of the series in times of high uncertainty. Consequently, logarithmic transformations of the variables in levels, have been conducted, in the form of:

$$Y_{i,t} = \log\left(\frac{P_{i,t}}{P_{i,t-1}}\right),$$

Where $P_{i,t}$ is the i^{th} equity mutual fund price at the end of day t .

Notably, for a rigorous examination of the Greek fund market to take place, the well-known Capital Asset Pricing Model (CAPM) is applied for estimating the excess returns of each Greek equity mutual fund under scrutiny. The CAPM exhibits the degree by which an asset is exposed to the market's systemic risk. The popularity of the specific model for estimating performance in relation to markets attributes a higher level of credence to the theoretical underpinnings of our estimations, rendering our results reliable in a significant extent. Evidence about the performance of mutual funds as well as assets in the more general form, is in high connection with the Efficient Market Hypothesis, which leaves no room for agents to outperform the market in a consistent manner. This is founded on rational behavior of economic units and expressed by Fama (1970). Interestingly, complying with rational thinking, a fund manager is more willingly prone to get exposed to risk when there is a bull market and the majority of market's securities tend to present increasing returns. This is in contrast to conditions of a bear market, where he is more risk averse as the majority of stocks move downwards.

More concretely, according to the CAPM theory, if alpha (α) is positive, then the mutual fund is better performing than the overall index and consequently is better managed than a zero-alpha mutual fund. In this case, the mutual fund is considered to present selectivity; thereby this fund's manager has succeeded in achieving a better performance for the fund than the market. Intriguingly, a good mutual fund is expected to exhibit not only selectivity but also market-timing skills expressed as the ability to take better advantage of the market's momentum. Therefore, it can highly accurately be said that selectivity and market-timing skills could be well-indicative of the portfolio manager's activity to outperform the market.

4. Empirical results and theoretical underpinnings

Figure 1 presents the daily returns of the seventeen Greek equity mutual funds under scrutiny. It can easily be observed that the 9th and the 12th fund examined exhibit higher excess returns than the rest of funds. All funds follow similar patterns, with high values before 2008, a sharp fall during that year, and upwards movement during 2009. Starting from then, a sequential new fall is observed up to 2012, whereas a rise can be seen afterwards that reaches its maximum value at the year of 2014. Vertical axis indicates excess returns.

Figure 1. Daily Prices of equity mutual fund

Figure 2 presents kurtosis values for mutual funds before and after the sovereign debt crisis. It is evident that in the second sub period kurtosis takes higher values. Vertical axis indicates values of kurtosis according to estimations.

Figure 2. Kurtosis Comparison

In Figure 3, the standard deviations during each of the sub periods are depicted. The post-crisis outburst period is found to be characterized by higher standard deviations,

implying higher volatility due to out of the ordinary economic conditions. Vertical axis provides values of standard deviation estimated.

Figure 3. Std. Dev. Comparison

Figure 4 exhibits the mean returns of Greek equity funds. It is more than evident that after the debt crisis outburst, negative mean return values were substantially lower than before the crisis. Thereby, managers' performance has been ameliorated in a significant extent. Vertical axis provides values of means of the funds' returns.

Figure 4. Mean Returns Comparison

In Figure 5, the beta coefficients of funds are depicted. Results are split among funds; thereby no safe results that the crisis brought about a more bullish- or bearish-type

investment style can be extracted. The beta coefficients are represented in the vertical axis.

Figure 5. Betas Comparison

The well-established CAPM equation which forms the basis is

$$Y_t = a + b \cdot X_t + u_t,$$

where Y_t denotes the excess return of the equity mutual fund, X_t expresses the market's excess return, a is the average expected excess return of the equity mutual fund when the net average return of the overall Index equals zero, b represents the systematic (market) risk of equity mutual fund i , and u_t is the disturbance term. The CAPM model is adopted in order to better represent whether there exists a positive constant term in the right part of the equation, which represents the level by which professional managers of funds can achieve higher returns than any other non-specialized investor could. Thereby, apart from the level of riskiness and aggressiveness of the fund manager, which is revealed by the beta (b) factor, it is the constant term (Jensen's alpha) that exhibits superiority of management and capacity of outperforming the market by professional managers.

For the purposes of this examination, a transformation of the CAPM equation is employed by assigning a linear form to the beta coefficient, $b = (\gamma + kX_t)$, where $k > 0$

Thereby, the CAPM equation is rendered into a second-order polynomial, in the following form:

$$Y_t = a + (\gamma + kX_t)X_t + u_t$$

$$Y_t = a + \gamma X_t + kX_t^2 + u_t$$

By performing least squares estimations, the selectivity being expressed by $a > 0$, as well as the market timing skills in the form of $k > 0$ can be estimated. In order to capture any significant effect from the Lehman Brothers default we incorporate in our model a dummy variable entitled DUM 1. Table 2 exhibits the results of the econometric

estimations performed by employing a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) framework in order to effectively capture volatility dynamics of funds, based on the model of Bollerslev (1986, 1988).

Tables 2a and 2b provide econometric results concerning the pre-crisis period whereas the corresponding evidence about the sovereign crisis period are depicted in Tables 3a and 3b. All terms in parentheses represent p-statistics of estimated values.

As can be easily seen, an autoregressive term of first or second degree was enough to solve any autocorrelation problems observed in our estimated models. While any heteroscedasticity problems had been solved by a simple GARCH(1,1) model. As far as Lehman Brothers dummy is considered, we can argue that it had not any significant additional effect in comparison to the market benchmark. This is indicative of the crisis having not deteriorated managers' ability to handle financial crises relative to the market in an overall perspective.

Table 2a. Estimation Results for the first sub-period before Greek sovereign crisis (funds 1-10).

Variable	1	2	3	4	5	6	7	8	9	10
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Mean Equation										
Constant term	-0.0004 (0.00)***	-0.0017 (0.00)***	-0.0016 (0.00)***	-0.0002 (0.00)***	-0.0016 (0.00)***	-0.0008 (0.00)***	-0.0008 (0.00)***	0.0004 (0.00)***	-0.0014 (0.00)***	-0.0017 (0.00)***
MARKET	0.8983 (0.00)***	0.7794 (0.00)***	0.6949 (0.00)***	0.974336 (0.00)***	0.7160 (0.00)***	0.8885 (0.00)***	0.8929 (0.00)***	1.070 (0.00)***	0.8055 (0.00)***	0.7232 (0.00)***
MARKET^2	-0.5222 (0.00)***	-0.5623 (0.00)***	-1.2899 (0.00)***	-0.8939 (0.00)***	-1.5834 (0.00)***	-0.3014 (0.00)***	-0.2250 (0.00)***	0.6290 (0.00)***	-0.1996 (0.04)**	-0.2360 (0.11)
DUM1	0.0001 (0.10)	0.0007 (0.988)	-0.0037 (0.98)	-0.00338 (0.983)	-0.0009 (0.99)	-0.0040 (0.87)	-0.0008 (0.97)	-0.0042 (0.99)	-0.0019 (0.95)	-0.0045 (0.92)
AR(1)	0.0419 (0.14)	0.1693 (0.00)***	0.0355 (0.19)	0.0592 (0.037)**	0.0732 (0.01)**	0.0445 (0.09)*	0.0839 (0.00)***	0.0660 (0.02)**	0.0566 (0.03)**	0.0829 (0.00)***
AR(2)		0.0866 (0.00)***	0.0914 (0.00)***	-0.0079 (0.778)	0.0746 (0.00)***	0.0374 (0.13)	0.0589 (0.02)**	0.0440 (0.11)	0.0477 (0.04)**	-0.0038 (0.89)
Variance Equation										
C	0.0000 (0.03)**	0.0000 (0.0637)	0.0000 (0.0553)	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.16)
RESID(-1)^2	0.0997 (0.00)***	0.0947 (0.00)***	0.0737 (0.00)***	0.1768 (0.00)***	0.1191 (0.00)***	0.1571 (0.00)***	0.0893 (0.00)***	0.1477 (0.00)***	0.0558 (0.00)***	0.0533 (0.00)***
GARCH(-1)	0.8958 (0.00)***	0.9070 (0.00)***	0.9222 (0.00)***	0.8137 (0.00)***	0.8607 (0.00)***	0.8493 (0.00)***	0.8934 (0.00)***	0.8258 (0.00)***	0.9368 (0.00)***	0.9477 (0.00)***
GED param.	6.71 (0.00)***	1.41 (0.00)***	1.58 (0.00)***	4.54 (0.00)***	1.49 (0.00)***	1.17 (0.00)***	1.26 (0.00)***	0.00 (0.00)***	1.24 (0.00)***	1.59 (0.00)***
R-squared	0.9570	0.9143	0.8407	0.9532	0.08255	0.9511	0.9791	0.9762	0.9412	0.8366
Adj. R-squared	0.9569	0.9140	0.8401	0.9530	0.8249	0.9509	0.9790	0.9761	0.9410	0.8360
S.E. of regr.	0.0034	0.0037	0.0057	0.0038	0.0062	0.0034	0.0023	0.0029	0.0034	0.0051
SSR	0.0154	0.0187	0.0436	0.0197	0.0514	0.0153	0.0070	0.0117	0.0157	0.0347
Log-L	589.3011	614.2029	513.9202	609.1002	504.8385	639.2494	647.9650	618.1804	597.2224	545.7729
DW stat.	2.0079	2.1202	1.9859	2.2818	2.0632	2.2493	2.1991	2.1825	1.9447	1.9935

Results indicate that in the pre-crisis period all the examined Greek mutual funds are found to have statistically significant alpha coefficients, but only one of them (MetLife Alico Equity Fund) has a positive sign. Notably, the sixteen out of seventeen mutual funds presenting a negative alpha coefficient indicate that these mutual funds' managers were not able to perform equally well as the market. Thereby, there is no evidence of positive selectivity for the vast majority of these Greek mutual funds during the period before the

sovereign debt crisis outburst. Moreover, during the same years, only thirteen out of seventeen funds have presented statistically significant market-timing coefficients, and only one of them is positive. It is worth mentioning that our econometric results provide evidence that almost two-thirds of the managers under examination exhibit poor market timing skills. This means that they do not have the dexterities required for taking advantage of the market's momentum for realizing profits. Intriguingly, it should be stressed that the fund with the positive alpha coefficient is the same fund whose manager presents positive and high timing skills. Moreover, all mutual funds under scrutiny exhibit statistically significant GARCH parameters, thereby indicating that volatility was present in the Greek mutual fund stock market. Furthermore, all regression estimations exhibit an over 80% level of R-squared coefficient, so they could be characterized as highly reliable.

Table 2b. Estimation Results for the first sub-period before Greek sovereign crisis (funds 11-17).

	11	12	13	14	15	16	17
Mean Equation							
Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant term	-0.0016 (0.00)***	-0.0008 (0.00)***	-0.0009 (0.00)***	-0.0008 (0.00)***	-0.0007 (0.00)***	-0.0009 (0.00)***	-0.0008 (0.00)***
MARKET	0.7098 (0.00)***	0.8639 (0.00)***	0.8854 (0.00)***	0.8710 (0.00)***	0.9186 (0.00)***	0.8307 (0.00)***	0.8622 (0.00)***
MARKET^2	-1.5041 (0.00)***	-0.3033 (0.00)***	-0.0649 (0.29)	-0.7509 (0.00)***	0.0913 (0.17)	-0.7469 (0.00)***	-0.1977 (0.06)*
DUM1	0.0019 (0.975)	0.0025 (0.968)	-0.0012 (0.97)	0.0013 (0.99)	0.0001 (0.99)	0.0003 (0.99)	0.0006 (0.99)
AR(1)	0.0440 (0.103)	0.0347 (0.201)	0.0911 (0.00)***	0.0497 (0.08)*	0.0664 (0.01)**	0.0433 (0.13)	0.0372 (0.18)
AR(2)	0.0913 (0.001)	0.0331 (0.23)	0.0426 (0.09)*	0.0124 (0.66)	0.0044 (0.87)	0.0228 (0.40)	0.0248 (0.38)
Variance Equation							
C	0.0000 (0.00)***	0.0000 (0.05)*	0.0000 (0.02)**	0.0000 (0.02)**	0.0000 (0.00)***	0.0000 (0.04)**	0.0000 (0.02)**
RESID(-1)^2	0.0819 (0.00)***	0.0409 (0.00)***	0.0970 (0.00)***	0.1171 (0.00)***	0.1163 (0.00)***	0.0816 (0.00)***	0.0754 (0.00)***
GARCH(-1)	0.9079 (0.00)***	0.9573 (0.00)***	0.9015 (0.00)***	0.8753 (0.00)***	0.8640 (0.00)***	0.9145 (0.00)***	0.9135 (0.00)***
GED param.	1.52 (0.00)***	1.56 (0.00)***	1.25 (0.00)***	1.45 (0.00)***	1.28 (0.00)***	1.72 (0.00)***	1.59 (0.00)***
R-squared	0.8579	0.9643	0.9772	0.9672	0.9795	0.9314	0.9439
Adj. R-squared	0.8574	0.9642	0.9771	0.9671	0.9794	0.9311	0.9437
S.E. of regr.	0.0052	0.0029	0.0023	0.0029	0.0024	0.0038	0.0036
SSR	0.0367	0.0112	0.0069	0.0110	0.0076	0.0198	0.0171
Log-L	529.5384	615.6972	679.4948	610.6285	645.4683	575.8084	583.0108
DW stat.	2.0470	2.1467	2.1376	2.1428	2.1911	2.0512	2.0401

Table 3a. Estimation Results for the sub-period referring to Greek sovereign crisis (funds 1-10).

	1	2	3	4	5	6	7	8	9	10
Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Mean Equation										
Constant term	0.0001 (0.38)	-0.0002 (0.11)	-0.0010 (0.00)***	0.0000 (0.99)	-0.0001 (0.59)	-0.0001 (0.62)	-0.0001 (0.44)	-0.0002 (0.10)	-0.00086 (0.00)***	-0.0001 (0.32)
MARKET	0.8572 (0.00)***	0.8565 (0.00)***	0.5173 (0.00)***	0.9087 (0.00)***	0.9267 (0.00)***	0.9199 (0.00)***	0.8573 (0.00)***	1.0620 (0.00)***	0.6609 (0.00)***	0.7968 (0.00)***
MARKET^2	-0.2160 (0.00)***	-0.0151 (0.82)	-0.1094 (0.75)	-0.3529 (0.00)***	-0.3157 (0.00)***	-0.2672 (0.00)***	-0.0644 (0.42)	0.3158 (0.00)***	-0.0240 (0.81)	-0.1437 (0.03)**
MA(1)	0.0214 (0.42)	-0.0087 (0.75)	-0.2798 (0.00)***	0.0226 (0.41)	0.0217 (0.42)	0.0027 (0.92)	-0.0116 (0.68)	0.0409 (0.12)	0.0206 (0.45)	-0.0599 (0.02)**
Variance Equation										
C	0.0000 (0.01)**	0.0000 (0.00)***	0.0000 (0.02)**	0.0000 (0.00)***	0.0000 (0.03)**	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.02)**	0.0000 (0.00)***
RESID(-1)^2	0.0939 (0.00)***	0.1561 (0.00)***	0.1989 (0.00)***	0.1557 (0.00)***	0.1544 (0.00)***	0.1684 (0.00)***	0.2035 (0.00)***	0.1447 (0.00)***	0.1016 (0.00)***	0.1109 (0.00)***
GARCH(-1)	0.9009 (0.00)***	0.8162 (0.00)***	0.8348 (0.00)***	0.8298 (0.00)***	0.8578 (0.00)***	0.8199 (0.00)***	0.8134 (0.00)***	0.8634 (0.00)***	0.8840 (0.00)***	0.8822 (0.00)***
T-DIST. DOF	4.94 (0.00)***	4.90 (0.00)***	4.10 (0.00)***	5.16 (0.00)***	6.32 (0.00)***	4.57 (0.00)***	4.36 (0.00)***	3.79 (0.00)***	5.47 (0.00)***	4.39 (0.00)***
R-squared	0.9388	0.9359	0.8508	0.9352	0.8763	0.9378	0.8672	0.9570	0.8159	0.8705
Adj. R-squared	0.9387	0.9357	0.8501	0.9350	0.8760	0.9377	0.8669	0.9569	0.8155	0.8702
S.E. of regr.	0.0054	0.0053	0.0059	0.0058	0.0078	0.0057	0.0068	0.0057	0.0071	0.0068
SSR	0.0386	0.0374	0.0379	0.0454	0.0814	0.0439	0.0617	0.0431	0.0673	0.0622
Log-L	548.2454	543.6616	548.7454	535.0893	489.4789	535.4299	530.1929	545.2765	489.3358	507.9016
DW stat.	2.1887	2.1495	2.2360	2.1743	2.1066	2.1669	2.0895	2.2119	2.0256	2.1314

On the other hand, when focusing on the post-crisis period, results differ considerably, especially regarding the selectivity skills of managers. This leads to conclusions about the sovereign debt crisis indeed having exercised an impact on fund managers' performance in Greece. More specifically, only three out of seventeen funds have statistically significant alpha coefficients and all of these are negative. Therefore, none of them has proven able to outperform the market. Moreover, the majority of the other fourteen funds also present negative coefficients, although their high values of standard errors do not allow for extracting econometrically articulate and safe conclusions. Nevertheless, when examining the market timing skills, there is evidence that ten out of seventeen funds show statistically significant relevant coefficients.

Notably, again only the MetLife Alico Equity Fund has a positive sign, in accordance with the pre-crisis period. Interestingly, the predictive power of the model we employ has become lower, most likely due to the wide array of uncertainty factors that economic conditions due to the crisis have brought about. Emphasis should be attributed to the lower absolute values of the negative selectivity and market timing coefficients in the post-crisis outburst period. This provides evidence that managers' performance considerably improved though did not reach significantly positive levels, remaining in tandem with the bad performance of the Greek equity mutual fund market.

Table 3b. Estimation Results for the sub-period referring to Greek sovereign crisis funds 11-17).

	11	12	13	14	15	16	17
Variable	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant term	-0.0003 (0.09)*	0.0000 (0.82)	-0.0002 (0.00)***	-0.0000 (0.99)	-0.0001 (0.56)	0.0001 (0.52)	0.0000 (0.72)
MARKET	0.8001 (0.00)***	0.9494 (0.00)***	0.8719 (0.00)***	0.7892 (0.00)***	0.9651 (0.00)***	0.8278 (0.00)***	0.9238 (0.00)***
MARKET^2	-0.0308 (0.73)	-0.2899 (0.00)***	-0.1085 (0.00)***	-0.2698 (0.00)***	0.0319 (0.48)	-0.3167 (0.00)***	-0.3709 (0.00)***
MA(1)	0.0189 (0.50)	-0.0944 (0.00)***	-0.0126 (0.65)	-0.0609 (0.02)**	-0.0208 (0.43)	0.0321 (0.25)	0.0089 (0.75)
Variance Equation							
C	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***	0.0000 (0.00)***
RESID(-1)^2	0.1505 (0.00)***	0.1665 (0.00)***	0.2195 (0.00)***	0.0832 (0.00)***	0.1196 (0.00)***	0.1671 (0.00)***	0.1821 (0.00)***
GARCH(-1)	0.8165 (0.00)***	0.8125 (0.00)***	0.7884 (0.00)***	0.8935 (0.00)***	0.8686 (0.00)***	0.8089 (0.00)***	0.8051 (0.00)***
T-DIST. DOF	5.34 (0.00)***	4.30 (0.00)***	3.99 (0.00)***	5.64 (0.00)***	4.23 (0.00)***	6.55 (0.00)***	5.81 (0.00)***
R-squared	0.8646	0.9596	0.9624	0.9126	0.9552	0.8936	0.9091
Adj. R-squared	0.8643	0.9595	0.9623	0.9124	0.9551	0.8934	0.9089
S.E. of regr.	0.0078	0.0046	0.0040	0.0058	0.0050	0.0064	0.0070
SSR	0.0807	0.0282	0.0218	0.0456	0.0338	0.0554	0.0659
Log-L	482.0102	575.4044	604.8516	517.3980	563.1691	508.0547	501.8286
DW stat.	2.0153	2.2170	2.2470	2.0392	2.2468	2.1613	2.1171

At this point, we have to mention that our focus is on whether changes in market timing skills were significant after the sovereign debt crisis outburst. In order to jointly test for all funds whether market timing skills are present, we formulate the following research hypothesis:

$$H_0: (\gamma+k)_{\text{post crisis}} - (\gamma+k)_{\text{pre-crisis}} = 0$$

Versus the alternative hypothesis

$$H_1: (\gamma+k)_{\text{post crisis}} - (\gamma+k)_{\text{pre-crisis}} \neq 0$$

As can be seen, in parts A, B and C of Table 4, there is statistically significant evidence that over the post crisis period the market timing skills have been improved significantly. This finding is mainly attributed to the change of average k (see part B) and not on changes of average γ coefficient (see part A). By looking all funds together, we can argue that on average the reduction in k was much less on post-debt crisis period when compared to the pre-debt crisis period. This later adds on market sensitivity in terms of $\gamma+k$.

Table 4. Estimation results for joint testing of the hypothesis of no change on market timing skills for all funds viewed simultaneously.

Part A	Average (y)	$S_{(y)}$	$S_{(y)}^2$	$(S_{(y)}^2)/n$
Pre Crisis Period	0.846155059	0.10034	0.0100681	0.0005922
Post Crisis Period	0.852388235	0.123547	0.0152638	0.0008979
$H_0: Y_{\text{post crisis}} - Y_{\text{pre-crisis}} = 0$				
t-test	0.161473015			

Part B	Average (k)	$S_{(k)}$	$S_{(k)}^2$	$(S_{(k)}^2)/n$
Pre Crisis Period	-0.509482353	0.575896	0.331656	0.0195092
Post Crisis Period	-0.149841176	0.177888	0.031644	0.0018614
$H_0: k_{\text{post crisis}} - k_{\text{pre-crisis}} = 0$				
t-test	2.46014781			

Part C	Average ($y+k$)	$S_{(y+k)}$	$S_{(y+k)}^2$	$(S_{(y+k)}^2)/n$
Pre Crisis period	0.336672706	0.64989	0.4223564	0.0248445
Post Crisis Period	0.702547059	0.223949	0.0501531	0.0029502
$H_0: (y+k)_{\text{post crisis}} - (y+k)_{\text{pre-crisis}} = 0$				
t-test	2.194578661			

Note: s is the standard deviation of the coefficient considered across funds

A possible explanation for this finding may be that the risk appetite of Greek fund managers increased significantly (or in other words their risk aversion has been reduced) by considering the Troika interventions by a number of measures for helping Greek economy.

This gives credence in the view that fiscal restrictions and out of the ordinary monetary policies to confront the crisis have significant effect on fund managers' behavior.

5. Conclusions

In this paper, we have examined the selectivity and market timing skills of seventeen Greek equity mutual funds in the period before and after the 2010 sovereign debt crisis outburst. The methodology employed is based on the Treynor and Mazuy specification of the Capital Asset Pricing Model, in order to examine the appearance or not of excess returns on selected funds due to active management.

Results obtained provide evidence for negative selectivity effects as expressed by the Jensen's alpha parameter. Notably, in the period after the crisis onset, selectivity remains with a negative sign but, interestingly enough, is closer to zero. Thereby, poor selectivity phenomena become weaker after the crisis emergence. Results are statistically significant concerning fewer funds than in the pre-crisis era.

When it comes to market timing skills, the empirical outcomes indicate that the great majority of the Greek funds under scrutiny are managed by people who cannot outperform the market. Nevertheless, it should be noted that there is a significant improvement in market timing skills in comparison to the pre-crisis era. In tandem with results about selectivity, as the market improves and measures by Troika adopted by Greece, fund managers increase their sensitivity to the market benchmark.

Notably, our findings provide support that the Efficient Markets Hypothesis is found to hold as fund managers are not able to outguess market performance neither based on stock selectivity nor by taking advantage of the emerging Greek market's momentum. Nevertheless, the crisis improves managers' performance, in conditions where benchmark indices become more volatile due to non-ordinary circumstances. Intriguingly enough, the capability of managers in the Greek fund market for exploiting excess profit making possibilities is strengthened during the non-conventional periods in comparison to normal times.

To the best of our knowledge, this study is the first to specifically consider the selectivity and market timing skills of Greek equity mutual fund managers not only before but also after the sovereign debt crisis by employing this certain methodology. It should be noted though that joint tests provide evidence that fund managers are able to manage funds even when crises appear and major events such as the Lehman Brothers collapse do not deteriorate managers' abilities.

This analysis derives its value added from the use of a representative and well-suited specification of a well-established pricing model. Arguably, this is applied to a fundamental sector in the financial market of a highly indebted country that has attracted global interest. One of the principal motivations for accomplishing this work has been to cast light on financial markets' volatility and the possibility of taking advantage of it in periods of high uncertainty. Moreover, we believe that studies like this could constitute a workhorse for enriching the policymakers' and financial analysts' arsenal in studying how to beat the markets in non-conventional times.

6. References

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