PORTFOLIO PERFORMANCE EVALUATION: THE CASE OF THE PORTUGUESE MUTUAL STOCK FUNDS MARKET

AVALIAÇÃO DO DESEMPENHO DOS FUNDOS DE INVESTIMENTO EM AÇÕES: O CASO PORTUGUÊS

EVALUACIÓN DEL FUNCIONAMIENTO DE LOS FONDOS: EL CASO DE LOS FONDOS DE INVERSIÓN DEL MERCADO PORTUGUÉS

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ABSTRACT

In this study, we investigate the portfolio performance evaluation of the Portuguese mutual stock funds market. For that purpose, we used different models with daily data, for which we tested different hypotheses: the existence of alphas with or without selectivity and the existence of betas with or without timing. There are differences induced by the use of unconditional and conditional models based on non-temporal variation in profitability and risk. The results suggest that fund managers have some capacities of selectivity but not of timing.

Keywords: Conditional performance, mutual stock funds, CFG model, selectivity, timing.

RESUMO

Neste trabalho, avaliamos o desempenho dos fundos de investimento em ações no mercado de capitais português. Para tal, aplicamos modelos não condicionais e condicionais a dados diários e testamos as hipóteses de os gestores terem ou não as capacidades de seletividade e/ou timing. Os resultados obtidos sugerem que os gestores possuem algumas capacidades de seletividade mas não de timing.

Palavras Chave: Avaliação do desempenho, fundos de investimento, modelo CFG, seletividade, timing.
RESUMEN

En este trabajo evaluamos el comportamiento de los fondos de inversión en acciones en el mercado de capital portugués. Para esto, aplicamos modelos no condicionados y condicionados a datos diarios y comprobamos las hipótesis de que los gestores tengan o no las capacidades de selección y/o timing. Los resultados obtenidos sugieren que los gestores tienen algunas capacidades de selección pero no de timing.

Palabras clave: Evaluación del comportamiento de fondos, fondos de inversión en acciones, modelo CFG, selección, timing.

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1. INTRODUCTION

From the theoretical point of view the trade off risk versus return has been the main factor of understanding the portfolio performance evaluation. The higher the risk of an asset, the higher will be the required premium for assuming that risk, which per se does not mean a better performance evaluation.

The risk variable has been the subject of several studies since the nineteenth-twenties, but it was the work “Portfolio Theory” of Markowitz (1952) that related risk and profitability in a rational way, trying to minimize the risk of the investor to a certain level of expected gain. Sharpe (1964), Lintner (1965) and Mossin (1966), developed a model that describes the relationship between risk and expected return: the Capital Asset Pricing Model (CAPM). The traditional performance approach developed by Jensen (1968) assumes that the risk parameters are constant over the evaluation period. According to the model, the portfolio’s excess return towards the risk-free rate depends on the parameter beta. Thus, according to Romacho and Cortez (2005), the alpha can be interpreted as the incremental return (positive or negative) obtained in addition to a portfolio under CAPM. To estimate each component of the manager’s contribution to the excess return, we have the model developed by Treynor and Mazuy (1966) which relates in a non-linear fashion the excess return of the portfolio and the excess return of the market. They studied a sample of 57 mutual funds, where they found that the managers had selectivity, but no timing.

One of the conditional measures proposed by Ferson and Schadt (1996) takes into account the portfolio performance evaluation based on investment strategy played by public information. The portfolio performance evaluation of the mutual funds based on the conditional CAPM, depends on public information of the macroeconomic variables such as: measure of the temporal structure slope of interest rates, dividends growth rate of a market index, indicator of a short-term interest rates, spread between the bond returns of companies with different ratings and a dummy variable for the month of January. These authors assume that the beta of the portfolio is the linear function of the macroeconomic variables vector. Since our investigation is to evaluate the portfolio performance of mutual funds in the Portuguese market share, it is worth of notice a study by Cortez and Silva (2002) in which they used the model of Ferson and Schadt (1996), applied to a sample of 12 funds from national bonds between April 1994 and March 1998. One verifies that for half of the funds of the sample the alphas are
significantly positive. Neutral performances were obtained considering macroeconomic variables.

Christopherson, et al. (1998) created a model (CFG hereafter), which assumes that both the betas and alphas are time-varying. They also applied the portfolio alpha in order to turn it dependable on public information, with macroeconomic mismatching variables, enabling a performance evaluation according to changes in the state of the economy. Christopherson, et al. (1998) conducted an empirical study with a sample of 185 pension funds in the U.S., between 1979 and 1990, and noted the relevance of both betas and alphas with variability over time. In terms of comparison of conditional and unconditional alphas, these are similar, since these funds do not always have large inputs of capital in situations of Bull Market; so that the results of the empirical study are consistent with the interpretation given by Ferson and Schadt (1996). More recently, Leite and Cortez (2009) contributed to the international mutual fund performance literature by providing evidence on the impact of using conditioning information in evaluating the performance of Portuguese-based mutual funds investing in local as well as in European Union stocks.

One of the most important developments in portfolio performance evaluation is related with the use of conditional models, which evaluate portfolio managers considering the public information available at the time the returns are generated. The purpose of this study is to evaluate and compare the performance of a sample of mutual stocks funds of the Portuguese capital market using unconditional and conditional models, since portfolio performance evaluation is one of the most interesting topics in finance, having not only attracted the attention of practitioners but also motivating many studies in the academic literature. The Portuguese market, in particular, is still largely unexplored. The remainder of this paper is organized in five sections. The second section concerns the methodology which presents the unconditional and conditional models in operational terms. The third section describes the data. The fourth section discusses the empirical study and results. Finally, the fifth section shows the main findings.

2. METHODOLOGY

2.1. UNCONDITIONAL MODEL

The measure proposed by Jensen (1968) has been taken as a reference for measuring the performance of the portfolio managers. This
measure assumes that risk is constant over the entire period of evaluation.

In this study we use a slightly modified version of the model presented in Coggins, et al. (2004) that is based on Jensen’s (1968) alpha. We removed the dummy variable that tests the "Monday effect", since in our preliminary analysis on this variable was not statistically significant. Its expression is given by:

\[ \text{tcr}_t = \alpha_c + \beta_{c1}\text{r}_{m,t} + \beta_{c2}\text{u}_{c,t-1} + u_{c,t} \]  

where:
- \( \alpha_c \): measure of unconditional performance of the portfolio \( c \);
- \( \text{tcr}_t \): excess return (over the risk free rate) of the portfolio \( c \) at period \( t \);
- \( \beta_{c1} \): measure of market risk of the portfolio \( c \);
- \( \text{r}_{m,t} \): market premium over the period \( t \);
- \( \beta_{c2} \): coefficient related to the moving average model of order 1 term for the portfolio \( c \); and
- \( u_{c,t-1} \) and \( u_{c,t} \): error term at instant \( t-1 \) and \( t \).

Since expression (1) takes into consideration that the risk level of the portfolio remains constant over time, \( \alpha_c \) represents the incremental return obtained beyond the return level of systematic risk assumed. A statistically significant positive (negative) value of \( \alpha_c \) suggests that the managers have a superior (inferior) performance in relation to the market.

In order to investigate the abilities of the portfolio managers to anticipate market movements, we added the quadratic term \( \text{r}_{m,t}^2 \) to equation (1) as in Treynor and Mazuy (1966). The model becomes:

\[ \text{tcr}_t = \alpha_c^{U2} + \beta_{c1}\text{r}_{m,t} + \beta_{c2}\text{u}_{c,t-1} + u_{c,t} \]  

If the value of \( \alpha_c^{U2} \) is significant and positive, then the portfolio managers abilities to select securities is improved (selectivity ability). A significantly positive \( \beta_{c2}^{U2} \) indicates that these managers change their exposure to risk in order to increase its profitability (timing ability).
2.2. CONDITIONAL MODEL

The conditional model of Christopherson, et al. (1998) assumes the existence of a temporal variation of both the conditional betas and alphas. This model allows the conditional performance of the fund to vary through time assuming that the conditional performance of the fund at time \( t \) is a linear function of common information variables known at that time. The CFG model is given by:

\[
r_{c,t} = \alpha_{cFG} + \alpha'_c z_{t-1} + b_{c,bm} r_{m,t} + B'_{cm} (z_{t-1} r_{m,t}) + \beta_{c2} u_{c,t-1} + u_{c,t}
\]

where:

- \( \alpha_{cFG} \): average alpha of the portfolio \( c \);
- \( z_{t-1} \): vector representing the difference between the realization of the public information variables and their unconditional average;
- \( \alpha'_c \): vector that measures the response of the conditional alpha of the portfolio \( c \) to the information variables;
- \( b_{c,bm} \): average beta (the unconditional mean of the conditional beta) of the portfolio \( c \);
- \( B'_{cm} \): vector that measures the response of the conditional beta of the portfolio \( c \) to the information variables;
- the remaining variables were previously defined.

Again, we apply the model adopted by Coggins, et al. (2004) with the exception of not including the dummy variable that tests the "Monday effect".

As before, the model of Treynor and Mazuy (1966) with conditional parameterization results from adding the quadratic term \( r_{m,t}^2 \) to equation (3):

\[
r_{c,t} = \alpha_{cFG}^2 + \alpha'_c z_{t-1} + b_{c,bm} r_{m,t} + B'_{cm} (z_{t-1} r_{m,t}) + \beta_{c2}^2 u_{c,t-1} + u_{c,t}
\]

Significant and positive values of \( \alpha_{cFG}^2 \) or \( \beta_{c2}^2 \) indicate that managers have capacities of selectivity or timing.

3. DATA

This investigation reports to the period of January 2003 to December 2006. We used daily data, corresponding to 994 records for each fund. Our study is composed by 10 Portuguese mutual stock
funds, domiciled in the Portuguese market, and classified according to the criteria’s of the Associação Portuguesa de Fundos de Investimento, Pensões e Patrimónios (PAIFFP) and Fundos de Acções Nacionais (FAN). The FAN invests at least 2/3 of the portfolio in shares (aggressive funds), with assets in Euro currency and issued by national entities. The mutual stock funds data were obtained from the Comissão de Mercado de Valores Mobiliários (CMVM) and from the Sociedades Gestoras de Fundos de Investimento Mobiliário (SGFIM).

Like in Coggins, et al. (2004), we use daily data. “In practice, active portfolio management and changes in market values and security risk, continuously affect the risk of a given portfolio. It seems therefore natural to use daily instead of monthly data to isolate portfolio performance given that managers’ decisions might affect the performance of mutual funds over a shorter time span than what is usually studied in this literature.” (Coggins, et al. 2004).

In Table 1 we present the name of the mutual stock funds analysed in this study.

<table>
<thead>
<tr>
<th>TABLE 1 - Mutual Stock Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funds of National Shares</td>
</tr>
<tr>
<td>Banif Acções Portugal (BAP)</td>
</tr>
<tr>
<td>Barclays Premier Acções Portugal (BPAP)</td>
</tr>
<tr>
<td>BPI Portugal (BPIP)</td>
</tr>
<tr>
<td>Caixagest Acções Portugal (CAP)</td>
</tr>
<tr>
<td>Caixagest Gestão Lusoacções (CGLA)</td>
</tr>
<tr>
<td>Espírito Santo Portugal Acções (ESPA)</td>
</tr>
<tr>
<td>Finicapital (FINIC)</td>
</tr>
<tr>
<td>Millennium Acções Portugal (MAP)</td>
</tr>
<tr>
<td>Postal Acções (POSTA)</td>
</tr>
<tr>
<td>Santander Acções Portugal (SAP)</td>
</tr>
</tbody>
</table>

In this study we used three macroeconomic variables or conditional variables: the return rate for the dividend (RRD) of the market index, yield curve slope (YCS) and a short-term interest rate (STIR). The return rate for the dividend of the market index is calculated based on the Portuguese Stock Index Total Return ($\text{TRPSI}_{20}$). The value obtained for each day is the sum of all the dividend payment in the prior 12 months divided by the current market price of the $\text{TRPSI}_{20}$ index.

The yield curve slope was found from the difference between the returns of risk free rates: a long-term bond and other short-term treasury bond. “Obrigações do Tesouro a 10 anos” and “Certificados de Aforro”
from the Portuguese capital market. The treasury bond is also used as an indicator for the macroeconomic variable short-term interest rate, as well as the risk free rate.

The daily return of the capital market is also based on the \( \text{PSI}_{20} \text{TR} \). Its determination is made according to the following formula and the data were obtained from Euronext Lisbon:

\[
R_{m,t} = \ln \left( \frac{\text{PSI}_{20,t} \text{TR}}{\text{PSI}_{20,t-1} \text{TR}} \right)
\]

(5)

where:
- \( R_{m,t} \): daily return of the capital market in the period \( t \) under the index \( \text{PSI}_{20} \text{TR} \);
- \( \text{PSI}_{20,t} \text{TR} \): index value of the capital market in the period \( t \); and
- \( \text{PSI}_{20,t-1} \text{TR} \): index value of the capital market in the period \( t - 1 \).

The market premium over the period \( t \) is given by:

\[
r_{m,t} = R_{m,t} - R_{f,t}
\]

(6)

with:
- \( R_{f,t} \): risk free rate.

The total return of the portfolio (fund) \( c \) in the period \( t \) is calculated as follows:

\[
R_{c,t} = \ln \left( \frac{P_{c,t}}{P_{c,t-1}} \right)
\]

(7)

where:
- \( P_{c,t} \): price for the portfolio (fund) \( c \) at the end of period \( t \); and
- \( P_{c,t-1} \): price for the portfolio (fund) \( c \) at the end of period \( t - 1 \).

Finally the market premium over the period \( t \) is the difference between the return of the portfolio \( c \) in the period \( t \) and the risk free rate:

\[
r_{c,t} = R_{c,t} - R_{f,t}
\]

(8)

The summary statistics for the macroeconomic variables and for the capital market return are presented in Table 2, and in Table 3 the summary statistics of the funds return.
4. RESULTS

The performance and risk estimates obtained through the equations (1) to (4), for each performance measure, are presented in Table 4. The parameters of each model were estimated by maximum likelihood method using SPSS version 15.0.
Considering the period in analysis, the results of the unconditional model (1) indicate that fund managers have little capacity to outperform the market. The estimates of $\alpha_c^U$ are positive, but very close to zero. Eight estimates of $\alpha_c^U$ (BAP, BPAP, BPIP, CAP, ESPA, MAP, SAP and POSTA) are statistically significant at level 1% and two (CGLA and FINIC) at level 5%.

The estimated values of the selection parameter obtained through the CFG model are very similar to those obtained in the unconditional model. The conditional alpha measure $\alpha_c^{CFG}$ suggests a neutral performance of the fund managers (positive alphas but very close to zero). The same eight funds are statistically significant $\alpha_c^{CFG}$ at level 1% and one fund (FINIC) at level 5%. The estimate of CGLA is not

<table>
<thead>
<tr>
<th>Funds</th>
<th>$\alpha_c^U$</th>
<th>$\alpha_c^{CFG}$</th>
<th>$\alpha_c^U$</th>
<th>$\beta_{c1}^U$</th>
<th>$\alpha_c^{CFG}$</th>
<th>$\beta_{c1}^{CFG}$</th>
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<tr>
<td>BAP</td>
<td>0.0008</td>
<td>0.0007</td>
<td>0.0012</td>
<td>-0.0178</td>
<td>0.0013</td>
<td>-0.0214</td>
</tr>
<tr>
<td></td>
<td>(0.001)*</td>
<td>(0.001)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>BPAP</td>
<td>0.0021</td>
<td>0.0021</td>
<td>0.0023</td>
<td>-0.0070</td>
<td>0.0023</td>
<td>-0.0062</td>
</tr>
<tr>
<td></td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.369)</td>
<td>(0.000)*</td>
<td>(0.452)</td>
</tr>
<tr>
<td>BPIP</td>
<td>0.0007</td>
<td>0.0006</td>
<td>0.0010</td>
<td>-0.0123</td>
<td>0.0010</td>
<td>-0.0164</td>
</tr>
<tr>
<td></td>
<td>(0.002)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.001)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
</tr>
<tr>
<td>CAP</td>
<td>0.0020</td>
<td>0.0020</td>
<td>0.0021</td>
<td>-0.0042</td>
<td>0.0021</td>
<td>-0.0042</td>
</tr>
<tr>
<td></td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.544)</td>
<td>(0.000)*</td>
<td>(0.569)</td>
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<tr>
<td>CGLA</td>
<td>0.0005</td>
<td>0.0004</td>
<td>0.0006</td>
<td>-0.0049</td>
<td>0.0006</td>
<td>-0.0063</td>
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<tr>
<td></td>
<td>(0.039)**</td>
<td>(0.330)</td>
<td>(0.018)**</td>
<td>(0.245)</td>
<td>(0.221)</td>
<td>(0.141)</td>
</tr>
<tr>
<td>ESPA</td>
<td>0.0022</td>
<td>0.0022</td>
<td>0.0024</td>
<td>-0.0079</td>
<td>0.0024</td>
<td>-0.0081</td>
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<td></td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.260)</td>
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<td>(0.276)</td>
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<tr>
<td>FINIC</td>
<td>0.0016</td>
<td>0.0016</td>
<td>0.0021</td>
<td>-0.0201</td>
<td>0.0021</td>
<td>-0.0248</td>
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<tr>
<td></td>
<td>(0.002)*</td>
<td>(0.003)*</td>
<td>(0.000)*</td>
<td>(0.030)**</td>
<td>(0.003)**</td>
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<td>MAP</td>
<td>0.0011</td>
<td>0.0015</td>
<td>0.0018</td>
<td>-0.0262</td>
<td>0.0016</td>
<td>-0.0045</td>
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<td>(0.000)*</td>
<td>(0.000)</td>
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<tr>
<td>POSTA</td>
<td>0.0020</td>
<td>0.0020</td>
<td>0.0021</td>
<td>-0.0036</td>
<td>0.0021</td>
<td>-0.0036</td>
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<tr>
<td></td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.606)</td>
<td>(0.002)*</td>
<td>(0.627)</td>
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<tr>
<td>SAP</td>
<td>0.0009</td>
<td>0.0008</td>
<td>0.0013</td>
<td>-0.0171</td>
<td>0.0013</td>
<td>-0.0192</td>
</tr>
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<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
<td>(0.000)</td>
<td>(0.000)*</td>
<td>(0.000)*</td>
</tr>
</tbody>
</table>

* 1% level of significance  
** 5% level of significance
significant. These results are similar to the Leite and Cortez (2009), for the National funds, concerning the neutral performance.

The estimates of parameters obtained from equation (2) allows us to analyze the selectivity and timing abilities based on the Treynor and Mazuy (1966) parameterization with unconditional market risk. According to the results in Table 4, it is notorious that the funds managers present some capacity of selectivity since the values of \( \alpha^U \) are positive. The funds BAP, BPAP, BPIP, CAP, ESTA, FINIC, MAP, POSTA and SAP present positive significant values of \( \alpha^U \) at level 1\% and the fund CGLA at level 5\%. On the other hand, we observe that the managers are incapable to anticipate market developments, since the values of \( \beta^U \) in all funds are negative. Only five funds (BAP, BPIP, FINIC, MAP and SAP) have statistical significant values.

The analysis of selectivity and timing using the CFG model and the Treynor and Mazuy (1966) performance measure, allows us to conclude again that fund managers show some selection ability (the values of \( \alpha^{CFG} \) are very close to zero), but are unable to anticipate market developments (negative values of \( \beta^{CFG} \)). With the exception of the fund CGLA (with a non significant estimate value of \( \alpha^{CFG} \)), all others funds present positive and statistically significant values of \( \alpha^{CFG} \) at level 1\%. Regarding the timing component, four funds (BAP, BPIP, FINIC and SAP) are negative and statistically significant and the others are also negative but without statistical significance.

5. CONCLUSIONS

The values of the 10 Portuguese mutual stock funds have some ability of selectivity (insignificant) for being extremely close to zero for the 4 measures used. Still, in terms of Jensen’s alpha (1968) parameterization with unconditional market risk, the best performance is the BPAP and the ESPA. As for the conditional alpha, the CFG model, the BPAP and ESPA show the best result. The empirical application of the model of Treynor and Mazuy (1966) parameterization with unconditional market risk, indicates that ESPA has better performance. Finally, the model of Treynor and Mazuy (1966) with conditional parameterization, gives us indication that the ESPA offers the best result. Regarding the timing parameter we conclude that managers are unable to anticipate market developments. This happens in both the
unconditional and the conditional measure. The results in terms of selectivity using the unconditional parameterization and the CFG model with daily data are, in part, similar to those in the literature that also uses these parameterizations with monthly data.

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