Preliminary Draft
Not To Be Quoted

WHY DOES PERFORMANCE PERSIST? EVIDENCE FROM ITALIAN EQUITY FUNDS

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December 2001

Abstract

Using a data set which is free of survivorship bias, we analyze the persistence of the performance of Italian equity funds from 1987 to 2000 and investigate the determinants of persistence. The main empirical results of the paper are as follows. First, the performance of Italian equity funds displays weak persistence: although persistence is detected in the whole sample period, on a year-by-year basis it turns out to be quite unstable. This result, analogous to that available for US funds, cannot be explained only by differences in funds' expenses. Second, above average performance is more likely to persist for those funds that attract huge cash inflows, charge higher management fees and have been active for a longer period of time, while it is less likely to be repeated among larger funds. No significant effect on positive persistence is instead detected for portfolio turnover, incentive fees, loading charges and the ownership structure of the fund's managing company. Third, the persistence of underperformance is not systematically influenced by any of these fund characteristics except for cash outflows, which increase the likelihood of negative persistence. Finally, even after controlling for all these variables, persistence appears to be also a "group phenomenon", due to market wide factors.

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[b] We thank Richard Brealey, Riccardo Cesari and Evi Kaplanis for their helpful comments. Antonio Di Clemente, Antonella Morelli and Cristina Ortenzi provided assistance in managing the data base. The views expressed in the article are those of the authors and do not involve the responsibility of the Bank of Italy.

1. Introduction

Since the early nineties, one of the most debated issues in the financial literature has been the persistence of mutual funds performance, i.e. the hypothesis that past performance helps predict future performance - see, for example, Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Brown and Goetzmann (1995), Malkiel (1995), Gruber (1996), Carhart (1997) and Wermers (2001). The common result is that performance persists over time: funds which had a satisfactory performance record in the past will continue to do so in the future. For example, Grinblatt and Titman (1992) find that 100 basis point of abnormal performance in a five years evaluation period increases expected abnormal performance by approximately 30 basis points in the following five years. This finding has aroused wide interest not only in the academic literature - since it is in contrast with the standard efficient market view, which implies that future performance cannot be predicted using past performance - but also among market participants. In fact, mutual funds' rankings based on previous performance records are carefully analyzed by both market practitioners and investors: funds' classifications are reported by the specialized press, and past performance appears in almost any advertising of the well performing funds. Furthermore, past performance is one of the most important factors influencing investors' choice among different funds.[1]

In this paper we provide a comprehensive analysis of the persistence of the performance of Italian equity funds. Since our data set includes all Italian equity funds in existence in each year, our results are free of survivorship bias (a factor which tends to produce persistence artificially).[2] Furthermore, the availability of data on several characteristics of the funds (e.g., net returns, management fees, incentive fees and total net assets) enables us to analyze the persistence of both net and gross returns (i.e. returns computed adding back the fees paid each year by the funds) and to investigate the determinants of persistence. We estimate persistence in each year, employing the traditional Jensen's a (Jensen 1968, 1969) and using several benchmarks. The first one is the MSCI Italy index, a value weighted single-index benchmark of the shares listed on the Milan Stock Exchange. In order to control for the funds' non-equity investments, we estimate persistence also using a two-index benchmark which includes the MSCI Italy index and an index of Italian government bonds. Moreover, in order to take account of the different investment styles followed by the funds, we estimate persistence using two different approaches based on mimicking portfolios. Following Fama and French (1992) and Carhart (1997), we define two benchmarks including combinations of the MSCI Italy index and three mimicking

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1 Sirri and Tufano (1992, 1998) and Wermers (2001) find that mutual funds' cashflow is related to superior past performance.

2 See Brown, Goetzmann, Ibbotson and Ross (1992). The methodologies used in some of the previous studies have been designed to mitigate the consequences of survivorship bias. See, for example, Elton, Blake and Gruber (1996), Gruber (1996) and Carhart (1997).

factors, related to stocks' market capitalization, book-to-market ratio and short-term return. In the second approach, the benchmark is based on mimicking portfolios that are estimated using maximum-likelihood factor analysis.

We find that the performance of Italian equity funds shows weak signs of persistence: although persistence is detected in some of the periods in our sample, the effect is quite unstable and in some years there is even evidence of reversal (i.e. funds that had better than average performance in the past performed poorly in later periods). This result has been obtained using both net and gross returns, and therefore cannot be explained only by differences in funds' expenses (funds that perform systematically better than average are not just funds with lower expenses) and is robust to alternative methods to estimate performance (using both raw returns and risk adjusted returns) and to the use of relative rather than absolute benchmarks (although not for any model specification in the latter case). This evidence is analogous to that reported by Malkiel (1995) and Brown and Goetzmann (1995) for the US funds, and is consistent with the paradigm of market efficiency. Second, the probability that outperformance persists over time is influenced by cash inflows and outflows, size, age and periodic costs (mainly represented by management fees), while it is not significantly affected by incentive fees, load charges and the ownership of the fund's managing company. As regards the determinants of persistent underperformance, the evidence is much less conclusive. Finally, even after controlling for funds' attributes, persistence appears to be also a "group phenomenon", due to market wide factors.

The paper is organized as follows. Section 2 discusses briefly the previous literature on performance persistence. Section 3 describes the data-set and the methods used to classify the funds and compute gross returns. Section 4 describes in detail the benchmarks used to estimate the funds' risk adjusted performance. Section 5 provides a comprehensive evaluation of performance persistence using the non parametric methodologies suggested in previous studies. Section 6 investigates the determinants of persistence using logit regressions analysis. The last section presents the conclusions.

2. Literature review

In this section we briefly review the main contributions to the literature on performance persistence. While some interesting studies are not commented,[3] the survey is intended to cover the most relevant developments of the recent literature.

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[3] Performance persistence is analyzed also by Beebower and Bergstrom (1977), Lehmann and Modest (1987), Shukla and Trzcinka (1994), Gruber (1996), Ter Horst and Verbeek (2000), Philpot, Hearth and Rimbey (2000) and Bollen and Busse (2001). However, the main focus of these papers is on other aspects of funds' performance.

Despite the fact that different methodologies have been used and different data sets and time periods have been analyzed, the common finding of the literature is that a fund's past performance is a good predictor of its future performance and that persistence cannot be explained only by differences in funds' expenses. Moreover, the previous studies generally find that persistence is concentrated mainly among the worst performers and that it tends to be strongest for short run periods.

Grinblatt and Titman (1992) analyze the relation between the Jensen's a in two subsequent time periods for a sample of 279 US funds from 1974 to 1984. They detect a significantly positive relation and find that mutual funds that realize a 1% abnormal return in a 5 year evaluation period are expected to realize a 0.28% percent abnormal return in the subsequent 5 years. Hendricks, Patel and Zeckhauser (1993) examine the time series properties of the returns of a sample of 165 US open-end no-load growth funds in the period 1974-88. Using a two-pass methodology based on Fama and MacBeth (1973),[4] they find a "hot hands" phenomenon in short run fund returns: risk adjusted residual returns obtained from quarterly market model regressions are positively serially correlated up to four quarters. However, they find no evidence of persistence for longer periods: after one year the serial correlation among residual returns becomes negative and non significant. Hendricks, Patel and Zeckhauser (1993) find also that performance persistence is mainly concentrated among underperformers. They show that a zero investment strategy that is long in the octile of funds that had the best net returns in the previous quarter and short in the worst performers generates significant risk adjusted returns of 6-8% in the year after the evaluation quarter. In a subsequent paper, Elton, Gruber and Blake (1996), using a sample of 188 equity funds designed to control for survivorship bias, reconfirm the hot hands phenomenon of Hendricks, Patel and Zeckhauser (1993). However, using risk adjusted returns to rank funds, Elton, Gruber and Blake (1996) find that the returns of the funds which had the best performance in the past exceed the returns of the poor performers also for longer periods (three years). Similar results are obtained when funds with high expenses are excluded from the analysis, suggesting that fees and expenses account for only part of the differences in performance across funds. The main conclusions of the Elton, Gruber and Blake (1996) study have been subsequently reconfirmed in Gruber (1996).

Brown and Goetzmann (1995) and Goetzmann and Ibbotson (1994) analyze the predictability of fund performance employing a non parametric methodology initially suggested by Brown, Goetzmann, Ibbotson and Ross (1992). Their results suggest that performance persists both in relative terms (i.e. when each fund performance is compared to the median performance of the mutual fund industry) and in absolute terms (i.e. defining overperformers those funds which

[4] In the first pass Hendricks, Patel and Zeckhauser (1993) estimate for each fund quarterly residual returns using market model regressions; subsequently, they run for each quarter a cross section to estimate the serial correlation in residual returns.

achieve positive risk adjusted returns); these conclusions are not changed when fees and expenses are added back to funds returns. However, the evidence in favor of persistence is strong in the 1970s and weaker in the 1980s: Malkiel (1995) finds that in the latter decade the performance of the US mutual funds shows reversals (funds that were successful in the past perform poorly in subsequent years).[5] Carhart (1997) analyses 30 years of returns for a large sample of US equity funds, and finds that fund persistence is in part explained by the persistence in stock returns documented by Jegadeesh and Titman (1993) and by differences in funds operating costs. Consistently with previous studies, Carhart finds that the remaining (unexplained) persistence is mainly concentrated in the worst performing funds. Finally, he finds that past performance helps predict future performance even after considering funds attributes such as expense ratios, turnover, size and growth in total net assets.

The issue of performance persistence has been thoroughly reconsidered by Wermers (2001) on the basis of a methodology introduced by Daniel, Grinblatt, Titman and Wermers (1997) and a new database (Wermers, 2000).[6] Wermers (2001) find that prior-year winning funds beat prior-year losers, during the following year, by almost 5 percent per year at the net return level, as well as beating market indexes by 2 percent per year. Moreover, because of sizable cash inflows, past winners are able to beat past losers (experiencing cash outflows) for at least two years following the ranking year. Finally, Wermers (2001) finds that persistence in growth-oriented funds is also positively correlated with portfolio turnover.

The previous literature on performance persistence has concentrated mainly on the US funds, while little evidence is available for other countries. Rare exceptions are represented by Brown,

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[5] However, the evidence shown by Malkiel (1995) is obtained using returns that are not risk-adjusted.

[6] Daniel, Grinblatt, Titman and Wermers (1997) develop a performance measure based on fund stockholdings in which each stock in the fund portfolio is matched with a benchmark portfolio that has the same characteristics of the stock in terms of size, book-to-market and prior-year return. By doing so, the fund portfolio-weighted return (i.e. the return before any trading costs and expenses are deducted) can be decomposed into three parts: style-based returns, style timing and selectivity (the latter capturing stock-picking talent). This approach provides a more precise method of controlling for style-based returns than the methods of decomposing performance with factor-based regressions of net returns, like those introduced by Fama and French (1992, 1993) and Carhart (1997). Moreover, by merging the database of stockholdings with data on the expense ratio, annual portfolio turnover and net returns, and by estimating institutional trading costs on both the NYSE/AMEX and Nasdaq, Wermers (2000) is also able to compute the incidence on fund returns of execution costs and expenses. Finally, the availability of data on funds' total net assets under management also allows Wermers (2001) to estimate net shareholder cashflows and to assess the relation between the reaction of consumers to past fund returns and the persistence in these returns.

Draper and McKenzie (1994), who analyze the persistence of UK pension fund investment performance, and by Allen and Tan (1999), who study the persistence of UK investment trust companies. Beltratti and Miraglia (2001) examine the persistence of some categories of Italian mutual funds during 1990-97. They find some evidence of persistence, but much of the effect occurs in a few years of the sample period. They also observe that the results are quite sensitive to the measures of performance.

More importantly, the previous studies focused more on detecting persistence and less in analyzing its determinants. Some suggestions on the latter topic can be found in Carhart (1997) and Volkman and Wohar (1995). Volkman and Wohar (1995) analyze the relation between a measure of current performance and some explanatory variables including past performance, size, load fees, management fees and investment policy goals. The effects of such funds' attributes are analyzed separately from each other, without taking into account the relations between the attributes.[7] Carhart (1997) regresses the fund's a in the current period on a measure of past performance and on the fund's attributes, with the aim of analyzing whether current performance is related to past performance even after taking account of the fund's attributes. Both papers can be interpreted as an analysis of the determinants of performance, rather than an analysis of the determinants of persistence.

3. The data

The data on mutual funds for the period from June 1985 to October 2000[8] are obtained from the Bank of Italy's data base and were extended and cross checked with information collected from the funds' annual reports and from the specialised press (*Il Sole 24-Ore*).

The basic information includes the fund's name, the investment objective, the funds' NAV, the dividend distributions and the distribution dates, the fund's management company and its ownership structure, the management fees, the incentive fees paid by the fund to the management company, the loading charges and the fund's portfolio turnover rate. A detailed description of the data used in the paper is reported in the Appendix.

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[7] For example, Elton, Gruber and Blake (1996) show that there is a significant negative relationship between fund size and expense ratio.

[8] Mutual funds were introduced in the Italian financial system in 1984. Since then the number of operating funds and the size of managed assets have grown very rapidly: in October 2001 there existed in Italy 982 mutual funds with net asset values equal to 478 billion euro (about 41 percent of GDP).

Mutual funds classification. In order to make meaningful comparisons funds must be grouped into homogeneous categories. A classification widely used in Italy is that adopted by *Assogestioni* (the Italian mutual funds association). The *Assogestioni* classification currently includes 24 different categories, based on the prevailing asset classes of investment (money-market, bond, balanced, equity, flexible) matched with the duration or the currency of denomination of bonds, or the residence or the industrial sector of listed companies. A problem with this classification is that, in the first half of the nineties, it was changed several times, to include 7, 14 and finally 20 groups. Since then, a comprehensive revision of the *Assogestioni* classification has occurred only at the beginning of 1999, with the introduction of the euro. As regards the period ending in 1995, Cesari and Panetta (1998) classify all the Italian mutual funds in operation from June 1984 to June 1995 on the basis of the composition of their portfolios, using the clustering procedure suggested by Sarle (1983). The categories which result from the cluster analysis closely match the following 4-level aggregation of the 20categories introduced by *Assogestioni* in 1995: Italian equity funds, Italian bond funds, international equity funds and international bond funds.[9] The cluster of Italian equity funds includes categories 1, 3 and 9 of the 1995 classification. Given such a close matching between the *Assogestioni* classification and the *ex-post* statistical classification, in this paper Italian equity funds until 1998 include categories 1, 3 and 9 of the 1995 classification of *Assogestioni*, while, since January 1999, they only include category 1 of the 1999 classification (the so-called "Fondi azionari Italia").

Survivorship bias. Survivorship bias arises if investors' withdrawals push the poorly performing funds out of the market, so that only superior funds remain alive. Therefore, samples which exclude funds which perished because of their inferior performance are biased towards finding persistence - see Brown, Goetzmann, Ibbotson and Ross (1992, 1996), Brown and Goetzmann

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[9] The analysis has been performed using the SAS Cluster Procedure (which minimizes the differences inside each cluster and maximizes the differences between different clusters) on the basis of the average proportion in each fund's portfolio of eight categories of assets (Italian government securities, Italian corporate bonds, Italian convertible bonds, foreign bonds, Italian equities, foreign equities, short term assets, other financial assets) for the entire period 1986-1995 and for two subperiods (1986-89 and 1990-95). The cluster procedure has been performed using all the funds which were active in Italy before 1994 (293 funds), excluding 3 funds for which the data set was not complete. For the entire period and for the second subperiod the results of the cluster analysis indicate that the optimal number of clusters is equal to 4. The classification of the single funds is highly stable (only 1 fund changes category from the entire period to the second subperiod). However, in the first subperiod there is no evidence of an optimal number of clusters. For only 9 of the funds is the correspondence between the classifications obtained by cluster analysis and that used by *Assogestioni* violated: 6 international equity funds were classified *ex-post* as Italian equity funds and 3 Italian bond funds were classified *ex-post* as international bond funds. The selection procedure and the results of the cluster analysis are discussed in detail in Cesari and Panetta (1998).

(1995) and Hendricks, Patel and Zeckhauser (1997). Our data-set includes the universe of Italian mutual funds and therefore our results are not affected by the survivorship bias that has influenced many of the previous studies - see, for example, Lehmann and Modest (1987), Malkiel (1995), Shukla and Trzcinca (1994) and Kahn and Rudd (1995).

The computation of gross returns. Differences in net performance across funds might be determined by differences in the funds' expenses: if all managers had similar investment ability, the low expenses funds would consistently overperform the remaining funds. Therefore, we have investigated performance persistence using both net and gross returns. The sources of the funds' expenses can be better understood after a brief description of the Italian institutional framework. In Italy a contract is signed among an investor, the fund's management company (which manages the fund's portfolio, thus deciding the investment policy) and a custodian bank (which acts as a custodian of the fund's assets and takes care of all the operations related to the fund's portfolio - e.g. securities purchases and sales, coupon and dividend payments, etc.). There are three main categories of expenses that are borne each year by the investors, since the fund's NAV is determined daily after these costs are subtracted:[10]
a) bank fees, i.e. the fees paid each year to the custodian bank as a percentage of the fund's NAV. In our sample period the median value of such fees across funds ranges from 0.14% of the NAV to 0.20%.
b) management fees, i.e. the fees paid every year to the management company as a percentage of the fund's NAV. The median value of such fees ranges from 1.08 percent of NAV in 1988 to 1.80 percent in 2000.
c) Trading costs, which include stamp duty, brokerage fees and the bid-ask spreads paid by the funds on securities transactions.

Brokerage fees and bid-ask spreads cannot be isolated, since they are considered a capital item and are included in securities' prices, thus influencing funds' performance directly. On the contrary, stamp duty and the components of expenses under a) and b) are included in the funds' annual report; therefore, in order to compute the funds returns before expenses (the "gross" returns), we added them back to the funds' "net" returns (i.e. the returns computed from the funds' unit values and dividends).

[10] On entering in the fund, investors usually pay also a load fee, as a fixed proportion of their investment. However, load fees are borne directly by the investors and do not influence the fund's NAV.

4. Risk adjustment

The measure of the funds' risk adjusted performance used in this work is the a coefficient suggested by Jensen (1968, 1969). The a has been estimated using several benchmarks. This choice is motivated by the fact that, given data limitation, our benchmark portfolios include only risky *financial* securities, as it is standard in the finance empirical literature, so that we have no guarantee that the chosen benchmark is *ex-post* mean variance efficient. A wider set of benchmarks will therefore provide information on the robustness of the results.

The first benchmark used to estimate the a is the MSCI value-weighted index of all shares listed on the Milan Stock Exchange (MSCI Italy; see the Appendix for data description):

$$\tilde{r}_{it} - r_{ft} = a_i + b_{im}(\tilde{r}_{mt} - r_{ft}) + \tilde{e}_{it} \qquad (1)$$

where r_i is the return on fund i, r_f is the risk free rate, r_m is the return of the benchmark (market) portfolio and b_{im} is the fund's systematic risk, i.e. its sensitivity to the return of the benchmark. A positive a indicates superior performance, while a negative value indicates inferior risk adjusted performance.

Elton, Gruber, Das and Hlavska (1993) show that the results obtained in a previous study by Ippolito (1989) using the S&P to measure the performance of the US mutual funds are reversed once one uses proxies which take into account the fact that US equity funds hold in their portfolio non-S&P equities and bonds. A similar problem arises when one analyses the performance of Italian equity funds. In fact, although in our sample period Italian equities represent the largest component of the funds' portfolio (approximately 60 percent), the proportion of Italian government bonds was also substantial (26 percent).[11] Therefore, we estimate risk-adjusted performance using also a two-index benchmark which includes both MSCI Italy and an index of Italian government bonds (see Appendix):

$$\tilde{r}_{it} - r_{ft} = a_i + b_{im}(\tilde{r}_{mt} - r_{ft}) + b_{ib}(\tilde{r}_{gt} - r_{ft}) + \tilde{e}_{it} \qquad (2)$$

where r_g is the return on the government bonds portfolio and b_{ib} is the sensitivity of the excess returns of fund i to the excess returns on the government bond portfolio. The choice of this two-index model can be justified on several grounds. One motivation often used in the literature[12] is to consider the funds as a combination of three portfolios (equities, government bonds and the

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[11] The remaining 14 percent of the funds' portfolio consisted of cash, Italian corporate bonds and foreign securities.

[12] See, for example, Blake, Elton and Gruber (1993) and Elton, Gruber, Das and Hlavka (1993).

risk-free asset) so that the return on the fund is the weighted average of the returns on the constituent portfolios, with weights b_{im}, b_{ib}, and $1-b_{im}-b_{ib}$ respectively. Therefore, management performance is the return earned by the fund in excess of the return obtained by a combination of the three assets. In this view, the Jensen's measure, rather than an equilibrium relationship, can be thought of as the extra return earned by the manager compared to the return on a passive portfolio with same risk. Alternatively, one could justify equation (2) by assuming a two-factor equilibrium model, in which MSCI Italy and the government bonds index are the pervasive factors.

If the funds' portfolios load heavily on specific subgroups of securities, equations (1) and (2) might not take account correctly of the strategies followed by the managers. For this reason, we construct also two benchmarks based on mimicking portfolios. Following an approach which is consistent with the Arbitrage Pricing Theory of Ross (1976) and that has been extensively employed in the finance literature - see, for example, Lehmann and Modest (1987) and Connor and Korajczyk (1991) - the first of such benchmarks has been estimated using factor analysis. Relying on the results of Panetta (1996), we fitted a 5-factor model, using maximum likelihood.[13] The funds' a has been subsequently estimated from the following time-series regression:

$$\tilde{r}_{it} - r_{ft} = a_i + \sum_{k=1}^{5} b_{ik} (\tilde{r}_{kt} - r_{ft}) + \tilde{e}_{it} \qquad (3)$$

where r_k is the return on factor k (the factor score) and $\hat{a}_{ik}$ is the sensitivity of the excess return of fund i to the excess return on factor k.

An alternative approach is the three factor model of Fama and French (1992, 1993), who suggest that securities returns in excess of the risk free rate are explained by the sensitivity of their return with respect to three factors: (i) the excess return on a broad market portfolio; (ii) the difference between the return on a portfolio of small capitalisation stocks and the return on a portfolio of large capitalisation stocks (SMB, small minus big); (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low book-to-market stocks (HML, high minus low). Therefore, the funds' a has been estimated through the following time series regression:

$$\tilde{r}_{it} - r_{ft} = a_i + b_{im}(\tilde{r}_{mt} - r_{ft}) + b_{iS} SMB + b_{iH} HML + \tilde{e}_{it} \qquad (4)$$

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[13] In Panetta (1996) the optimal number of systematic factors is determined applying the cross validation technique suggested by Conway and Reinganum (1988). The methodology used to estimate the factor scores of equation (3) is described in Appendix 1.

where $ß_{iS}$ is the sensitivity of the excess return of fund i to the return on the size portfolio and $ß_{iH}$ is the sensitivity of the excess return of fund i to book-to-market portfolio.[14]

Finally, in order to check whether performance persistence can be exclusively attributed to short-run persistence in stock returns we have also estimated the funds' *a* through the Carhart (1997)'s model:

$$\tilde{r}_{it} - r_{ft} = a_i + b_{im}(\tilde{r}_{mt} - r_{ft}) + b_{iS}SMB + b_{iH}HML + b_{iM}PR1YR + \tilde{e}_{it} \quad (5)$$

where $ß_{iM}$ is the sensitivity of the excess return of fund *i* to the return on the so-called "momentum" portfolio *PR1YR* (the difference between the return on a portfolio of high-return stocks and the return on a portfolio of low-return stocks).

The performance estimates are consistent with those obtained by Cesari and Panetta (2002) for the period from June 1985 to 1995. With net returns, Jensen's alphas are not significantly different from zero. With gross returns, however, the performance is positive under any of the models described above. Cesari and Panetta (2002) argue that this evidence supports Grossman and Stiglitz (1980)'s view of market efficiency, suggesting that informed investors are compensated for their information gathering.

5. Persistent performers

In order to perform the analysis we required at least 36 months of data.

Several methods have been used in the literature to measure performance persistence. A first approach consists in regressing each fund's performance in period t on the performance in period t+1.[15] A second approach consists in analyzing in each period the performance of portfolios of mutual funds grouped on past performance.[16] In this analysis we use a third methodology, suggested by Brown *et al*. (1992): persistence is evaluated using non-parametric

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[14] The methodology used to estimate the factor scores and to construct the mimicking portfolios related to size and to market-to-book is described in the Appendix.

[15] This approach has been used by Goetzmann and Ibbotson (1994) and by Carhart (1997). A variant of this approach, which consists in computing rank correlations between performance measures in two subsequent periods, has been used by Shukla and Trzcinka (1994).

[16] This approach has been used by Elton, Gruber and Blake (1996), Hendricks, Patel and Zeckhauser (1993), Gruber (1996).

tests based on two-way contingency tables which analyse the performance of each fund relative to the median industry performance. This choice is motivated by two reasons: first, since the funds' performance is measured with error (due to estimation errors and to mispecifications in the benchmark used to estimate risk adjusted performance), non parametric methods allow us to reduce the bias in the tests, as long as the bias does not change the funds' position relative to the median performance in the industry. Second, we choose the Brown *et al*. (1992) approach since it provides a convenient framework to investigate the determinants of performance persistence. These advantages might come at the cost of a loss of power of our tests.

To compute the tests, we classify each fund with respect to its relative return in period t and in the following period (t+1): the fund is defined winner (*w*) if its return is higher than the median return of all funds. Similarly, a fund is classified as loser *(l)* if its return is lower than the median. Subsequently, we define winner-winner *(w,w)* the funds that were winners for two subsequent periods and loser-loser *(l,l)* the funds which were losers in both periods. Loser-winner *(l,w)* and winner-loser *(w,l)* are defined analogously. In Table 1 we report the results of such procedure for the funds' raw returns. In each row of the Table winner-winner (loser-loser) is the number of funds which overperformed (underperformed) in the pair of years indicated in the first column of the Table. The periods considered in each row end in October of each year: for example, winner-winner for 1987-88 indicates the number of funds which were winners between November 1986 and October 1987 and that were also winners between November 1987 and October 1988. In the Table we present also a test which is equal to the ratio between the logarithm of the cross product ratio (CPR, or odds ratio[17]) and its standard deviation, and is used to analyze the relation between funds' relative performance in successive years: in case of no association between relative performance in subsequent years, the log of the CPR should not

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[17] The cross product ratio is defined by $CPR = (w,w*l,l)/(w,l*l,w)$ and can equal any non negative number. The value CPR=1 is obtained when the variables which appear in the row and in the column of the 2 by 2 table are independent, and is used as a baseline for comparisons. For large enough samples the CPR is normally distributed with standard deviation

be significantly different from zero. As mentioned above, the results of the analysis are reported also for gross returns, in order to understand how much persistence is influenced by the funds' expenses.

The results presented in Table 1 suggest that there is little relative persistence in funds' raw returns: the Z-statistic is positive and significant only in seven of the thirteen periods in our sample. Furthermore, in some years the Z-statistic is negative (although not significant), indicating a reversal of performance: e.g., most of the funds that were winners in 1994 became losers in 1995. This finding is similar to the results obtained for the US equity funds by Malkiel (1995) and Brown and Goetzmann (1995). The results obtained with gross returns are very similar to those obtained using net returns, suggesting that the persistence of relative returns which is detected in some years does not simply reflect differences in funds' expenses.

If funds' returns are influenced by a set of common factors, persistency could merely reflect differences in funds' degree of risk. In this case one would expect riskier funds to show persistently higher returns than the less risky funds. Therefore, in Table 2 we examine the persistence of the risk adjusted returns, i.e. of the funds' a coefficients. In general, the risk adjustment does not change dramatically the results obtained using raw returns (see Table 2);[18] this result is not surprising, since we are considering a group of funds with homogeneous investment policy (remember that we included only equity funds in our sample), so that differences in systematic risk across funds are small. Analogously to the results obtained for the raw returns, using gross returns does not influence the results, confirming that differences in funds' expenses are not sufficient to explain performance persistence. The above results are qualitatively similar to those obtained defining funds winners or losers on the basis of absolute benchmarks, although both Fama and French's model and Carhart's model allow to reject persistence over the whole sample period (see Table 3).[19]

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[18] We ignore the effects of cross-sectional dependencies among the funds' performances on our tests. However, Brown and Goetzmann (1995) show that for a sample of funds influenced by survivorship bias the bootstraped p-values for the CPR are almost equal to the empirically observed p-values.

[19] In Table 3 absolute winners are defined on the basis of both raw and risk-adjusted returns. In the former case, winners are those funds that beat the MSCI Italy (see column 1 of Table 3)

Table 1TESTS OF RELATIV

Table 2

TEST OF RELATIVE PERSISTENCE OF EQUITY FUNDS PERFORMANCE

The table shows the value of the Z-test for the persistence of funds' performance using several performance measures. The first measure is the funds' raw return. The second is the CAPM alpha, where the market portfolio is proxied with the value weighted index of all shares listed on the Milan Stock Exchange (Vw-MSE). The third is the CAPM alpha in which the benchmarks are the Vw-MSE and a portfolio of Italian government bonds (see the Appendix). The fourth is the APT alpha obtained with a 5 factor model estimated using exploratory factor analysis and the procedure suggested by Lehman and Modest (1988) (see the Appendix). The Z-test is the log of the odds ratio divided by its standard deviation, and is asymptotically normally distributed. The log of the odds ratio is $\log^{[(w,w*l,l)/(w,l*l,w)]}$ and its standard deviation is $\sqrt{(1/w,w)+(1/l,l)+(1/w,l)+(1/l.w)}$ where w indicates winners and l indicates losers. A fund is classified as a winner (loser) in each year if its performance is above or equal (below) the median of all funds with returns reported that year. Winner-winner (loser-loser) indicates the number of funds that are winners (losers) for two subsequent time periods. Winner-loser and loser-winner are defined accordingly.

Year	Net returns: z-test						Gross returns: Z-test					
	Raw returns	CAPM: MSCI Italy	CAPM: MSCI Italy and gvt. bon.	APT: 5-factor model	Fama-French 3-factor model	Carhart 4-factor model	Raw returns	CAPM: MSCI Italy	CAPM: MSCI Italy and gvt. bon.	APT: 5-factor model	Fama-French 3-factor model	Carhart 4-factor model
1987-88	0.95	0.95	0.95	1.29	1.67	1.67	0.56	1.29	0.95	2.00	2.00	2.00
1988-89	2.18	2.49	2.18	1.85	1.59	1.59	1.54	1.59	2.49	2.18	0.91	0.91
1989-90	2.22	2.23	2.23	0.57	2.76	2.76	1.68	3.25	2.76	1.69	2.76	2.76
1990-91	1.80	2.53	3.47	3.24	2.53	2.53	1.80	2.53	3.69	3.24	3.01	3.01
1991-92	3.29	2.16	-0.24	2.16	0.97	0.97	3.29	1.69	-0.73	1.69	0.97	1.45
1992-93	-1.35	0.45	0.90	0.90	1.35	1.35	-1.80	0.45	-0.45	1.35	1.35	1.35
1993-94	2.61	1.10	1.32	1.10	1.76	1.76	2.61	1.54	1.76	1.97	1.76	2.19
1994-95	-1.46	-0.79	-0.33	-2.05	-0.14	-0.14	-1.66	-1.43	0.33	-0.74	-1.02	-1.23
1995-96	4.21	1.66	2.89	4.57	3.65	3.46	4.02	1.25	2.49	5.21	2.87	3.07
1996-97	-0.92	-0.95	0.50	-1.57	-0.75	-1.16	-0.71	-0.54	0.91	-1.36	0.29	0.29
1997-98	4.33	1.83	3.01	-2.03	3.20	3.40	4.68	3.00	3.01	-2.22	3.20	3.20
1998-99	-0.53	0.97	1.47	-1.62	0.00	0.00	0.53	0.97	1.23	-1.62	-0.49	-0.49
1999-00	2.29	1.29	0.77	3.01	0.52	1.03	2.54	2.04	2.04	3.01	0.52	0.00
Total	5.27	3.74	4.87	2.93	4.97	4.97	5.20	4.26	5.20	4.32	4.58	4.71

Table 3

EQUITY MUTUAL FUNDS' RETURNS PERSISTENCE WITH ABSOLUTE BENCHMARKS

The table shows the value of the Z-test for the persistence of funds' performance using absolute benchmarks. In the first column winners are defined as mutual funds which beat the Vw-Mse in a given year. In the second column winners are defined as mutual funds which beat the equally weighted portfolio including the Vw-Mse and a portfolio of Italian government bonds (see Appendix). In the third column winners are defined as mutual funds which have a positive alpha using the Vw-Mse as the benchmark portfolio. In the fourth column winners are defined as mutual funds which have a positive Jensen's alpha when the Vw-Mse and government bonds are used as the benchmark portfolios. In the fifth column winners are defined as mutual funds which have a positive alpha using the 5-factor APT model estimated with exploratory factor analysis, using the procedure suggested by Lehman and Modest (1988). The Z-test on the cross product ratio is defined in Table 2, and is asymptotically normally distributed.

Year	Net returns: Z-test							Gross returns: Z-test						
	Raw returns		Risk-adjusted returns					Raw returns		Risk-adjusted returns				
	MSCI Italy	MSCI Italy and gvt. bonds	CAPM: MSCI Italy	CAPM: MSCI Italy and gvt. bonds	APT: 5-factor model	Fama-French 3-factor model	Carhart 4-factor model	MSCI Italy	MSCI Italy and gvt. bonds	CAPM: MSCI Italy	CAPM: MSCI Italy and gvt. bonds	APT: 5-factor model	Fama-French 3-factor model	Carhart 4-factor model
1987-88	-0.14	0.12	0.68	0.96	0.00	0.95	0.56	0.65	0.15	1.65	1.00	-0.72	1.76	1.76
1988-89	2.26	1.56	2.62	2.46	0.79	1.84	1.97	0.63	1.83	0.85	0.59	-0.14	0.52	0.52
1989-90	0.52	1.66	2.96	2.21	1.50	2.49	2.49	0.95	1.08	2.85	2.81	1.60	2.68	2.68
1990-91	2.36	2.26	1.88	2.28	1.52	1.23	1.23	2.36	0.83	0.69	1.28	0.48	1.61	1.61
1991-92	-0.16	1.20	-1.05	0.26	1.85	-0.27	-0.27	0.21	0.96	-0.96	-0.09	1.99	-0.24	-0.32
1992-93	0.11	-1.43	-0.20	-0.43	-0.71	-0.47	-0.47	-1.51	-0.99	-1.37	-0.07	-0.21	-0.61	-0.70
1993-94	1.70	1.06	-0.93	0.10	-1.46	-1.09	-1.20	2.66	0.38	0.28	-0.12	-0.85	-0.29	-0.36
1994-95	-2.43	-0.92	-0.72	-0.27	-0.59	0.48	0.61	-1.85	-1.30	-0.64	-0.49	-0.21	0.17	0.32
1995-96	1.07	0.79	1.28	2.26	0.67	0.49	0.55	1.34	1.57	-0.18	2.39	0.97	0.44	0.79
1996-97	-1.81	0.01	-1.66	-1.26	1.10	-0.03	-0.49	-1.91	-1.39	-0.55	-1.10	1.72	0.92	0.68
1997-98	5.08	2.51	3.06	1.08	1.00	3.26	3.26	5.94	2.86	2.67	2.84	1.40	2.86	3.29
1998-99	1.09	2.42	1.36	1.82	2.20	0.91	1.50	1.69	2.43	1.37	1.99	2.43	1.98	1.89
1999-00	0.84	2.35	1.17	1.17	2.11	-0.11	-0.21	2.35	2.35	1.92	1.91	2.35	1.27	1.27
Total	4.76	6.38	4.56	6.91	4.77	1.25	1.22	5.08	4.39	2.28	5.72	3.10	0.83	0.96

6. Why does performance persist?

In this section we analyze whether it is possible to identify some variables that predict the persistence of funds' net performance. In doing this we investigate the effect of funds' attributes as well as variables which are under the control of the fund manager on the probability to earn repeatedly abnormal returns. Previous research has found that persistence may be due only to one side of the distribution of performance, i.e. to repeated losers; therefore, we separately analyze the determinants of the probability to observe "positive persistence" (i.e. the probability that a fund is a winner conditional on being a winner in the previous period) and of "negative persistence" (i.e. the probability that a fund is a loser in any two subsequent periods).

To analyze the determinants of positive persistence, we estimate the following logit model using maximum likelihood:

$$\begin{aligned}\Pr(PERFW_{i,t}=1 \mid PERFW_{i,t-1}=1) = \mathrm{F}(&b_0 + b_1 SALES_{i,t} + b_2 REDEMPTIONS_{i,t} + b_3 SIZE_{i,t} \\ &+ b_4 AGE_{i,t} + b_5 TURNOVER_{i,t} + b_6 PERCOSTS_{i,t} \\ &+ b_7 INCFEE_{i,t} + b_8 NOLOADFEE_{i,t})\end{aligned} \tag{6}$$

where $PERFW_{i,t}$ is a variable which equals 1 if fund *i* is a winner in period *t* and equals 0 if it is a loser, and $\mathrm{F}(\cdot)$ is the cumulative logistic distribution.[20]

Sales of shares (*SALES*) should have a positive effect on the probability of being a repeat winner, as cash inflows can be reinvested into best performing stocks. The opposite is true for redemptions. The effects of cash inflows on positive persistence can be quite sizable if one considers that investors tend to chase top-performing funds (see footnotes 1 and 6). Moreover, recent evidence on US mutual funds shows that stocks purchased by funds have significantly higher returns than stocks they sell (Chen, Jegadeesh and Wermers, 2000).

The next variable we consider is the size of the fund (*SIZE*), measured by the fund's net assets value (NAV) at the beginning of the period in which persistence is measured. *SIZE* might influence the probability to earn consistently abnormal returns in two opposite ways: small funds might have an advantage over large funds in that they might exploit more easily individual stock selection and market timing opportunities without altering market prices. However, large funds might be able to bargain lower transaction costs on their trades and might be able to buy (or produce) better quality research.

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[20] Function F is defined as: $\Pr(Y_{i,t}=1) = e^{b_0 + B' x_{i,t}} / (1 + b_0 + B' x_{i,t})$.

Among the regressors we also include the age of the fund (*AGE*), expressed in years since fund inception. Older funds might benefit from their experience, which allows them to earn consistently superior returns: for example, the fund staff might have built over time close links with the management of firms whose shares are owned by the fund, so as to have access to higher quality information on firms' performance; moreover, long customer relationships with brokers might result in lower transaction costs. However, fund managers might find it easier to take advantage of good investment opportunities by establishing a new fund, rather than by radically changing the investment policy of an existing funds.

We also examine the effect of the fund's portfolio turnover (*TURNOVER*). If managers trade more to take advantage of their superior information, higher turnovers should be associated with abnormal positive performance. However, it is also possible that a higher turnover determines only higher transaction costs, thus decreasing the probability to be a repeated winner or increasing the probability to be a repeated loser.

The remaining variables are all related to other types of fund expenses.[21] Periodic costs (*PERCOSTS*) include all costs regularly incurred by the fund: management fees, bank custody fees and a residual item ("other costs"). The variable is calculated as a percentage of NAV. A negative relation between *PERCOSTS* and the probability to earn consistently abnormal returns would indicate that repeated winners (losers) are funds paying lower (higher) fees. A positive relation would be consistent with the hypothesis that, because of intense competition in the industry, winners can keep their relative position only if they are willing to incur remarkably higher information costs. *INCFEE* is a dummy variable that is equal to one if the management company charges the fund an incentive fee.[22] Since management effort should be higher for funds with incentive fees, we expect *INCFEE* to have a positive relation with the probability of repeated outperformance and a negative relation with the probability of repeated underperformance. Finally, *NOLOADFEE* is a dummy variable that is equal to one if the fund does not charge shareholders either front-end loads or back-end loads. If loading fees are used to dissuade redemptions (Chordia, 1996), reducing fund's cash holdings and leaving more room to manoeuvre to managers, no load funds should be less likely to be repeat winners (controlling for all the other variables).

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[21] In unreported preliminary estimates we also included among the regressors a dummy variable equal to one if the fund's managing company is controlled by a bank. The dummy was never significant (either for positive persistence or for negative persistence) and was discarded.

[22] In Italy incentive fees typically are never-negative and centered around an index (not around zero).

Finally, since we are analyzing the probability of relative persistence, we standardize *SIZE*, *AGE*, *TURNOVER* and *PERCOSTS* in each year by their median value (e.g., $SIZE_{it}$ is the NAV of fund *i* in year *t* divided by the median of NAV in year *t*).

The first column of Table 4 reports the estimates of the coefficients of equation (6), as well as the *p*-values of the estimates. Relative performance is measured by the Jensen alphas estimated using Fama and French's 3-factor model. Returns are net of transaction costs, fees and operating expenses (but are gross of any sales charges).

Not surprisingly, the effect of gross inflows on the probability of a fund being a repeat winner is positive and strongly significant. Redemptions instead have a negative effect, although it is not significant at the 10 percent level. Larger funds are less likely to repeat outperformance, but the opposite is true for older funds, suggesting that learning effects and customer relationships with brokers play a role once the other factors have been taken into account. Portfolio turnover tends to reduce the probability of positive persistence, but its effect is not significant at the 10 percent level. The positive relation between repeated outperformance and periodic costs indicates that, among the best performing funds, higher manager compensation is on average associated with superior ability. The coefficient on incentive fee dummy is also positive, but it is not significant at conventional levels. No effect is detectable for the no load fund dummy.

Brown and Goetzmann (1995) suggested that the fact that mutual funds' performance persists only in some years might indicate not only that it is due to the relative ability of individual managers, but also that it is a group phenomenon, ascribable (at least partially) to market wide factors.[23] In order to further investigate this hypothesis, we re-estimated the probit adding both year dummies and two regressors, which we consider the most natural candidates to capture the effect of market-wide factors: stock market volatility and the equity excess return in each year. The results of the regressions are reported in the second column of Table 4. Persistence is positively affected by an increase in the excess return on equities and negatively by a rise in market volatility, and both effects are significant.

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[23] Brown and Goetzmann (1995) suggest that the fact that persistence is correlated among funds might be due to herding behaviour among managers or to correlated dynamic portfolio strategies.

Table 4

DETERMINANTS OF POSITIVE PERSISTENCE OF MUTUAL FUNDS RELATIVE PERFORMANCE

Logit estimates of the probability that the relative performance of Italian equity funds shows positive persistence. Relative performance is assessed on the basis of net returns (see the Appendix for data description) and is adjusted for risk through Fama and French's 3-factor model. The estimation method is maximum likelihood. The dependent variable is 1 if the fund is a winner both at time t-1 and at time t and 0 if the fund is a winner in t-1 and a loser in t. Size is the lagged value of the fund's total net assets. Turnover is equal to the minimum between purchases and sales of equities, divided by the value of the fund's equity portfolio. Management fees is the ratio between fees paid by the fund to the managing company and the fund's total net assets. Incentive fee is a dummy variable equal to one if the fund pays incentive fees to the managing company. No load fee is a dummy variable equal to one if the fund does not charge entry or redemption fees. Age, size, turnover, and management fees are divided by their median values in each year. Market volatility is the standard deviation of the weekly returns of the shares traded on the Milan Stock Exchange. The excess return on equities is the difference between equity returns and the return on the three months T-bills. *p*-values are in square brackets. The *p*-value of the Hausman test is the probability of being wrong in choosing the fixed effect model instead of the pooling model.

	pooling without time dummies		pooling with time dummies		fixed effects without time dummies		fixed effects with time dummies	
Sales	0.0056	[0.00]	0.0038	[0.00]	0.0067	[0.00]	0.0022	[0.15]
Redemptions	-0.0010	[0.28]	-0.0019	[0.09]	-0.0012	[0.35]	-0.0032	[0.04]
Size	-0.1885	[0.00]	-0.1060	[0.07]	-0.3009	[0.00]	-0.1074	[0.35]
Age	0.5951	[0.02]	0.7739	[0.02]	2.5969	[0.01]	-1.7519	[0.36]
Turnover	-0.0997	[0.25]	-0.0666	[0.50]	0.0395	[0.80]	0.1179	[0.58]
Periodic costs	0.5645	[0.07]	0.5233	[0.15]	1.8019	[0.01]	-0.0631	[0.94]
Incentive fee	0.2569	[0.23]	0.1808	[0.47]	-0.1505	[0.79]	-1.4215	[0.06]
No load fee	0.1244	[0.66]	-0.0355	[0.91]	0.4753	[0.63]	0.3950	[0.72]
Stock market volatility			-0.6131	[0.03]			-2.1394	[0.00]
Stock Excess return			0.0231	[0.00]			0.0712	[0.00]
No. Obs.	511		504		456		456	
Pseudo-R	0.1214		0.2770		0.2031		0.5239	
Hausman test			0.0000	[1.00]				

Table 5

DETERMINANTS OF NEGATIVE PERSISTENCE OF MUTUAL FUNDS RELATIVE PERFORMANCE

Logit estimates of the probability that the relative performance of Italian equity funds shows negative persistence. Relative performance is assessed on the basis of net returns (see the Appendix for data description) and is adjusted for risk through Fama and French's 3-factor model. The estimation method is maximum likelihood. The dependent variable is 1 if the fund is a loser both at time t-1 and at time t and 0 if the fund is a loser in t-1 and a winner in t. Size is the lagged value of the fund's total net assets. Turnover is equal to the minimum between purchases and sales of equities, divided by the value of the fund's equity portfolio. Management fees is the ratio between fees paid by the fund to the managing company and the fund's total net assets. Incentive fee is a dummy variable equal to one if the fund pays incentive fees to the managing company. No load fee is a dummy variable equal to one if the fund does not charge entry or redemption fees. Age, size, turnover, and management fees are divided by their median values in each year. Market volatility is the standard deviation of the weekly returns of the shares traded on the Milan Stock Exchange. The excess return on equities is the difference between equity returns and the return on the three months T-bills. p-values are in square brackets. The p-value of the Hausman test is the probability of being wrong in choosing the fixed effect model instead of the pooling model.

	pooling without time dummies		pooling with time dummies		fixed effects without time dummies		fixed effects with time dummies	
Sales	-0.0020	[0.10]	-0.0022	[0.13]	-0.0008	[0.67]	0.0004	[0.91]
Redemptions	0.0033	[0.01]	0.0022	[0.11]	0.0039	[0.03]	0.0039	[0.42]
Size	-0.0271	[0.42]	0.0479	[0.29]	-0.0790	[0.16]	0.0246	[0.86]
Age	-0.1212	[0.72]	-0.6143	[0.20]	2.5269	[0.07]	7.0452	[0.18]
Turnover	0.1095	[0.42]	0.0020	[0.99]	0.2109	[0.44]	-0.1088	[0.86]
Periodic costs	0.1415	[0.76]	-0.3869	[0.52]	0.3555	[0.74]	1.0989	[0.52]
Incentive fee	-0.2445	[0.37]	-0.0566	[0.88]	-0.3054	[0.81]	-1.6866	[0.28]
No load fee	0.2898	[0.39]	0.6567	[0.13]				
Stock market volatility			0.3111	[0.69]			7.9184	[0.00]
Stock Excess return			0.0396	[0.02]			-0.4700	[0.00]
No. Obs.	312		292		241		241	
Pseudo-R	0.0538		0.3500		0.2515		0.7649	
Hausman test			145.86	[0.00]				

However, the two market-wide variables do not decrease the significance of the year dummies,[24] suggesting that other macroeconomic factors might influence persistence.

To check for the presence of fund heterogeneity not explained by the right-hand side variables, we also replicate the estimates by using Chamberlain (1980)'s conditional logit model. The Hausman test (reported in the last row of the table) strongly supports the pooling model.[25]

The methodology employed to analyze the determinants of negative persistence is similar to that used previously. In particular, we estimate the following logit model:

$$\begin{aligned}\Pr(PERFL_{i,t}=1 \mid PERFL_{i,t-1}=1) = \mathrm{F}(&b_0 + b_1 SALES_{i,t} + b_2 REDEMPTION S_{i,t} + b_3 SIZE_{i,t} \\ &+ b_4 AGE_{i,t} + b_5 TURNOVER_{i,t} + b_6 PERCOSTS_{i,t} \\ &+ b_7 INCFEE_{i,t} + b_8 NOLOADFEE_{i,t})\end{aligned} \tag{7}$$

where $PERFL_{it}$ is a variable which equals 1 if fund *i* is a loser in period *t* and equals 0 if it is a winner. The estimates of equation (7) (reported in Table 5) are much less clear-cut. As expected, redemptions increase the probability of being a repeat loser, but once we control for macro factors this effect is not anymore significant at the 10 percent level. The same is true for sales of shares, although in this case the effect is negative as expected. All other explanatory variables are not significant at the 10 percent level and the Hausman test clearly rejects the hypothesis of no unexplained heterogeneity left over. Quite interestingly, the coefficient of incentive fee dummy is always negative, although never significant. The incentive fee dummy is thus the only variable in addition to redemptions whose effect seems to be consistent across all model specifications. This result is suggestive of the fact that the pronounced convexity of the manager reward structure determined by never negative incentive fees in case of underperformance provides managers with a strong incentive to increase portfolio risks when they are doing very poorly relative to peers.[26] Also in the case of negative persistence, the inclusion of market wide factors does not substantially reduce the significance of the year dummies. However, in contrast with the result obtained for positive persistence, the coefficient of excess returns is negative and that of volatility is positive.

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[24] When we include volatility and the excess return among the regressors one of the calendar dummies cannot be estimated, since it becomes a linear combination of other variables.

[25] A detailed discussion of pooled and fixed-effect logit models for panel data can be found in Chamberlain (1980) and Greene (1993).

[26] Related evidence for US mutual funds can be found in Elton, Gruber and Blake (2001).

7. Conclusions

Our main empirical results can be summarized as follows:

a) the performance of Italian equity funds shows weak signs of persistence: although persistence is detected in some years, in the remaining periods of the sample we find some evidence of reversals, i.e. funds that had better than average performance in the past performed poorly in later periods. This result has been obtained using both net and gross returns, and therefore cannot be explained *only* by differences in funds' expenses (funds that perform systematically better than average are not just funds with lower expenses); our finding is robust to alternative methods to measure performance (using both raw returns and several definitions of risk adjusted returns) and to the use of relative rather than absolute benchmarks (although not for any model specification in the latter case). This evidence is analogous to that reported by Malkiel (1995) and Brown and Goetzmann (1995) for the US funds and is consistent with the paradigm of market efficiency.

b) The probability of positive persistence is higher for funds that attract huge net inflows, charge above average management fees and have been active for a longer period of time, while it is lower for larger funds. No significant effect can be ascribable to the proprietary structure of fund's managing company, fund's portfolio turnover, incentive fees or load charges.

c) The determinants of negative persistence are much harder to be detected. Losers recording substantial outflows are more likely to continue to perform poorly, but all other fund attributes are not significant at the 10 percent level.

d) In any case, even after controlling for all these funds' characteristics, persistence appears to be also a "group phenomenon", due to market wide factors.

Appendix

Data sources and the estimation of the factor scores

In this Appendix we briefly describe the data sources and the method used to construct the variables employed in the analysis.

Stock price indices. We used the MSCI value weighted index of all shares listed on the Milan Stock Exchange (MSCI Italy); the index chosen is computed assuming that net dividends are reinvested. Returns were calculated as the monthly logarithmic change in prices.

Government bond price index. The returns on Italian government bonds have been computed as simple average of the returns on the two most important categories of Italian government bonds - CCT's (*Certificati di Credito del Tesoro*, long-term floating-rate bonds) and BTP's (*Buoni Poliennali del Tesoro*, long-term fixed-coupon bonds). The indexes are the MTS total return indexes (i.e., adjusted for coupon payments) and were drawn from Thomson Financial Datastream. Returns were calculated as the monthly logarithmic changes in the total return index.

The risk-free rate is the rate of return on BOTs (*Buoni Ordinari del Tesoro*, Treasury bills); since the shortest maturity of the BOT is three months, returns were compounded back to yield one month rates.

The construction of the size, book-to-market and momentum factors. In order to mimic risk factors related to size, book-to-market and momentum, portfolios of shares were formed following the methodology described in Fama and French (1993). First, in June of each year (from 1984 to 1995) all the common shares (*azioni ordinarie*) listed at the MSE were ranked on size (the market value of each share multiplied by the outstanding number of shares) and then split into two groups: in the first group (small, henceforth S) have been included all the shares with size below the median, while in the second group (big, B) have been included the shares with size above the median. Second, the shares were split into three groups on the basis of the book-to-market ratio (BTM), i.e. the ratio between book equity and market equity (BE/ME): in the first group (low, L) have been included all shares in the bottom 30%, in the second (medium, M) the shares in the middle 40% and in the third (high, H) the shares in the top 30%. Third, the shares were split into three groups on the basis of the so-called "momentum", i.e. the return earned on the twelve months ending in December of the previous year: in the first group (bottom performers, Z) have been included all shares in the bottom 30%, in the second (intermediate performers, I) the shares in the middle 40% and in the third (top performers, A) the shares in the top 30%. Eighteen portfolios were then formed combining the previous size, BTM and momentum groups (S/L/Z, S/L/I, S/L/A, S/M/Z, S/M/I, S/M/A, S/H/Z, S/H/I, S/H/A, B/L/Z, B/L/I, B/L/A, B/M/Z, B/M/I, B/M/A, B/H/Z, B/H/I, B/H/A). For example, the S/L/Z portfolio

includes the shares that are small cap (S) and have a low book-to-market ratio (L) and a low momentum (Z). Monthly value weighted returns were then calculated for each portfolio from July of year t to June of year t+1. In each month the return on the portfolio which should mimic the SMB factor was then calculated as the difference between the simple average of the nine small portfolios and the simple average of the nine big portfolios:

$$r_{SMB} = \frac{1}{9}[(r_{S/L/Z} + r_{S/L/I} + r_{S/L/A} + r_{S/M/Z} + r_{S/M/I} + r_{S/M/A} + r_{S/H/Z} + r_{S/H/I} + r_{S/H/A}) - (r_{B/L/Z} + r_{B/L/I} + r_{B/L/A} + r_{B/M/Z} + r_{B/M/I} + r_{B/M/A} + r_{B/H/Z} + r_{B/H/I} + r_{B/H/A})]$$

A similar procedure was followed to obtain the returns on the portfolios mimicking the risk factors related to BTM and to momentum:

$$r_{HML} = \frac{1}{6}[(r_{S/H/Z} + r_{S/H/I} + r_{S/H/A} + r_{B/H/Z} + r_{B/H/I} + r_{B/H/A}) - (r_{S/L/Z} + r_{S/L/I} + r_{S/L/A} + r_{B/L/Z} + r_{B/L/I} + r_{B/L/A})]$$

$$r_{PR1YR} = \frac{1}{6}[(r_{S/L/A} + r_{S/M/A} + r_{S/H/A} + r_{B/L/A} + r_{B/M/A} + r_{B/H/A}) - (r_{S/L/Z} + r_{S/M/Z} + r_{S/H/Z} + r_{B/L/Z} + r_{B/M/Z} + r_{B/H/Z})]$$

The data on BTM are drawn from *Indici e dati*, a volume published every year by Mediobanca and containing accounting and market information on all Italian firms listed on the MSE. The data on shares' total returns and capitalization were drawn from the Bank of Italy share price database until 1994 and from Thomson Financial Datastream thereafter.

The estimation of the factor scores. The factor scores of the 5-factor benchmark were estimated using maximum likelihood factor analysis (MLFA). We first calculated the covariance matrix S of the monthly returns of the 76 shares which were continuously listed on the Milan Stock Exchange from January 1994 to October 2000. Subsequently, we used MLFA to decompose the covariance matrix into the 76 x 5 factor loading matrix G and the 76 x 76 residual risk matrix F:

$$S = \Gamma\Gamma' + \Phi .$$

The 76x1 vector of portfolio weights w_j for each of the 5 benchmark portfolios was then estimated using the Minimum Idiosyncratic Risk Portfolios (Mirp) procedure suggested by Lehmann and Modest (1988):

$$\underset{wj}{\text{Min}}\ w_j'\Phi w_j \qquad j=1,\ldots..,5$$

$$s.t.\ \ w_j'\Gamma_k = 0 \quad \text{for j} \neq \text{k}$$

$$w_j' i = 1$$

where ? is a vector of ones and G_k is the vector of the loadings of each security to factor k (i.e. the k-th column of the loading matrix G). The portfolio weights were then multiplied by the monthly excess returns on the securities to determine the monthly time series of the returns on the 5 benchmark portfolios (the factor scores).

Data on mutual funds. The data on mutual fund unit values, the value of dividends, distribution dates were drawn from the Bank of Italy mutual funds database and were cross checked with the data reported by *Il Sole 24-Ore*. Data on bank fees, management fees, incentive fees and on equities sales and purchases were drawn from the Bank of Italy's mutual funds data base, and were cross checked with the data published in the funds' annual reports (*Rendiconto annuale*). The fund's equity portfolio turnover (TOVER) was calculated as:

$$\text{TOVER} = \frac{\min\left(P_t, S_t\right)}{E_{t-1} + E_t}$$

where P_t is total purchases of equities and S_t is total sales of equities in period t and E_t is the value of the equity portfolio at the end of period t.[27] A fund is defined as part of a bank group if at least 50 percent of the capital of the fund's managing company is owned by one or more banks or by a company which is itself part of a bank group. No load funds are funds which charge neither entry nor exit fees. Funds with incentive fees are funds which pay to the management company an extra fee if the return on the fund's portfolio exceeds some given benchmark. In Italy, incentive fees are never negative.

Market volatility. Standard deviation in each two-year interval of the weekly returns on the MSCI Italy. The excess return on equities is the difference between the returns on the MSCI Italy and the return on the three months T-bills.

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[27] The results shown in the previous sections remain virtually unchanged if the portfolio turnover is calculated as $\text{TOVER}_t = \frac{\left(P_t + S_t - \left|NI_t\right|\right)}{NAV_{t-1} + NAV_t}$, where P_t is total purchases of securities, S_t is total sales of securities, NI_t is the net inflow in period t and NAV_t is the fund's net asset value at the end of period t.

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