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Style, Fees and Performance of Italian Equity Funds

by Riccardo Cesari and Fabio Panetta

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STYLE, FEES AND PERFORMANCE 0F ITALIAN EQUITY FUNDS

by Riccardo Cesari (*) and Fabio Panetta (**)

Abstract

Using a clustering procedure, we classify Italian funds *ex-post* on the basis of the composition of their portfolios and find that the optimal number of clusters is equal to 4. The four groups which result from the statistical classification closely match the 4-level aggregation of the 20 *ex-ante* categories used by the Italian mutual funds association.

We then estimate the risk-adjusted performance of Italian equity funds, using both net and gross returns and employing both one-factor CAPM benchmarks and multi-factor benchmarks. In addition to the standard Jensen's a, we measure risk-adjusted performance using the Positive Period Weighting measure (PPW), which is not influenced by managers' market-timing strategy. Using net returns (calculated after management fees and taxes but before load fees) the Italian equity funds' performance is not significantly different from zero. However, when the funds' performance is evaluated on the basis of gross returns (i.e. returns computed adding back management fees paid each year by the funds), the performance of the Italian equity funds is always positive. In particular, when both a 2-index benchmark that takes account of the funds' investments in government bonds and a 5-factor APT benchmark are considered, performance is positive and significant using both Jensen's a and the PPW. This result supports Grossman and Stiglitz's (1980) view of market efficiency, suggesting that informed investors (investment funds) are compensated for their information gathering.

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Contents

1. Introduction and main results[1]

Recent empirical work has challenged the traditional view on mutual funds' performance put forward by Jensen (1968). In his paper Jensen concluded that the risk-adjusted performance of mutual funds was inferior, after expenses, to the performance of the benchmark portfolio, and that, before expenses, mutual funds' performance was scattered randomly around the CAPM market line. Therefore, Jensen concluded that mutual fund managers have no private information. A different conclusion was reached by Ippolito (1989), who found that funds' risk-adjusted returns were positive after accounting for transaction costs and expenses. Furthermore, Ippolito found no evidence that higher management fees, expenses and turnover were associated with inferior net returns. These two contrasting views on mutual funds' performance are still widely debated in the literature and the issue of performance is still open, together with several related questions concerning the choice of benchmarks, the appropriate performance measure, the stability of the funds' risk profiles and objectives, the effect of managers' market-timing activity, and the effect of survivorship bias.

The analysis presented in this paper differs from previous work in several respects. First of all, we provide the first comprehensive study of the performance of Italian equity funds.[2] Second, our performance results are free of

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[1] We thank Richard Brealey and Evi Kaplanis for their helpful comments. We also benefited from the comments of the participants in the 1996 conference of the Association for Mathematical Applications in Social and Economic Sciences (AMASES). Gianni Zamboni, Roberto Gentili e Stefano Viaggi supplied useful information. Antonio Di Clemente and Cristina Ortenzi provided assistance in managing the data base.

[2] Owing to data limitations, the previous studies of Italian funds - see for example Panetta and Zautzik (1991), Ferretti and Murgia (1991) - analysed a small number of funds of different categories, focusing on short periods.

survivorship bias, since no fund disappeared from the Italian market, and our data set includes returns on all the equity funds in existence in Italy from 1984 to 1995. We analyse the risk-adjusted performance using both net returns (i.e. returns calculated after management fees and taxes but before load fees) and gross returns (i.e. returns computed adding back to funds' net returns the management fees paid each year by the funds) and using both CAPM benchmarks and multifactor benchmarks. Managers' market-timing ability is taken into account in two ways: first, we estimate the Treynor and Mazuy (1966) and Henriksson and Merton (1981) measures of market timing; second, we estimate the Positive Period Weighting (PPW) measure suggested by Grinblatt and Titman (1989b), which is not influenced by managers' attempts to time the market. Our main empirical results can be summarised as follows.

(a) Using a cluster technique, we classify Italian mutual funds *ex-post* on the basis of their portfolio holdings from 1986 to 1994. We find that the optimal number of different categories is four. Our *ex-post* statistical classification closely matches the 4-level aggregation of the 20 *ex-ante* categories used by Assogestioni (the Italian mutual funds association). We identify the four statistical categories as Italian equity funds, Italian bond funds, international equity funds and international bond funds.

(b) As a proportion of Net Asset Value (NAV), the total expenses paid by the Italian funds increased from 1.55 to 1.61 per cent between 1987 and 1995. The increase was entirely due to the rise in management fees (the largest component of total expenses) from 1.08 to 1.33 per cent for the industry as a whole and from 1.20 to 1.44 for Italian equity funds.

(c) Using net returns, we found that Jensen's alpha for Italian equity funds is approximately equal to zero and not statistically significant. However, when performance is evaluated on the basis of gross returns, the risk-adjusted performance of Italian equity funds is always positive; when both a 2-index benchmark that takes account of fund investments in government bonds and a 5-factor APT benchmark are considered, performance is positive and significant using both Jensen's α and the PPW. This result is consistent with that of Ippolito (1989) for US funds, and supports Grossman and Stiglitz's (1980) view of market efficiency, suggesting that informed investors are compensated for their information gathering.

(d) The timing coefficients are rarely positive and significant, suggesting that fund managers do not successfully anticipate market-wide movements for both the bond market and the equity market.

(e) Grinblatt and Titman's performance measure (the PPW) broadly confirms the results obtained using Jensen's alpha. Using the same benchmark, the cross-fund correlation between the alpha and the PPW is approximately equal to 90 per cent. Using the same performance measure but different benchmarks, the (simple and rank) correlation coefficient between the estimates is still high, ranging between 85 and 94 per cent, thus confirming only in part the results obtained by Grinblatt and Titman (1994) for US funds.

The organisation of the paper is as follows: in Section 2 we review the main contributions of the literature on funds' performance; in Section 3 we describe the cluster technique used to classify funds; in Section 4 we describe the method used to compute funds' gross returns and the evolution of the expenses for the whole sector; in Section 5 we estimate the risk-adjusted performance of equity funds. In the three appendices we discuss the details of the cluster analysis, the computation of gross returns and the sources of the data.

2. Review of the literature

Thirty years of research on the performance of mutual funds has resulted in the accumulation of several theoretical issues and a large body of conflicting evidence. A complete review of the subject would require a separate paper;[3] therefore, in this section we shall consider only the main contributions on mutual funds' performance, proposing an interpretation of the literature in terms of (i) methodological problems and (ii) empirical results and their explanation.

2.1 Methodological issues

From a methodological point of view, since the path-breaking papers by Treynor (1965), Sharpe (1966) and Jensen (1968), the CAPM has become the standard framework for performance measurement.[4] Jensen suggested the alpha parametrization to measure funds' risk-adjusted performance.[5]

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[3] A survey of the literature on the performance of mutual funds can be found in Shukla and Trzcinka (1992) and Ippolito (1993).

[4] Alternative methodologies, making use of portfolio composition, have been suggested by Cornell (1979), Grinblatt and Titman (1989a, 1993), Elton and Gruber (1991).

[5] With respect to the Treynor measure and Sharpe's "reward-to-volatility" ratio, Jensen's alpha has the advantage of exploiting regression estimation and testing procedures. However, Shukla and Trzcinka (1992) show that all three measures are highly correlated in terms of fund ranking.

Treynor and Mazuy (1966) raised the issue of the consequences of a short-term tactical adjustment of a fund's risk profile according to its managers' expectations of bull and bear markets and suggested a quadratic regression framework to take account of managers' timing strategies. Fama (1972) decomposed total performance into two components: selectivity (i.e. the ability to choose the best-performing shares) and market timing (i.e. the ability to forecast the performance of the entire market). Grant (1977) showed that ignoring managers' timing strategies would bias mutual funds' performance measures downward. Merton (1981) and Henriksson and Merton (1981) provided an alternative measure of market timing, based on managers' ability to forecast the sign (not the magnitude) of the market's excess return. The models of Treynor and Mazuy (1966) and Henriksson and Merton (1981) have been generalised by Admati, Bhattacharya, Pfleiderer and Ross (1986) and Jagannathan and Korajczyk (1986), respectively. The latter show that continuous trading (dynamic hedging) and investment in option-like assets (such as equities of highly levered companies) could create artificial (negative) market-timing and non-information-based beta changes. Grinblatt and Titman (198933) suggested an alternative measure - the Positive Period Weighting measure (PPW) - which is not influenced by managers' timing behaviour.

Merton's (1973) extension of the CAPM to an intertemporal setting resulted in the inclusion of additional hedging components in the equilibrium equation. The inclusion of other risk factors in addition to the market portfolio stems from the empirical work of Black, Jensen and Scholes (1972), Blume and Friend (1973), Fama and MacBeth (1973). The issue of defining the market portfolio and choosing an efficient benchmark was raised by Roll (1977, 1978) in the context of CAPM tests and promptly spread into the performance literature along with the diffusion of Ross's (1976) arbitrage pricing theory.

Using both CAPM and APT, Lehmann and Modest (1987) and Grinblatt and Titman (1994) showed that different performance measures yield similar inferences when the same benchmark is used; on the other hand, inferences differ considerably when different benchmarks are used, even when the performance measure is the same. Therefore, a positive performance could simply reflect the inefficiency of the chosen benchmark, rather than managers' skill (see also Roll, 1977; Dybvig and Ross, 1985b). Grinblatt and Titman (1989a, 1989b) restated the problem and showed that in order to detect superior ability of fund managers, the benchmark portfolio has to be mean-variance efficient only with respect to uninformed investors. In other words, the benchmark portfolio should result in a zero alpha for other passive market portfolios in order to provide unbiased performance measures. This solution, however, is no longer valid if managers have market-timing ability with respect to the uninformed observer. This, in fact, would induce skewness in the distribution of portfolio returns and apparent inefficiency with any mean-variance approach (Dybvig and Ross, 1985a).

2.2 *Empirical issues*

Gross/Net performance. Earlier empirical work on mutual funds' performance was conducted under the embarrassing alternative of irrational investors wasting money by investing in funds with significantly negative performance on the one hand and inefficient capital markets dominated by managers systematically beating the market portfolio on the other. Jensen's (1968) result was in favour of the first alternative:

the risk-adjusted annual performance of a sample of 115 US mutual funds appeared inferior, after deducting expenses, to the performance of the benchmark portfolio, whilst before expenses it was statistically equal to zero. Mains (1977) reversed Jensen's results using monthly data, instead of annual returns. In a subsequent paper, Ippolito (1989) found that the risk-adjusted net performance (i.e. net of fees and expenses) of a sample of 143 US mutual funds was comparable to that of the chosen benchmark, so that managers were compensated for their information gathering, in accordance with Grossman and Stiglitz's (1980) definition of market efficiency with costly information. In other words, mutual funds beat the market before expenses but not after management costs and turnover costs had been deducted from returns. Superior ability requires, on average, greater expenses. Similar results were obtained by Grinblatt and Titman (1989a) and Droms and Walker (1996). Elton, Gruber, Das and Hlavka (1993) argue that Ippolito's conclusions are due to the choice of an inefficient benchmark and that, after taking account of mutual funds' holdings of non-S&P500 securities, Ippolito's conclusions are reversed. A similar result of underperformance (both gross and net of expenses) was obtained by Malkiel (1995) using a sample of US equity funds.

Market timing and selectivity. Treynor and Mazuy (1966) found that the managers of a sample of 57 funds had no significant timing ability. Kon and Jen (1979), using switching regressions for 49 mutual funds, detected multiple levels of the funds' betas, and therefore indirect evidence of timing activity. However, managers' attempts to time the market appear to have no significant effects on funds' performance - see, for example, Treynor and Mazuy (1966), Kon (1983), Chang and Lewellen (1984), Henriksson (1984). In fact, most managers seem to follow a *perverse* timing strategy (i.e. have a negative market timing) as in Chen and Stockum (1986), Cumby and Glen (1990), Chen, Lee, Rahman and Chan (1992).

Henriksson (1984), Breen, Jagannathan and Offer (1986) and Lee and Rahman (1990) show that ignoring the heteroskedasticity of the error term induced by managers' timing strategy would bias the market-timing measure toward significant negative results. This implies that WLS, GLS or some other heteroskedasticity-consistent estimation method (White, 1980) is required. Alternatively, bootstrap t-ratios should be used (Cumby and Glen, 1990). A negative correlation is generally found between market timing and selectivity, implying a trade-off between different skills or, alternatively, a case for artificial market timing. Connor and Korajczyk (1991) find evidence of spurious market timing induced by option features in funds' portfolios (costly puts and dynamic hedging) changing the beta without any active timing or selection ability on the part of managers.

Survivorship bias. Brown, Goetzmann, Ibbotson and Ross (1992) have shown that if only superior performers survive (i.e. if low performers are abandoned by investors and pushed out of the market) then performance measures are upward biased. Interest in data-sets which are free from survivorship bias has increased recently - see for example Carhart (1995), Malkiel (1995), Elton, Gruber and Blake (1995), Gruber (1996). However, the bias could actually be negligible, since the selection mechanism would not operate fully: in fact, Sirri and Tufano (1992) find that investors reward funds that perform well, but do not penalise those that perform poorly. Moreover, they show that investors' entry/exit decisions depend on raw rather than risk-adjusted performance.

3. Classifications of mutual funds

Our data-set includes all the Italian mutual funds in operation from June 1984 to June 1995.[6] In total, 410 funds are considered. For each fund the basic information includes the fund's name, the investment objective and the management company. We also collected data on each fund's portfolio composition, Net Asset Value (NAV), dividend distributions and distribution dates.

In order to make meaningful comparisons, funds must be classified into homogeneous categories. Two classifications are used in Italy: the Bank of Italy's classification and the classification used by Assogestioni (the Italian mutual funds association). However, neither can be used *a-priori* for our objective. In fact, the Bank of Italy groups mutual funds into three main institutional categories (bond funds, balanced funds and equity funds) according to the funds' investment objectives stated in the prospectus, but does not distinguish funds which invest primarily in Italian securities from those which invest mainly in foreign securities, a distinction that has become increasingly important since the 1990 liberalisation of capital flows. The Assogestioni classification includes 20 different categories and distinguishes between Italian and international funds; however, this classification has been introduced only recently, and has been changed several times, to include 7, 14 and finally 20 groups. Furthermore, both classifications are only indicative, as managers can change a fund's investment policy. Therefore, we selected funds with similar investment objectives using a clustering procedure, in order to group

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[6] Mutual funds were introduced in the Italian financial system in 1984. Since then the number of operating funds and the volume of managed assets have grown very rapidly: at the end of 1995 in Italy there were 459 mutual funds with a combined Net Asset Value of 127 billion lire (approximately 7.2 per cent of GDP).

funds ex-post, on the basis of the asset composition of each fund at the end of each month from January 1986 to June 1995. The results of the cluster analysis suggest that the optimal number of clusters is four and that the categories which result from the analysis closely match the 4-level aggregation of the 20 Assogestioni categories into Italian equity funds, Italian bond funds, international equity funds and international bond funds.[7] However, given the close matching between the *ex-ante* Assogestioni classification and the *ex-post* statistical classification[8] (see Table A.2 in Appendix 1), in the empirical analysis of the following sections we chose to use the Assogestioni categories, since their public availability ensures that our results can be replicated.

In Table 1 we report summary statistics for each of the four categories of mutual funds obtained using the cluster technique: the number of funds, the NAV (in billions of lire) and total expenses, whose largest component is management fees, i.e. the fees paid each year by the fund to the asset management company *(Società di gestione).* The table shows the dramatic increase of the number of funds in the period under examination (from 41 in 1985 to 409 in 1995). Since 1990, the number of international equity funds has shown the largest increase; however, this category of funds recorded a less dynamic increase in terms of NAV, since it includes many small specialised funds with the highest level of total expenses as a percentage of NAV. The Italian bond funds have the largest average size (the average NAV was 640 billion lire in

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[7] The selection procedure and the results of the cluster analysis are discussed in detail in Appendix 1.

[8] A similar result was obtained by McDonald (1974) and Chen, Lee, Rahman and Chan (1992) by comparing the beta and stated investment objectives of mutual funds. The advantage of clustering is that the optimal number of categories can be tested empirically.

Table 1

SUMMARY STATISTICS

The figures reported in the Table are those of the Italian mutual funds which were active in June 1995. Funds are classified in 4 categories (Italian equity funds, International equity fund, Italian bond funds, International bond funds) according to the cluster technique discussed in Appendix 1. N is the number of operating funds at the end of each year. NAV is the annual average total net asset value (in billion lire) of the operating funds in each year. Expenses is the average value of total expenses (management fees, bank fees and taxes) paid by the fund, expressed as a percentage of the fund's NAV.

Year	Italian equity funds			Italian bond funds			International equity funds			International bond funds		
	N	NAV	Expenses	N	NAV	Expenses	N	NAV	Expenses	N	NAV	Expenses
1984	6	259	1.43	4	401	1.11	-	-	-	-	-	-
1985	20	6470	1.53	19	4758	1.31	2	119	1.43	-	-	-
1986	29	38489	1.55	27	13195	1.32	4	1063	1.45	-	-	-
1987	35	42942	1.69	32	23293	1.42	5	1615	1.39	-	-	-
1988	52	32770	1.71	44	19711	1.39	14	1362	1.57	5	191	1.20
1989	61	30059	1.82	53	16303	1.46	27	2344	1.70	8	587	1.86
1990	69	27791	1.76	67	17014	1.29	39	3283	1.82	9	486	1.70
1991	78	24155	1.74	72	24664	1.31	59	3911	1.80	12	791	1.74
1992	83	19011	1.76	81	33930	1.15	71	4127	1.79	20	2899	1.48
1993	88	20430	1.92	87	44114	1.22	85	8869	2.07	32	8234	1.50
1994	100	33665	1.80	102	65295	1.18	106	21969	1.97	46	12089	1.35
1995	109	33904	1.77	118	63497	1.14	125	20437	1.99	57	8717	1.42

1994) and the lowest expenses in relation to NAV (114 basis points in 1995). The Italian equity funds are about half the size of the bond funds, while their expenses have been 60 to 70 basis points higher in recent years. The expenses of (both Italian and international) equity funds have shown a tendency to increase, while those of the Italian bond funds have declined.

4. Costs and returns of Italian mutual funds

4.1 The computation of gross returns

In order to analyse performance correctly, funds' returns must be made comparable with those of the benchmarks. The first factor one has to consider is the effect of taxes: in fact, in Italy mutual funds receive bond coupons and equity dividends net of withholding taxes (12.5 per cent on coupons and 10 per cent on dividends). Therefore, in order to measure the returns on mutual funds and those on the benchmarks homogeneously, we estimated the funds' net performance using the returns on equity and bond benchmarks net of withholding taxes (see Appendix 3).

The second factor that we have considered is the effect of funds' expenses, in order to compute funds' net and gross performance. The returns computed on the basis of the funds' unit values are net of the expenses paid each year by the funds. These expenses are of three different types:

(a) bank fees i.e. the fees paid to the bank which acts as custodian of the fund's assets and which takes care of all the operations related to the fund's portfolio (e.g. coupon and dividend payments);

(b) *management fees,* i.e. the fees paid every year to the management company as a percentage of the fund's NAV. This item includes *incentive fees,* i.e. the extra fees that some of the funds pay to the management company if the return of the fund's portfolio exceeds a given benchmark;

(c) *trading costs:* this category includes stamp duty, bid-ask spreads and brokerage fees. The first component is included in the fund's annual report (the item "other expenses"), while the others are considered as a capital item and included in securities' prices (thus influencing performance directly), so that they cannot be isolated.

Since the available benchmarks' total returns are gross of custody and administration fees,[9] we calculated the monthly *net* returns of funds by adding back to their published returns" the bank fees described under (a) above, according to the methodology described in Appendix *2.*

Net returns, however, include both "output" and "price" components of the asset management service, since they are computed net of management fees. Therefore, in order to distinguish each component of the asset management service and evaluate managers' ability to obtain a positive performance *before* expenses, we calculated the *gross* returns of funds (the service "output") adding back to their net returns defined above the management fees described under (b).[11] In order to focus on the effect of funds' expenses, we decided to ignore

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[9] The total returns on the benchmarks are also gross of the trading costs due to the initial purchase of the benchmark and any subsequent trade. This implies a small bias against mutual funds in performance comparisons.

[10] I.e. returns corrected to take account of dividend payments.

[11] The methodology which has been used to compute monthly gross returns is described in detail in Appendix 2.

the effect of the extra taxes paid by Italian mutual funds as a percentage of their Net Asset Value (NAV), thus biasing our performance results against mutual funds.[12]

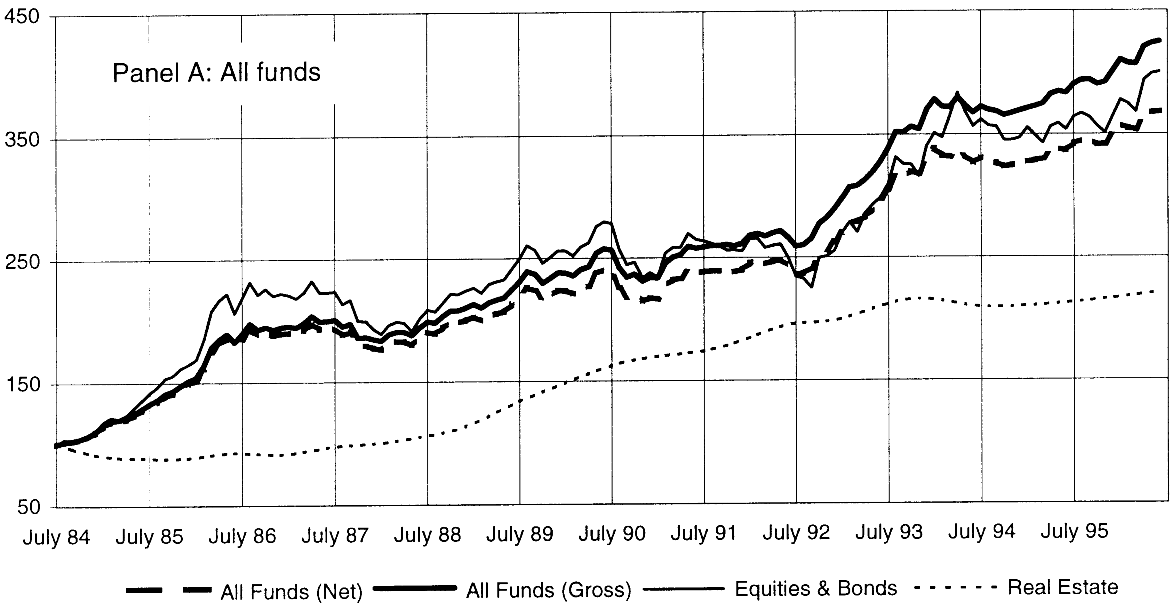
In order to appreciate the importance of the corrections described above, in this section and in Section 4.2 we briefly describe the magnitude of funds' expenses. Figure 1 (Panel A) compares for the period July 1984-June 1996 the index of the unit value of all the Italian mutual funds computed using gross returns (henceforth the "gross index") with alternative indices. First, we included the "net index" of Italian mutual funds. Second, we included an index representing the value of a portfolio formed in equal proportions by Italian equities and Italian government bonds.[13] Finally, we included a real-estate index computed by Nucci (1996). In June 1996 the value of 100 lire invested in mutual funds in 1984 was 368 lire, less than the value of 100 lire invested in the equity-government bond portfolio (approximately 400 lire) . However, when management fees are added back, the gross index had reached a value (425 lire) which was higher than that of the equity-government bond portfolio. In Panel B of Figure 1 we show the net and gross indices for the Italian equity funds, together with the value weighted index of all equities listed on the Milan Stock Exchange (Vw-Mse) and that of the equity-government bond benchmark. The evidence is very similar to that of Panel A: the

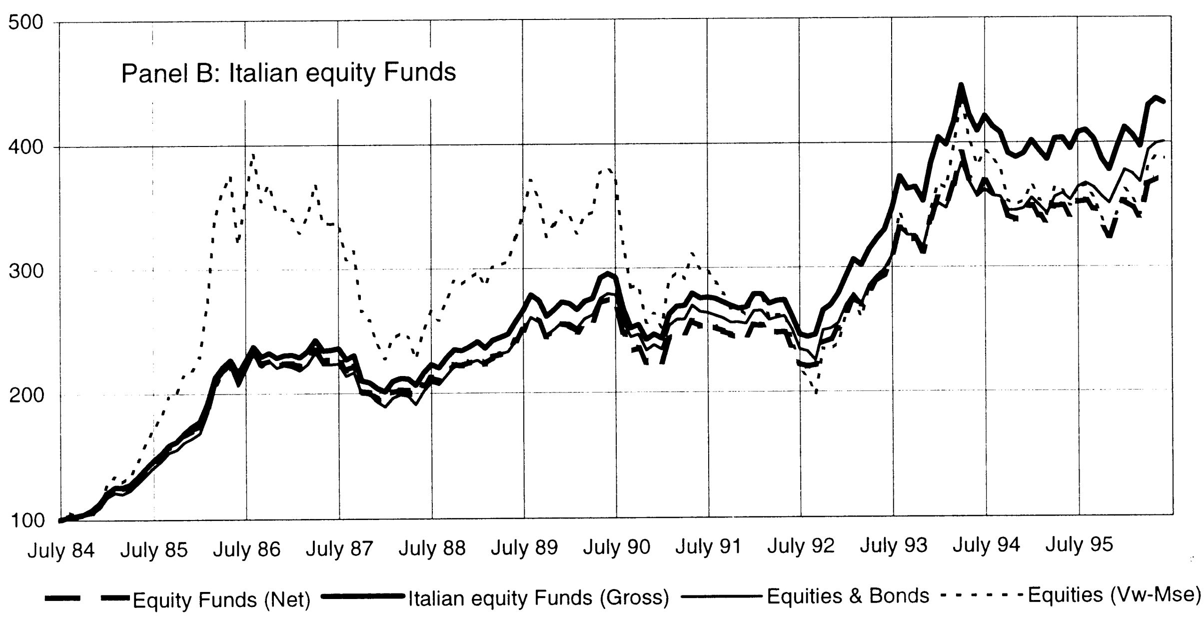
[12] Although in Italy the income received from mutual funds (both dividends and capital gains) is tax exempt for households, the latter pay a tax on the capital gains obtained from their investments in Italian funds indirectly. In fact, the funds pay a tax which is proportional to their NAV and equals 0.05 per cent of the value of government securities, bank deposits and bonds held in their portfolios, 0.10 per cent of the value of convertible bonds and shares issued by Italian manufacturing firms and 0.25 per cent of the value of all the remaining assets. On the contrary, no tax is paid by households on capital gains on bonds and equities held directly.

[13] The equity component of the portfolio is the value-weighted index of all the shares listed on the Milan Stock Exchange; for government bonds we used the Bank of Italy's BTP and CCT indices (see Appendix 3).

NET AND GROSS PRICE INDICES OF ITALIAN MUTUAL FUNDS

(July 1, 1984 = 100)





final value of the net index of equity funds (367 lire) is below that of equities (387 lire) and of the equity-government bond portfolio (400 lire); however, when management fees are added back, the gross index of equity funds outperforms the alternative indices, reaching a value of 432 at the end of June 1996.

Table 2 reports the continuously compounded gross and net yearly returns for each of the four statistical categories of Italian mutual funds. The table shows the large swings recorded by each category during the last thirteen years. In particular, for the equity funds the high variability of returns is influenced by the two world wide stock market crises of 1987 and 1990. For the bond funds the negative returns recorded in 1994 are mainly due to the monetary tightening which took place in the major economies: in that year, yields on American and German bonds jumped by more than 200 basis points, and those on Italian and Spanish bonds by as much as 400 basis points. In Figure 2 we report the holding period returns for 1 and 3-year horizons for the entire sector of Italian funds and for Italian equity funds only.

4.2 Cost dynamics and cost differences among funds

At an aggregate level, the main components of the costs paid each year by the Italian funds (bank fees, management fees and taxes) have shown different time patterns during the last decade (see Figure 3, Panel A): bank fees and taxes decreased, respectively, from 0.23 and 0.24 per cent of NAV in 1987 to 0.16 and 0.12 per cent in 1995.[14] Vice-versa, management fees rose steadily (from 1.08 per cent of NAV in

The reduction in tax payments was due mainly to the new regime introduced in 1992.

Table 2

NET AND GROSS RETURNS OF ITALIAN MUTUAL FUNDS

The figures are yearly averages of annualised monthly returns for. Funds are classified on the basis of a cluster technique (see Appendix 1). Net returns are the funds' returns computed including dividends and bank fees, while gross returns are net returns plus management fees (see Appendix 2). For 1984 and 1985 gross returns are partially estimated. The mean, standard deviation, skewness and kurtosis for the whole period 1984-1996 are also reported.

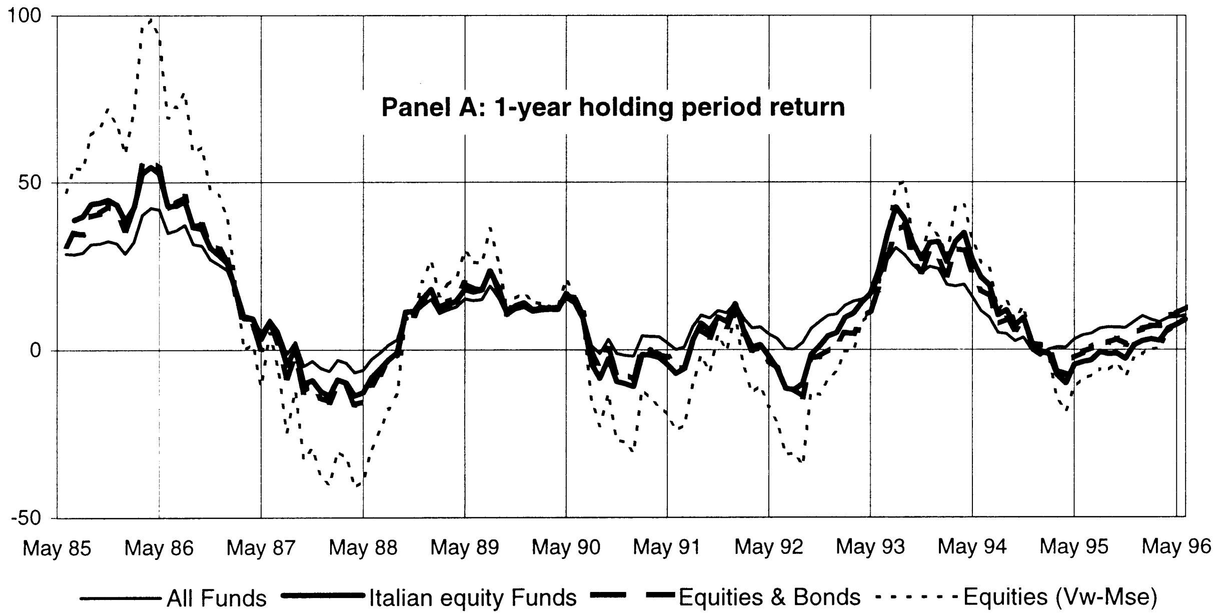
Year	NET RETURNS				GROSS RETURNS			
	Italian equity funds	Italian bond funds	Interna-tional equity funds	Interna-tional bond funds	Italian equity funds	Italian bond funds	Interna-tional equity funds	Interna-tional bond funds
1984	27.8	21.3			29.0	22.2		
1985	42.1	17.1	34.3		43.3	18.1	35.5	
1986	27.1	14.7	34.7		28.3	15.7	35.9	
1987	-13.6	4.8	-10.9		-12.3	5.8	-9.8	
1988	13.8	8.1	14.2	5.3	15.0	9.1	15.4	6.1
1989	12.6	8.9	12.0	3.6	14.0	9.8	13.4	4.8
1990	-11.4	10.1	-9.7	6.9	-10.1	11.1	-8.3	8.2
1991	7.0	11.0	8.8	11.0	8.3	12.0	10.3	12.4
1992	2.6	9.9	13.8	20.3	4.0	10.8	15.3	21.6
1993	30.2	17.5	32.9	23.5	31.9	18.6	34.8	25.0
1994	0.3	0.6	-4.4	-8.4	1.9	1.7	-2.5	-7.1
1995	-0.2	9.7	6.9	10.5	1.3	10.8	8.6	11.8
1996	15.7	9.5	6.9	-4.0	17.2	10.5	8.7	-2.7
mean	10.9	10.6	11.3	8.5	12.3	11.6	12.8	9.8
stand. dev.	41.4	9.7	37.4	20.8	41.4	9.6	37.4	20.8
skewness	-0.2	-0.1	-0.1	1.6	-0.2	-0.1	-0.1	1.6
kurt.	0.2	1.1	1.3	9.2	0.2	1.1	1.3	9.1

1987 to 1.33 per cent in 1995, with a peak of 1.42 per cent in 1993). The overall effect on total costs as a percentage of NAV has been a slight increase, from 1.55 to 1.61 per cent. Similar patterns emerge if one looks only at the Italian equity funds (see Figure 3, Panel B): management fees rose from 1.20 to 1.44 per cent of NAV, while total costs increased from 1.69 to 1.77 per cent. Vice-versa, the management fees of

Figure 2

HOLDING PERIOD RETURNS: ITALIAN FUNDS, ITALIAN EQUITIES AND EQUITIES-GOVERNMENT BONDS BENCKMARK

(continuously compounded yearly returns)



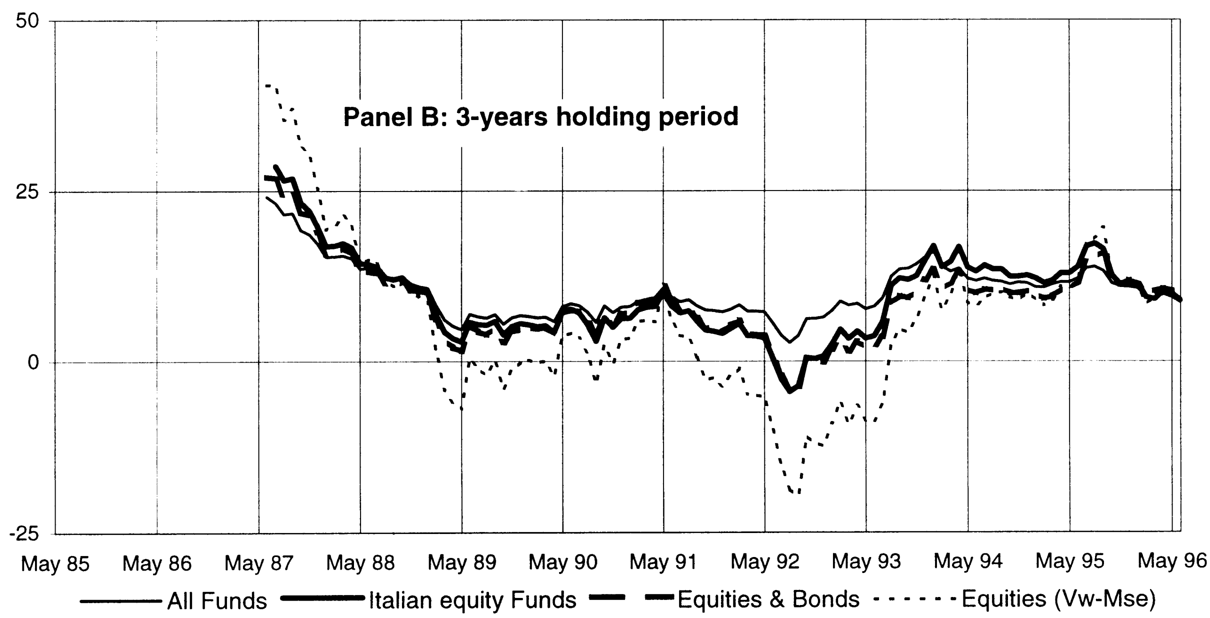
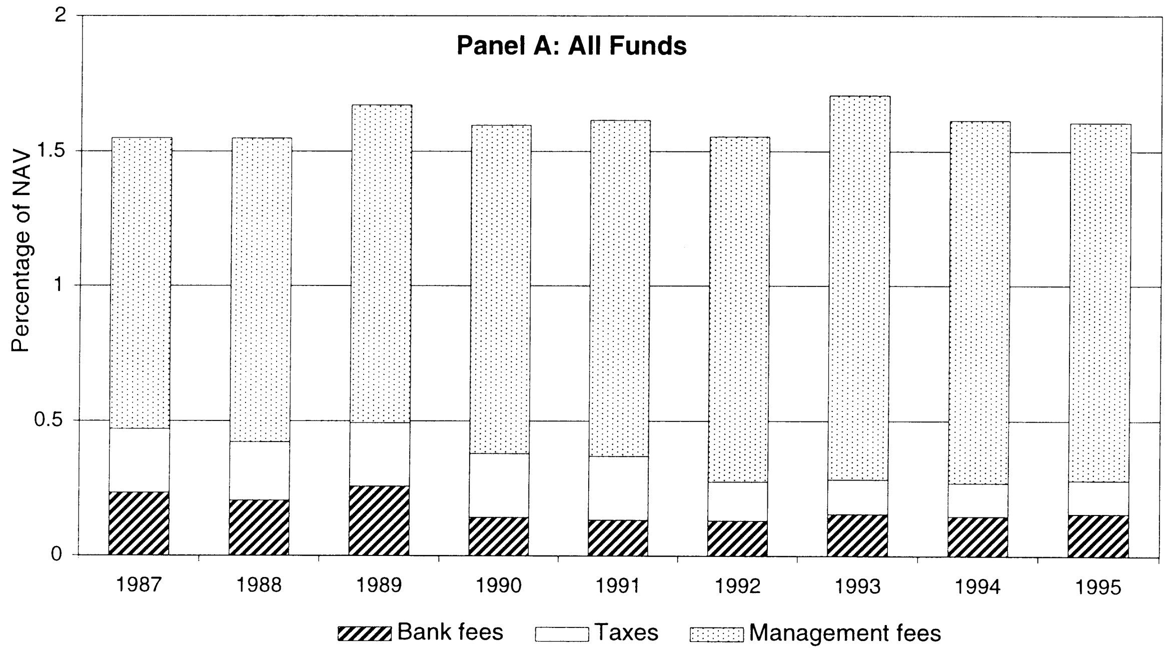
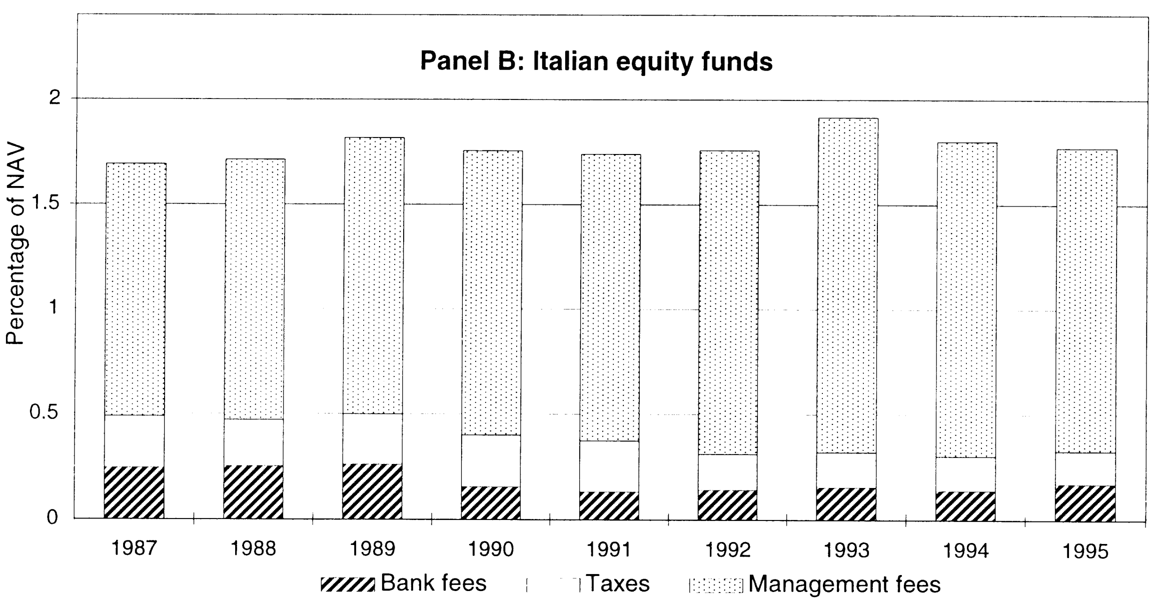


Figure 3

BANK FEES, MANAGEMENT FEES AND TAXES OF ITALIAN MUTUAL FUNDS

(percentages of Net Asset Value)





Italian bond funds remained approximately constant (0.97 per cent of NAV), so that their total costs fell from 1.42 per cent in 1987 to 1.14 per cent in 1995. For the entire sector, the standard deviation of the ratio of management fees to NAV increased from 0.29 in 1987 to 0.41 in 1995.[15]

The rise of management fees for the entire sector between 1987 and 1995 was influenced both by the revision of the fees charged by the funds which were operating in 1987 and by the pricing strategy and the characteristics of the new entrants. In order to separate these two effects, in Figure 4 we have compared the distribution of management fees in 1987 and in 1995, considering for the latter year both the entire sector (409 funds) and the subgroup which includes only the 72 funds which were operating in 1987. The distribution of the ratio of management fees to NAV in 1987 averaged 1.08 per cent (see Panel A) and had two modal values at 1 per cent (about half of the sample) and 1.22 per cent (18 per cent of the sample). The standard deviation was 0.29 per cent. In 1995 the management fees for the 72 funds were equal to 1.16 per cent of NAV, with a first mode at 1 per cent and an increased frequency at the second mode of 1.25 per cent; the standard deviation fell to 0.27 per cent, along with the total range, owing to the smaller number of outliers. Therefore, the increase of management fees is also confirmed for the group of 72 funds. As a proportion of total costs the growth of the management fees of the 72 funds is even more pronounced (from 71.3 per cent in 1987 to 82.4 per cent in 1995, a figure similar to that of the entire industry; see Figure 4, Panel

[15] As a percentage of total costs, bank fees decreased from 9.9 to 9.5 per cent between 1987 and 1995, while tax payments fell from 18.9 to 7.8 per cent. Consequently, the weight of management fees increased, reaching 82.6 per cent of mutual funds' total expenses in 1995.

B). In this case both the standard deviation and the range halved.[16]

In order to explain the differences across funds, we analysed the relationship between the ratio of management fees to NAV and the characteristics of mutual funds. Each fund was classified according to 13 criteria, and simple "dummy" models for the analysis of variance between sub-groups were tested for significance. In Table 3 we describe the 13 classification criteria and report the results of the statistical tests on the significance of the association between each pair. The analysis of the differences in management fees inside each subgroup is reported in Table 4.

As expected, the classification of the funds (determined on both the statistical and the Bank of Italy criteria) is associated with different management fees (see Table 4). In particular, the fees are higher for equity funds and for international funds, compared to bond and domestic funds. The distinction between the funds which distribute dividends and those which do not is also significant, although the latter are dominated by bond funds and the relation could be spurious. However, if cross-effects are considered, the management fees of the bond funds which do not distribute dividends are significantly higher than the fees of the remaining funds (1.08 as against 0.87 per cent on average). In terms of absolute and relative size, large funds are significantly less expensive than small funds. The former, however, are more often bond funds than equity funds (see Table 3), so that the significance is reduced if style is taken into account. The classification in terms of relative age (with respect to the annual median) is also significant,

16 Note that the panel distribution in 1995 does not adequately represent the universe of mutual funds if the ratio of management fees to NAV is considered, but it is similar (apart from more frequent outliers in the universe) if the ratio to total expenses is used.

Table 3

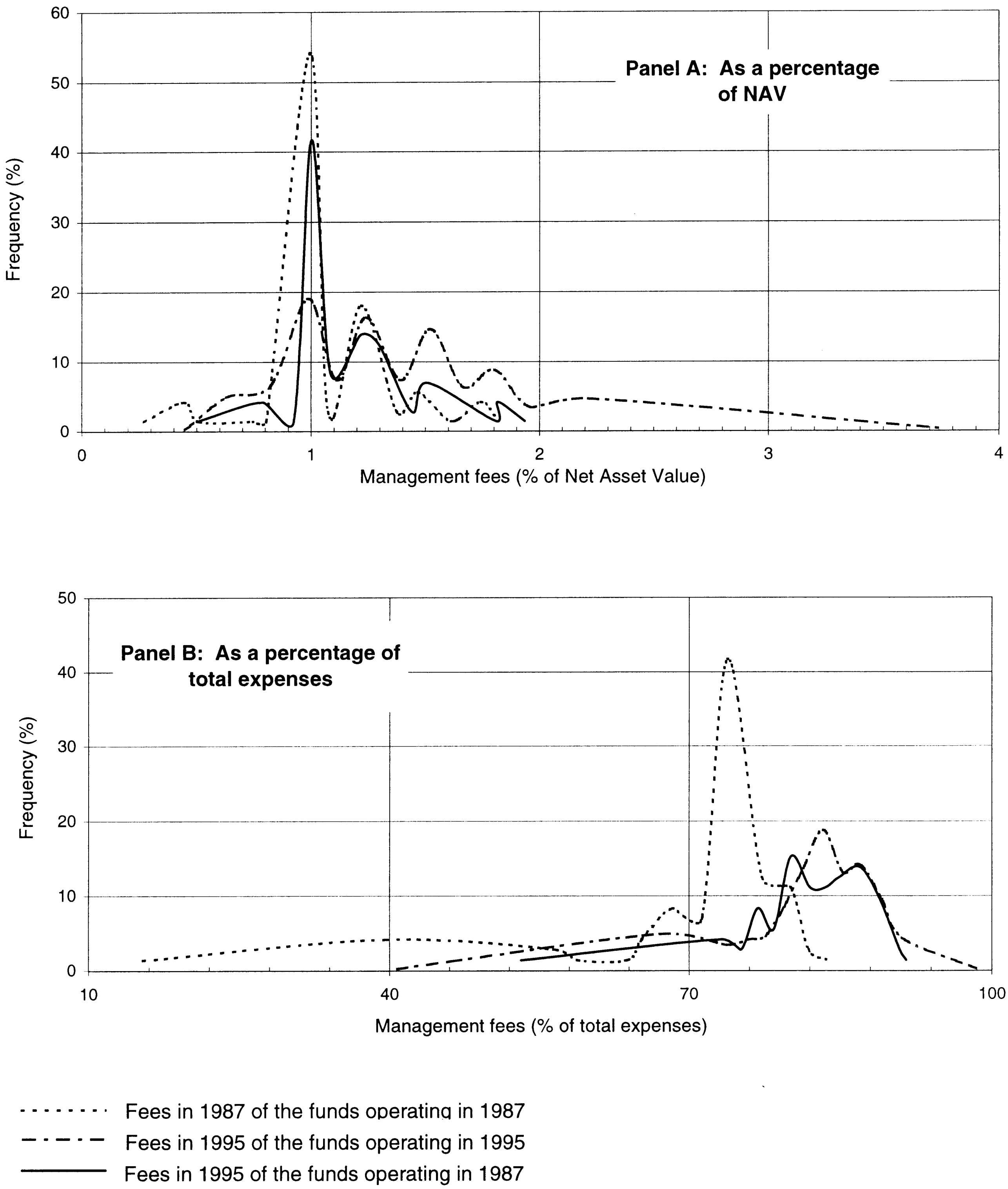
ASSOCIATION BETWEEN MUTUAL FUND CHARACTERISTICS

The table shows the sign and the degree of statistical association between each pair of mutual fund characteristics from 1987 to 1995 using the chi-square test and Kendall's tau test. The order in each case is given by the label (A, B, C,....) of the sub-groups. The symbol 0 means no association at the 5% level; + (-) means that the association is positive (negative) and significant at the 5% level. For example, the symbol - in cell (3,4) of the table means that dividend distribution is negatively associated with size. The following characteristics of Italian funds have been considered:

1. *Statistical classification:* C=Italian equity funds (A) or Italian bond funds (B); D=International equity funds (E) or International bond funds (F);
2. *Bank of Italy classification*: A=Equity funds; M=Balanced funds; O=Bond funds;
3. *Distribution of dividends*: C= funds which do not distribute dividends; D= funds which distribute dividends;
4. *Size:* G=large funds (NAV greater than 2,500 billion lire in 1994); P=small funds (NAV below 250 billion lira 1994); M=medium sized funds;
5. *Relative size*: G=large funds (above the 66th quantile of NAV); P=small funds (below the 33th quantile of NAV); M=medium size funds;
6. *Age*: V=old funds (4 years old or more); G=young funds (less than 4 years old);
7. *Relative age*: V=old funds (above the 66th quantile); G=young funds (below the 33th quantile); M=medium aged funds;
8. *Inflow channel*: B=over 50% of annual gross inflows through the banking system; S=other;
9. *Accumulation plans*: R=over 50% of gross inflows through accumulation plans; N=other;
10. *Incentive fees*: S = management fees include an incentive fee; N=no incentive fee;
11. *Bank funds*: B=the fund belongs to a bank group (at least 50% of the shares of the management company are held by banks); N=other;
12. *Group*: G=the managing company belongs to a group which participates in other management companies; N= other;
13. *Transfer of control*: T=mutual funds managed by companies that have been transferred to a different group; N=other cases.

Fund characteristics	2. Bank of Italy classification	3. Distribution of dividends	4. Size	5. Relative size	6. Age	7. Relative age	8. Inflow channel	9. Accumulation plans	10. Incentive fees	11. Bank funds	12. Group size	13. Transfer of control
1. Statistical classification	-	-	+	+	-	-	+	0	0	0	0	+
2. Bank of Italy classification		+	-	-	+	+	-	-	-	-	0	0
3. Distribution of dividends			-	-	+	+	-	-	0	-	-	0
4. Size				+	-	-	-	-	0	0	+	+
5. Relative size					-	-	0	0	-	+	+	0
6. Age						+	+	+	0	0	-	-
7. Relative age							+	+	0	-	-	-
8. Inflow channel								+	+	+	-	+
9. Accumulation plans									0	0	0	+
10. Incentive fees										+	-	0
11. Bank funds											0	+
12. Group size												+

ITALIAN MUTUAL FUNDS: FREQUENCY DISTRIBUTION OF MANAGEMENT FEES



showing lower fees for older funds. The latter, both in terms of absolute and relative age are usually larger funds (both in absolute and relative terms) but relative age is still

Table 4

DIFFERENCES IN MANAGEMENT FEES AMONG MUTUAL FUNDS

The table analyses the significance of the differences in management fees (in percentage of NAV) among the Italian funds in existence between 1987 and 1995. Funds are classified in sub-groups according to the criteria described in Table 3. The symbol *** means significance of all differences at the 5% level, taking into account the Bonferroni inequality for multiple comparison. The symbol A | B,C means that A is significantly different from B and C but B is not significantly different from C. For bimodal criteria we used the t test corrected for heteroskedasticity; in the other cases we used both the Kramer-Tukey and the Ryan-Einot-Gabriel-Welsch tests, obtaining the same results.

Fund characteristics	Management fees (percentage of NAV)				Test
1. Statistical classification	A=1.41	B=0.97	E=1.55	F=1,21	***
2. Bank of Italy classification	A=1.58	M=1.30		O=1.03	***
3. Distribution of dividends	C=1.34		D=0.95		***
4. Size	G=1.06	M=1.18		P=1.35	P | G,M
5. Relative size	G=1.17	M=1.35		P=1.35	G | M,P
6. Age	G=1.31		V=1.27		not sign.
7. Relative age	G=1.31	M=1.35		V=1.21	V | G,M
8. Inflow channels	B=1.20		S=1.37		***
9. Accumulation plans	N=1.29		R=1.35		***
10. Incentive fees	N=1.21		S=1.71		***
11. Bank funds	B=1.24		N=1.38		***
12. Group size	G=1.27		N=1.29		not sign.
13. Transfer of control	N=1.29		T=1.27		not sign.

significant when size is taken into account. The method of fund-raising used (i.e. through the banking system or by means of salesmen) is an important discriminating factor among mutual funds: distribution through the banking system is paired with lower management fees (1.20 as against 1.37 per cent of NAV) and lower bank fees (0.13 as against 0.18 per cent). The result is still true when allowance is made for fund style. The existence of accumulation plans is correlated with non-banking channels and its significance is due entirely to the channel type. The case of incentive fees is related, as expected, to the risk of the portfolio and it represents a significant factor in explaining differences in management fees. As in the case of distribution method, if a bank controls the management company of a fund there is a sizeable reduction in management fees (1.24 as against 1.38 per cent), possibly due to scope and scale economies inside the financial group. Bank fees are lower as well (0.15 as against 0.27 per cent).

5. Risk-adjusted performance measurement and results

The analysis of mutual funds' performance is based on the choice of the measure of performance and the risk adjustment model. In this work we use two measures of performance First, the standard Jensen (1968, 1969) a coefficient, which measures funds' risk-adjusted performance using the security market line. As is well known, Jensen's α is an unbiased measure of performance when the fund's manager has security-specific information but no timing information. Vice-versa, when the manager follows a successful timing strategy, Jensen's measure is usually downward biased and can be negative. Therefore, we also measure performance using Grinblatt and Titman's 1994) Positive Period Weighting measure (PPW), which is not influenced by the manager's timing strategy.

The Jensen measure. The alpha coefficient suggested by Jensen (1968, 1969) is equal to the difference between the excess return (risk premium) on the fund and the theoretical excess return which should have been earned by the portfolio, given its risk. If the portfolio's equilibrium return is defined by the CAPM, in the absence of timing ability Jensen's performance measure is equal to the intercept from the following time series regression:

$$(1) \qquad \tilde{r}_{it} - r_{ft} = \alpha_i + \beta_{im}(\tilde{r}_{mt} - r_{ft}) + \tilde{\varepsilon}_{it}$$

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 β_{im} is the fund's systematic risk, i.e. its sensitivity to the return of the benchmark. A positive alpha indicates superior performance, while a negative value indicates inferior risk-adjusted performance.

The choice of the benchmark model is not an easy one, since it presents both theoretical and empirical difficulties. In addition to the well-known work of Roll (1977, 1978), recent empirical research has shown that performance evaluation is sensitive to the choice of the benchmark – see for example Lehmann and Modest (1987), Grinblatt and Titman (1994). In a recent paper, Elton, Gruber, Das and Hlavka (1993) show that the results obtained by Ippolito (1989) using the S&P index to measure the performance of US mutual funds are reversed once proxies are introduced to take account of the fact that US equity funds hold non-S&P equities and bonds in their portfolios. A similar problem arises when one analyses the performance of Italian equity funds. In fact, in the period under examination the portfolio of Italian equity funds was only in part invested in equities, while a substantial proportion of the portfolio was invested in Italian government bonds: for example, in our sample period (from *1984* to 1995) the average monthly proportion of Italian equities for the whole portfolio was approximately equal to 60 per cent, while the proportion of Italian government bonds was 26 per cent.[17] In this study we control for the effect of non-equity securities in two ways: first, we employ government bond indices in addition to the standard equity benchmarks used in performance evaluation. Further checks have been performed to verify whether our results are influenced by funds' holdings of foreign stocks. In fact, although such investments are quite small, their variance might nonetheless influence the performance estimates. Second, we computed performance using a 5-factor model, where the factors should include non-equity variables.

The first model adopted to estimate a was the CAPM, using both the value-weighted return on all the stocks listed on the Milan Stock Exchange (Vw-Mse) - which is theoretically implied by the CAPM - and the equally-weighted return on all stocks listed on the Milan Stock Exchange (Ew-Mse). This choice was made because, owing to data limitations, our benchmark portfolio includes only risky *financial* securities, as is standard in the finance empirical literature, so that we have no guarantee that the chosen portfolio is *ex-post* mean-variance efficient.[18] A wider set of benchmarks therefore provides information on the robustness of the results.

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[17] The remaining 14 per cent of mutual funds' portfolio consisted largely of Italian corporate bonds, foreign securities and cash.

[18] To verify that benchmarks are not inefficient with respect to the uninformed investor (unconditional distribution), we calculated the α of the value-weighted index with respect to the equally-weighted Mse index and vice-versa, both with and without market-timing coefficients. In no case was the alpha statistically significant.

The second benchmark used to estimate the funds' alpha was obtained by including among the regressors the excess return on a portfolio of Italian government bonds (see Appendix 3):

$$(2) \qquad r_{it} - r_{ft} = \alpha_i + \beta_{im}(r_{mt} - r_{ft}) + \beta_{ib}(r_{bt} - r_{ft}) + \varepsilon_{it}$$

where r_b is the return on a portfolio of government bonds and β_{ib} is the sensitivity of the excess returns of fund *i* to the excess returns of the government bond portfolio. The choice of this two-index model can be justified on several grounds. One approach often used in the literature[19] is to consider the funds as a combination of three portfolios, equities, government bonds and the risk-free asset, so that the return on the fund is the weighted average of the returns on the constituent portfolios, with weights β_{im}, β_{ib}, and $1-\beta_{im}-\beta_{ib}$ 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, 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 the same risk.[20] Alternatively, one could justify equation (2) simply by assuming a two-factor equilibrium model, in which the (equally or value-weighted) return on stocks and the return on the portfolio of government bonds are the systematic factors.

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19 See, for example, Blake, Elton and Gruber (1993), Elton, Gruber, Das and Hlavka (1993).

20 We believe it is important to note that our choice to evaluate fund performance by considering the actual composition of the fund's portfolio implies a severe evaluation, since we are implicitly giving managers no credit for their global asset allocation choices, specifically for investing in government bonds instead of stocks, given that the Italian bond market outperformed the Italian equity market for a large part of our sample period.

The next model we used to control for the effect of non-equity securities was the Arbitrage Pricing Theory (APT), following an approach which has been extensively employed in the literature – see, for example, Lehmann and Modest (1987), Connor and Korajczyk (1991). On the basis of Panetta (1996), we estimated a 5-factor model, using maximum likelihood. The factor scores were estimated using the method suggested by Lehmann and Modest (1988).[21] The funds' α was subsequently estimated from the following time-series regression:

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

where r_k is the return on factor k and b_{ik} is the sensitivity of the excess return of fund i to the excess return of factor k.

Market timing. The foregoing analysis assumes that the manager's performance is entirely due to security-specific information. However, the manager could adopt a timing strategy, i.e. he could change the risk of the portfolio in response to his or her forecasts on market-wide returns. In this case, the alpha estimated from time series regressions is a downward-biased estimate of the manager's microforecasting ability. Therefore, the performance measurement literature has attempted to distinguish between security selection, i.e. the manager's microforecasting ability and market timing (macroforecasting).

In this work we used two different models which have been suggested in the literature. The first is based on the quadratic regressions of Treynor and Mazuy (1966) and Admati,

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[21] The data and the methodology used to estimate the factor scores in equation (3) are described in Appendix 3.

Bhattacharya, Pfleiderer and Ross(1986): if the fund's manager changes the portfolio's risk in response to anticipated changes of market conditions, increasing the β when the forecasted excess market return is positive and decreasing it in the opposite case, the fund's characteristic line will no longer be linear, and the beta in equation (1) becomes $\beta_{im}(t) = \beta_i + \gamma_i^{TM}(\tilde{r}_{mt} - r_{ft})$; the fund's risk-return relationship becomes:

$$(4) \qquad \tilde{r}_{it} - r_{ft} = \alpha_i + \beta_i(\tilde{r}_{mt} - r_{ft}) + \gamma_i^{TM}(\tilde{r}_{mt} - r_{ft})^2 + \tilde{\varepsilon}_{it}.$$

In equation (4) the term α_i is the manager's selectivity, while the term $\gamma_i^{TM}(\tilde{r}_{mt} - r_{ft})^2$ measures the market-timing component of performance. A positive value of γ_i^{TM} indicates that the manager has superior timing ability.

An alternative model for detecting market timing has been suggested by Merton (1981) and Henriksson and Merton (1981). The manager's market-timing ability is defined as the ability to anticipate whether the return on the risky asset will be higher or lower than the risk-free rate. The manager is assumed to choose between two different levels of risk, which depend on the probability he attaches to the market excess return being positive.[22] Therefore, the manager chooses, say, β_{i0} if $r_{mt} \leq r_{ft}$ and $\beta_i (> \beta_{i0})$ if $r_{mt} > r_{ft}$. If we define the dummy variable D_m=1 when $r_{mt} > r_{ft}$ and 0 otherwise, we can rewrite the Henriksson and Merton market-timing beta as:

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22 Henriksson and Merton (1981) show that their test is also applicable to the case in which the manager selects from more than two discrete systematic risk levels, chosen on the basis of different degrees of confidence in the forecasts.

$$\beta_{im}(t) = \beta_{i0} + (\beta_i - \beta_{i0})D_m \equiv \beta_{i0} + (\beta_i - \beta_{i0})\left[\frac{\max(0, r_{mt} - r_{ft})}{r_{mt} - r_{ft}}\right]$$

$$= \beta_i + (\beta_i - \beta_{i0})\frac{\max[0, -(r_{mt} - r_{ft})]}{r_{mt} - r_{ft}}$$

so that:

$$(5) \qquad r_{it} - r_{ft} = \alpha_i + \beta_i(r_{mt} - r_{ft}) + \gamma_i^{HM} \max[0, -(r_{mt} - r_{ft})] + \varepsilon_{it}$$

where $\gamma_i^{HM} = (\beta_i - \beta_{i0}) > 0$ indicates market-timing ability on the part of the manager.[23] Merton and Henriksson interpret timing ability as a put option on the market portfolio with exercise price equal to the risk-free rate, so that the return from market timing, $\max[0, -(r_{mt} - r_{ft})]$, is the payoff from the put option: in particular, in (5) the return of the fund is equal to the standard CAPM formula plus the value of γ_i^{HM} put options on the market return, which have a positive value whenever the return on the market is lower than the risk-free rate.

In the following analysis equations (4) and (5) are estimated using the models presented in equations (1), (2) and (3). Following Connor and Korajczyk (1991) and Shukla and Trzcinka (1992), the 5-factor model of equation (3) is estimated evaluating the managers' market-timing ability only for the first risk factor, i.e. including in the regressions the square term of equation (4) and the put term of equation (5) only for the first risk factor. Although there is no theoretical reason for this choice, adding extra (squared or put) terms for each of the risk factors would have resulted in a severe reduction of the degrees of freedom for several funds.

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[23] Equation (5) has been obtained by noting that max(0,x)= x+max(0,-x).

Our choice is also empirically justified by the high correlation which exists between the factor scores on the first factor and the returns on the market: from a practical point of view, our choice can be thought of as a simplification which allows us to estimate the manager's ability to forecast market returns, which we regard as the key variable. However, our choice has a negligible impact on the results.[24]

The positive period weighting measure (PPW). A different performance measure has been proposed by Grinblatt and Titman (1989b, 1994) to avoid the measurement bias induced by managers' timing strategy. Grinblatt and Titman (1989b) show that if w_{mt} is a weighting process orthogonal to the excess return of the market and formed by non-negative elements summing to 1, then asymptotically in T:

$$(6) \qquad PPW_i = \sum_{t=1}^{T} w_{mt}(r_{it} - r_{ft}) \xrightarrow{p} \alpha^* \geq 0$$

i.e. PPW is a consistent estimator of the manager's positive performance whenever the fund manager has selectivity and/or independent timing information. The same result holds even if timing and selectivity are correlated, provided the manager has constant absolute risk aversion. To make the PPW operational, we determine the weights following Cumby and Glen (1990). First, we normalise the investor's initial wealth to 1 and assume that he or she has a power utility function $U(W_t) = \frac{1}{1-\vartheta} W_t^{1-\vartheta}$. At the end of period t the investor's wealth is equal to $W_t = 1 + (1-\beta_m) r_{ft} + \beta_m r_{mt}$ and, under the null hypothesis of

24 For a subset of the funds we have repeated the regressions, including among the regressors the market-timing term for each factor, obtaining results similar to those shown below.

no superior information and stationarity of returns, the expected utility maximisation is:[25]

$$\max_{\beta_m} E[U(W)] \cong \max_{\beta_m} \frac{1}{T} \sum_t \frac{[1 + r_{ft} + \beta_m(\tilde{r}_{mt} - r_{ft})]^{1-\vartheta}}{1-\vartheta}$$

$$\frac{\partial E[U(W)]}{\partial \beta_m} = E[\frac{\partial U}{\partial W}(\tilde{r}_{mt} - r_{ft})] = \frac{1}{T} \sum_t \; [1 + r_{ft} + \beta_m(\tilde{r}_{mt} - r_{ft})]^{-\vartheta}(\tilde{r}_{mt} - r_{ft}) = 0$$

The required positive weights can be obtained from the first order condition:

(7) $$\sum_t w_{mt}(\tilde{r}_{mt} - r_{ft}) = 0$$

where $w_{mt} = \dfrac{[1 + r_{ft} + \beta_m(\tilde{r}_{mt} - r_{ft})]^{-\vartheta}}{\sum_t [1 + r_{ft} + \beta_m(\tilde{r}_{mt} - r_{ft})]^{-\vartheta}}$

and $\sum_t w_{mt} = 1.$

The PPW measure is strictly positive if the portfolio manager has selectivity skill, both with and without timing activity.[26] Under the normality condition and the null hypothesis of no superior information, a t-test for PPW is given by:

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25 In the case of a multiple benchmark β_m is a *vector* of portfolio holdings.

26 Grinblatt and Titman (1989b) have shown that Jensen's alpha is still a period-weighting measure, with weights orthogonal to the benchmark and summing to 1 (by OLS properties) but no longer positive. In particular, Jensen's measure gives negative weights to returns in bull markets (r_{mt} above average), downward biasing the performance measure for successful market timers. The Treynor and Mazuy and the Henriksson and Merton measures are also period-weighting measures, with a special correction for the assumed forms of beta variations.

(8) $$\frac{PPW_i}{s_\varepsilon \sqrt{\sum_t w_{mt}^2}} \sim t_{T-K-1}$$

where s_ε is the root mean square error of Jensen's regression and K is the number of benchmarks used to define mean-variance efficient portfolios.

Empirical results. In order to perform the analysis we required at least 36 months of data; we have therefore eliminated from the sample the funds which became active after June 1992. This choice reduced our sample to 82 equity funds. Descriptive statistics of the Italian equity funds used in this study are shown in Table 5. It should be noted that survivorship bias is not an issue in our case. Survivorship bias, in fact, arises if investors' withdrawals force 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 superior performance – see Brown *et al.* (1992). Our complete data set on Italian mutual funds allows us to study performance in the absence of survivorship bias, since during our sample period no Italian equity fund perished.

For each fund, the performance was estimated using both net and gross returns over the available sample period (the funds became active at different dates during the period). The performance for the whole sector was estimated constructing an equally-weighted portfolio including all the funds.[27] The t-

[27] Since the funds were active for a different number of months, the average alpha of the single funds is not equal to the alpha of the portfolio of funds. We chose to use the latter measure of aggregate performance since the regression framework allows us to perform statistical tests. However, the results are very similar to those obtained averaging the alphas of the single funds.

Table 5

SUMMARY STATISTICS: EQUITY FUNDS

The summary statistics refer to the Italian equity funds that were active for at least 36 months at the end of June 1995. Funds are classified as equity funds using cluster analysis (see Appendix 1). Net returns are the funds' annualised monthly returns calculated including the dividends and bank fees paid each year by the funds, while gross returns are net returns plus management fees (see Appendix 2). Equity return is the return on the value-weighted index including all stocks listed on the Milan Stock Exchange, adjusted for dividends and for changes in capital structure. Government bond return is the return on a portfolio of Italian government bonds (see Appendix 3). Size is the median Net Asset Value (NAV) of the funds in the sample expressed in billions of lire. Total fees is the median ratio of all costs (bank fees, management fees, taxes and "other expenses") paid by the funds in the sample to their NAV. Management fees is the median value of the fees paid by the funds to the management companies as a percentage of their NAV.

Year	No. of operating funds	Funds' return:		Equity return	Gov. bonds return	Funds' size	Total costs	Management fees
		net	gross					
1986	29	24.16	25.80	46.00	14.12	616	1.38	1.02
1987	35	-11.93	-10.92	-37.50	9.26	561	1.53	1.02
1988	52	12.94	14.08	20.30	9.47	174	1.46	1.09
1989	61	12.85	14.20	16.72	9.94	146	1.62	1.20
1990	69	-9.14	-7.35	-27.44	12.93	87	1.68	1.28
1991	78	5.74	7.18	-0.31	13.92	76	1.72	1.26
1992	82	2.10	3.20	-9.22	9.28	70	1.68	1.40
1993	82	30.01	31.51	37.43	20.51	89	1.77	1.45
1994	82	1.40	2.66	1.63	2.07	196	1.78	1.48
1995	82	0.58	1.83	-2.80	12.57	205	1.70	1.42

statistics have been obtained using White's (1980) heteroskedasticity-consistent standard errors procedure.

Table 6 shows the results for the funds' alpha estimated using equations (1) to (3); all the values are expressed as yearly continuously-compounded returns. For the entire sample, using net returns, the estimated alpha is always positive (between 7 and 109 basis points) although never significant. The results obtained by estimating the CAPM on the value-weighted and equally-weighted equity indices of the Milan Stock Exchange (Ew-Mse and Vw-Mse) are similar, both when only the stock market benchmarks are used and when government bonds are added to the regressions. The inclusion of the government bond index worsens the alpha by approximately 80 to 100 basis points, reflecting the fact that in our sample period the Italian bond market outperformed the equity market. A positive value for the aggregate alpha is also obtained using the 5-factor APT model (0.90 per cent cn an annual basis); however, even this result is not statistically significant. As far as the single funds are concerned, with multiple benchmarks more than half the funds had a negative performance, although the alphas are rarely significant (2 to 8 negative and significant, 7 to 18 positive and significant).

When gross excess returns are used, the performance of the whole sample of funds becomes always significant, except when the cx is estimated using the two-index model with the Ew-Mse. The results obtained using the value and equally-weighted equity indices are similar: 223 and 241 basis points, respectively, using only the equity benchmarks, and approximately 140 basis points using the equity and government bond benchmarks. The performance of the 5-factor model (222 basis points on a yearly basis) is very similar to that obtained using only the equity benchmarks; this result might be

Table 6

EQUITY MUTUAL FUNDS PERFORMANCE: JENSEN'S ALPHA WITH NET AND GROSS RETURNS

Funds' performance has been estimated using monthly data from July 1985 to June 1995. In model (1) the market portfolio is the equally weighted portfolio including all the stocks listed on the Milan Stock Exchange (Ew-Mse); equities' returns are adjusted for dividend distributions and changes in the capital structure. In model (2) the benchmark portfolios are the Ew-Mse and a portfolio including the main categories of Italian government bonds (see Appendix 3). In model (3) the market portfolio is the value-weighted index including all stocks listed on the Mse (Vw-Mse). In model (4) the benchmark portfolios are the Vw-Mse and the government bond portfolio. In model (5) the 5 factors have been estimated with maximum likelihood factor analysis, using the procedure suggested by Lehmann and Modest (1988) (see Appendix 3). *All funds* is the estimate obtained for the equally-weighted portfolio which includes all the funds in the sample. *Single funds* is the result of the regressions estimated for each fund separately. Funds' net returns include dividends and bank fees, while gross returns are net returns plus management fees (see Appendix 2). For the *single funds* the coefficients are considered significant at the 5 per cent level each tail. For the entire sector (*all funds*) the symbol * indicates significance at the 5 per cent each tail and ** means significant at the 2.5 per cent each tail. The αs are expressed on a yearly basis using continuously compounded returns.

Model	All funds					Single funds					
	Net returns		Gross returns		Adj. R^2	Net returns			Gross returns		
	α	t_α	α	t_α		Neg. α	Significant α		Neg. α	Significant α	
							Pos.	Neg.		Pos.	Neg.
(1) Ew-Mse	1.09	0.89	2.41 *	1.97	87.8	24	16	2	7	26	2
(2) Ew-Mse, Government bonds	0.07	0.07	1.39	1.29	90.7	46	9	8	24	15	3
(3) Vw-Mse	0.90	0.95	2.23 **	2.35	92.7	31	18	4	11	32	2
(4) Vw-Mse, Government bonds	0.10	0.12	1.42 *	1.71	94.5	41	11	6	20	21	3
(5) APT: 5 factors	0.90	1.01	2.22 **	2.49	93.8	48	7	5	22	16	3

due to the dominance of the equity factors in the estimation of the factor scores. The proportion of funds with negative alphas decreases to 25 per cent approximately; about 20 per cent of the funds display a significant positive performance, while the negative values are rarely significant.

As previously mentioned, foreign holdings account for a very small proportion of the Italian equity funds' portfolio; however, the high volatility of returns on foreign stocks expressed in Italian lire might influence our performance results. Therefore, we made two checks: first, we repeated our regressions adding to our two-index model the return on a world stock index;[28] second, we calculated the (simple and rank) correlation between our APT intercepts and the foreign holdings in the funds' portfolios. The results of our tests suggest that foreign holdings have only a marginal influence on our estimates.[29]

Table 7 shows the timing coefficients estimated using gross returns and the regressions specified in equations (4) and (5). For the whole sample, the value of gamma relative to the equity indices is negative and not significant.[30] The

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28 In the regressions we employed the returns on the Morgan Stanley Capital International World stock index. Similar results were obtained using the Morgan Stanley Europe index.

29 When the returns on the world stock index are added to our two-index regressions, the average a decreases only slightly (by approximately 15 basis points). The simple correlation between the APT intercepts and the proportion of foreign assets in the funds' portfolios is approximately equal to 6 per cent and is not significant. A similar result is obtained using the rank correlation.

30 If discretely compounded returns are a linear function of the β, the use of continuously compounded returns could create a spurious impression of timing ability. Therefore, in order to check whether the estimates of the coefficient of the square term in equation (4) are influenced by the use of logarithmic returns, the market-timing regressions which will be discussed below were replicated using discrete compounding. However, no difference was found, as one would expect since, over short horizons (one month), logarithmic and percentage returns are approximately equal.

Table 7

EQUITY MUTUAL FUNDS: MARKET TIMING

The models have been estimated using monthly gross returns from July 1985 to June 1995 (similar results have been obtained using net returns). The benchmarks used in each regression are described in Table 6. In models (2) and (4) a timing coefficient γ has been estimated separately for the equity and the bond index. In model (5) the timing coefficient γ has been estimated only for the first factor. *All funds* is the estimate obtained for the equally-weighted portfolio which includes all the funds in the sample. *Single funds* is the result of the regressions run for each fund separately. In panel A funds' market timing has been estimated using the Treynor-Mazuy quadratic regression. In panel B the market timing coefficient has been estimated using the Henriksson-Merton model. The γs are considered significant at the 5 per cent level each tail.

Model	All funds		Single funds		
	γ	t_γ	Neg. γ	Significant γ	
				Positive	Negative
Panel A: quadratic regressions					
(1) Ew-MSE	-0.08	-0.48	73	1	18
(2) Ew-MSE, government bonds: $\gamma_{Ew\text{-}Mse}$	-0.08	-0.49	70	1	21
γ_{GB}	2.99	0.44	23	6	2
(3) Vw-MSE	-0.11	-0.90	52	7	17
(4) Vw-MSE, government bonds: $\gamma_{Vw\text{-}Mse}$	-0.08	-0.70	51	5	15
γ_{GB}	-0.98	-0.20	48	4	11
(5) APT: 5 factors	-0.04	-0.41	60	6	19
Panel B: Henriksson-Merton regressions					
(1) Ew-MSE	-0.04	-0.68	74	1	17
(2) Ew-MSE, government bonds: $\gamma_{Ew\text{-}Mse}$	-0.02	-0.46	70	1	14
γ_{GB}	0.04	0.12	34	2	1
(3) Vw-MSE	-0.03	-0.70	54	6	13
(4) Vw-MSE, government bonds: $\gamma_{Vw\text{-}Mse}$	-0.01	-0.26	44	6	8
γ_{GB}	-0.24	-1.01	65	1	11
(5) APT: 5 factors	-0.01	-0.20	53	8	10

estimates of the single funds show that l0-15 per cent of the funds have a negative and significant timing coefficient with respect to the equity returns, implying that managers engage in timing activities but have no superior ability to forecast market-wide movements.[31] The estimates of the timing coefficient relative to the bond market suggest a similar picture: the value of the gamma relative to the government bond index are in general not significant, implying that managers cannot successfully forecast bonds' excess returns.

Table 8 shows the results obtained by estimating the selectivity parameter alpha using both the Treynor and Mazuy quadratic regression and the Henriksson and Merton regressions. For the (equally or value-weighted) equity benchmarks and the 5-factor APT benchmark, the inclusion of the market-timing term improves the estimated alpha, in line with the results obtained in earlier studies.[32] However, when we include the government bond benchmark, the timing-adjusted alphas become smaller (by more than 100 basis points), but still positive and, when the Vw-Mse is used, significant at the 5 per cent each tail. Using gross returns, managers' selection ability results in a risk-adjusted extra return ranging from 150 to 350 basis points; such values are generally statistically significant at the usual confidence level.

In Table 9 we show the results of the funds' total performance, estimated as the sum of the terms which represent managers' market-timing and selectivity abilities, estimated

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[31] Jagannathan and Korajczyk (1986) show that spurious evidence of perverse timing ability might arise as a consequence of non-linearities in returns originated by the option component of the funds' portfolios; however, the proportion of options in the portfolio of Italian equity funds is very small. Alternatively, our evidence of perverse timing might reflect the fact that funds engage in dynamic trading strategies (e.g. portfolio insurance) or invest in highly levered stocks.

[32] See for example Henriksson (1984), Connor and Korajczyk (1991).

Table 8

EQUITY MUTUAL FUNDS SELECTIVITY: NET AND GROSS RETURNS

Funds' selectivity has been estimated using monthly data from July 1985 to June 1995. The benchmarks used in each regression are described in Table 6. In models (2) and (4) a timing coefficient has been estimated separately for the equity and the bond index. In model (5) the timing coefficient is estimated only for the first factor. *All funds* is the estimate obtained for the equally-weighted portfolio which includes all the funds in the sample. *Single funds* is the result of the regressions run for each fund separately. Funds' net returns include dividends and bank fees, while gross returns are net returns plus management fees (see Appendix 2). In panel A funds' selectivity is the constant term in a Treynor-Mazuy quadratic regression. In panel B funds' selectivity is the constant term obtained by estimating the Henriksson-Merton model. For *single funds* coefficients are considered significant at the 5 per cent level each tail. For *all funds* the symbol * means significant at the 5 per cent level each tail, while ** means significant at the 2.5 per cent level each tail. The αs are expressed on a yearly basis using continuously compounded returns.

Model	All funds					Single funds					
	Net returns		Gross returns		Adj.	Net returns			Gross returns		
	α	t_α	α	t_α	R^2	Neg. α	Significant α		Neg. α	Significant α	
							Pos.	Neg.		Pos.	Neg.
Panel A: quadratic regressions											
(1) Ew-MSE	1.48	1.01	2.80 *	1.90	87.7	12	18	3	7	41	2
(2) Ew-MSE, Government bonds	0.24	0.18	1.54	1.16	90.5	30	7	4	12	13	2
(3) Vw-MSE	1.43	1.28	2.76 **	2.47	92.7	26	18	5	12	38	2
(4) Vw-MSE, Government bonds	0.57	0.56	1.87 *	1.83	94.5	33	13	6	17	27	2
(5) APT: 5 factors	1.14	1.07	2.46 **	2.30	93.8	30	9	3	14	21	2
Panel B: Henriksson-Merton regressions											
(1) Ew-MSE	2.19	1.08	3.51 *	1.73	87.8	9	23	2	4	40	2
(2) Ew-MSE, Government bonds	0.69	0.36	1.96	1.03	90.5	21	6	2	12	14	2
(3) Vw-MSE	1.73	1.13	3.06 **	2.01	92.7	20	15	4	15	28	1
(4) Vw-MSE, Government bonds	1.23	0.85	2.51 *	1.73	94.5	26	11	3	20	19	1
(5) APT: 5 factors	1.13	0.78	2.44 *	1.69	93.8	35	6	3	21	12	2

Table 9

EQUITY MUTUAL FUNDS: TOTAL PERFORMANCE WITH NET AND GROSS RETURNS

Performance has been estimated using monthly data from July 1985 to June 1995. The benchmarks used in each model are described in Table 6. For models (2) and (4) the timing coefficient γ has been estimated separately for the equity and the bond indices. In model (5) the timing coefficient γ is estimated only for the first factor. *All funds* is the estimate obtained for the equally-weighted portfolio which includes all the funds in the sample. *Single funds* is the result of the regressions run for each fund separately. In panel A funds' performance is estimated using the Treynor-Mazuy quadratic regressions. In panel B the performance is estimated using the Henriksson-Merton model. Funds' net returns include dividends and bank fees, while gross returns are net returns plus management fees (see Appendix 2). For *single funds*, coefficients are considered significant at the 5 per cent level each tail. For *all funds*, the symbol * means significance at the 5 per cent level and ** means significance at the 2.5 per cent. The πs are expressed on a yearly basis using continuously compounded returns. The total performance t-test is calculated as in Grinblatt and Titman (1994).

Model	All funds					Single funds					
	Net returns		Gross returns		Adj. R^2	Net returns			Gross returns		
	π	t-value	π	t-value		Neg. π	Significant π		Neg. π	Significant π	
							Pos.	Neg.		Pos.	Neg.
Panel A: quadratic regressions											
(1) Ew-Mse	1.07	0.87	2.39 *	1.95	87.7	24	16	3	8	27	2
(2) Ew-Mse, Government bonds	0.07	0.06	1.39	1.27	90.5	46	9	8	23	15	3
(3) Vw-Mse	0.87	0.92	2.19 **	2.32	92.7	30	18	4	11	32	2
(4) Vw-Mse, Government bonds	0.08	0.10	1.40 *	1.68	94.5	42	12	6	20	21	3
(5) APT: 5 factors	0.89	0.99	2.20 **	2.46	93.8	47	5	5	21	15	3
Panel B: Henriksson-Merton regressions											
(1) Ew-Mse	1.08	0.89	2.41 *	1.96	87.8	28	12	3	13	24	2
(2) Ew-Mse, Government bonds	0.07	0.06	1.37	1.24	90.5	51	8	8	32	13	4
(3) Vw-Mse	0.90	0.95	2.22 **	2.34	92.7	29	15	4	14	31	3
(4) Vw-Mse, Government bonds	0.26	0.31	1.57 *	1.86	94.5	44	13	6	17	22	3
(5) APT: 5 factors	0.90	1.00	2.21 **	2.47	93.8	47	8	7	24	16	3

using equations (4) and (5). Following Grinblatt and Titman (1994), in the Treynor and Mazuy framework the total performance has been computed (for each fund and for the equally-weighted portfolio of all the funds in the sample) by adding the average return from market timing to the selectivity parameter alpha, i.e.:

$$\pi_i^{TM} = \alpha_i + \gamma_i^{TM}\left[\frac{1}{T}\sum_{t=1}^{T}\left(\tilde{r}_{mt} - r_{ft}\right)^2\right]. \tag{9}$$

Analogously, using the Henriksson and Merton model, the total performance has been computed as:

$$\pi_i^{HM} = \alpha_i + \gamma_i^{HM}\left[\frac{1}{T}\sum_{t=1}^{T}\max\left(0, \tilde{r}_{mt} - r_{ft}\right)\right]. \tag{10}$$

In order to test the significance of the total performance measures, the standard errors of π_i^{TM} and of π_i^{HM} have been calculated using the procedure suggested by Grinblatt and Titman (1994). For π_i^{TM} the standard error was therefore calculated as:[33]

$$SE(\pi^{TM}) = \sqrt{q'Vq} \tag{11}$$

where $q' = [1\ 0\ \mathrm{var}(\tilde{r}_m - r_f)]$ and V is the variance covariance matrix of the coefficients in the quadratic regressions. Subsequently, the t-test for π^{TM} was calculated as:

[33] The methodology used to calculate the significance of the Treynor and Mazuy total performance is discussed in Grinblatt and Titman (1994), Appendix B, p. 441. Equation (11) represents the matrix form of the variance of the sum of the two components of the term π_i^{TM} in equation (9) (the selectivity component α_i and the market timing component) taking into consideration the covariance between the two terms estimated from the regressions.

$$(12) \qquad \frac{\pi^{TM}}{SE(\pi^{TM})} \sim t_{T-K-1} \, .$$

The tests have been made both for the single funds and for the equally-weighted portfolio of funds. A similar procedure has been followed to compute the standard error of π^{HM}. The results of the analysis, shown in Table 9, are very similar to those reported in Table 6. This is a consequence of the fact that funds' risk measures (the βs for the CAPM and the factor loadings for the APT) do not change very much with the inclusion of the market-timing term.

A comparison of the single funds gross performance using different benchmarks is provided in Figure 5, using the 5-factor APT and the two-index model (Vw-Mse plus Government bonds). The cross-correlation is about 83 per cent in terms of ranks and 87 per cent in terms of levels, suggesting that different benchmarks could provide different performance ranking of funds, in line with the results of Grinblatt and Titman (1994) for US funds. In our case, however, the correlations are higher.

Performance results using the PPW measure are given in Table 10. They have been obtained by setting the relative risk aversion coefficient θ to 4.23, as in earlier estimates for the Italian stock market.[34]

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[34] The relative risk aversion coefficient θ has been set to 4.228 as in the estimates reported by Panetta and Violi (1995) for the Italian stock market. A similar figure was obtained for Spain by Alonso, Rubio and Tusell (1990). Cumby and Glen (1990) assume a value of 6, Grinblatt and Titman (1994) a value of 8. We also tried different values for θ, ranging from 3 to 6, but only obtained negligible changes so that the PPW measure does not seem to be sensitive to the value of θ.

Table 10

EQUITY MUTUAL FUNDS' PERFORMANCE: POSITIVE PERIOD WEIGHTING MEASURE WITH NET AND GROSS RETURNS

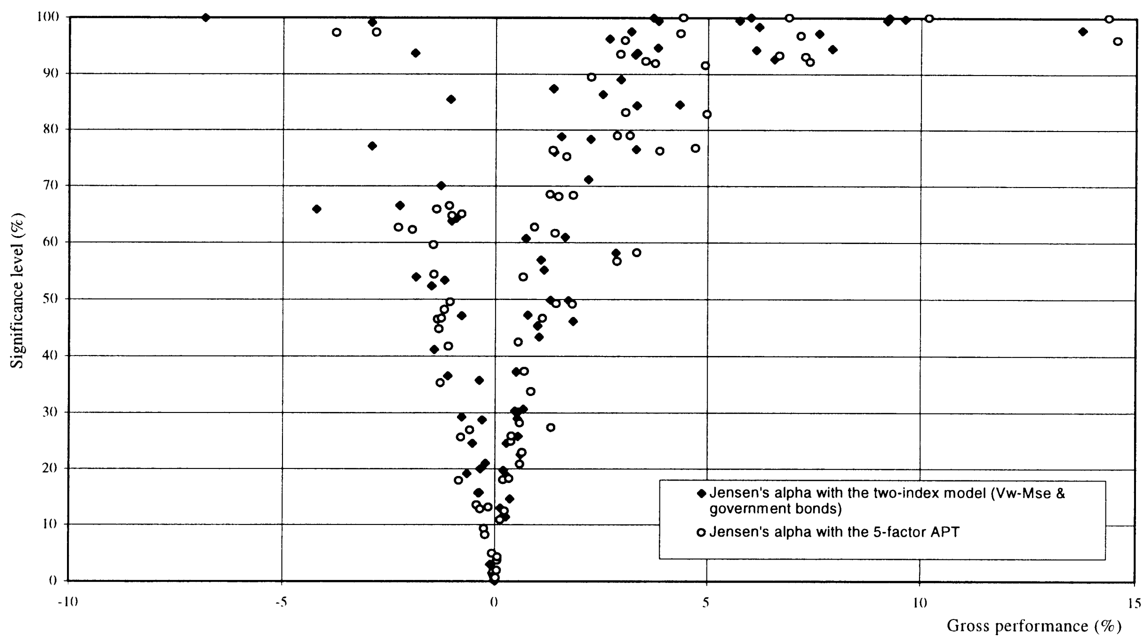
Funds' performance has been estimated with monthly data up to June 1995, using Grinblatt and Titman's (1989b) positive period weighting measure (PPW). The benchmarks used in each model are described in Table 6. *All funds* is the PPW for the equally-weighted portfolio which includes all the funds in the sample. *Single funds* is the PPW for each fund. Funds' net returns include dividends and bank fees, while gross returns are net returns plus management fees (see Appendix 2). For *single funds*, coefficients are considered significant at the 5 per cent level each tail. For *all funds*, the symbol * means significance at the 5 per cent level and ** means significance at the 2.5 per cent. The PPW measures are expressed on a yearly basis using continuously compounded returns. The t-tests for the PPW are calculated as in Grinblatt and Titman (1994).

Model	All Funds				Single funds					
	Net returns		Gross returns		Net returns			Gross returns		
	PPW	t_{PPW}	PPW	t_{PPW}	Neg. PPW	Significant PPW		Neg. PPW	Significant PPW	
						Pos.	Neg.		Pos.	Neg.
(1) Ew-MSE	1.10	0.89	2.43 *	1.96	29	12	3	13	22	2
(2) Ew-MSE, Government bonds	0.07	0.06	1.40	1.28	54	6	9	36	13	5
(3) Vw-MSE	0.92	0.95	2.25 **	2.34	39	15	7	15	26	2
(4) Vw-MSE, Government bonds	0.08	0.09	1.41 *	1.67	48	8	10	28	19	5
(5) APT: 5 factors	0.96	1.07	2.28 **	2.53	49	9	8	28	13	2

Figure 5

JENSEN'S ALPHA OF THE ITALIAN EQUITY FUNDS WITH DIFFERENT BENCHMARKS

(yearly continuously compounded returns)



A direct comparison with Jensen's α (see Table 6) shows that the results are quite similar: net performance is positive but never significant; gross performance is always positive and significant with the exception of the two-index model (value-weighted Mse plus government bonds). As noted by Cumby and Glen (1990), this similarity is not surprising because of the high sample correlation between Jensen's weights and the PPW weights (up to 98 per cent in our case[35]). Given that the PPW measure is independent of the functional form of market-timing and beta changes, this result suggests that Jensen's alpha is a reliable performance measure for Italian equity funds.

Considering the results for single funds, we note that the PPW increases the number of negative performers, both net

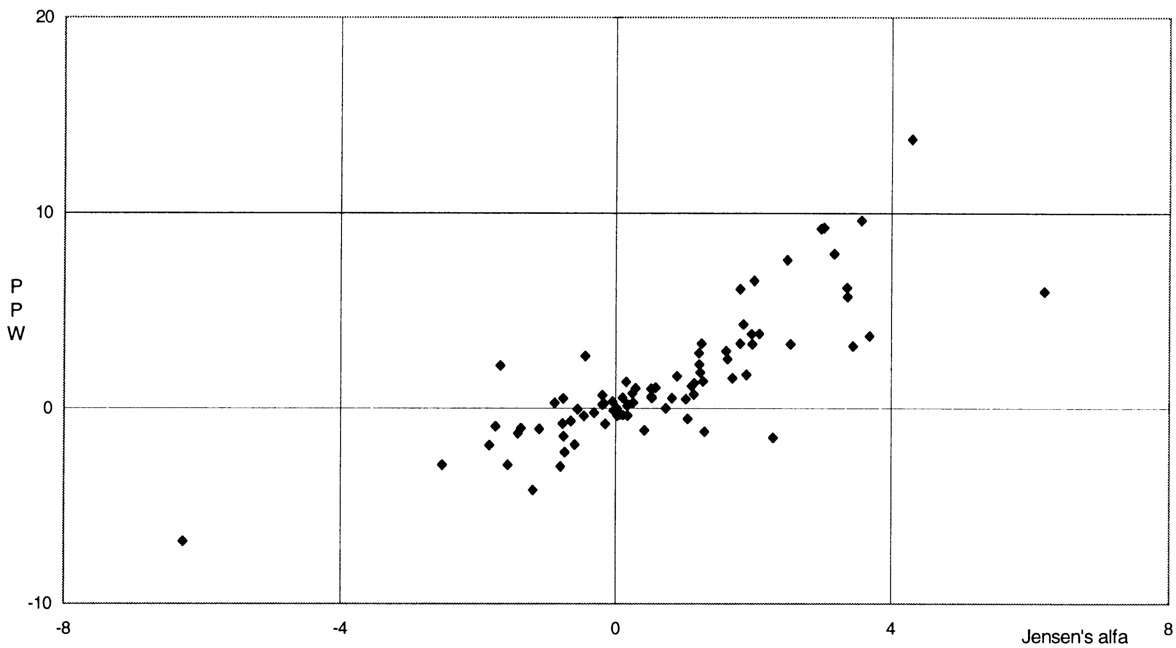
[35] Only for the APT benchmark is the sample correlation between risk factors and PPW weights near zero.

and gross of management fees. This reflects the fact that in most cases we found a negative market timing, implying a positive bias in Jensen's performance measure. The number of statistically significant results, however, is almost the same using the Vw-Mse, the two-index models (Vw-Mse plus government bonds) and the 5-factor APT model, both with Jensen's alpha and the PPW measure. The estimates obtained with the two performance measures using the same model (the two-index model with Vw-Mse and government bonds) are shown in Figure 6: the rank and level correlations are approximately equal to 82 per cent. Using the 5-factor model the same figures are 79 and 73 per cent, respectively.

Figure 6

GROSS PERFORMANCE WITH JENSEN'S ALFA AND THE POSITIVE PERIOD WEIGHTING MEASURE (*)

(yearly continuosly compoundend returns)



(*) Jensen's alpha and the PPW have been estimated using a two-index model in which the benchmark portfolios are the value-weighted index of all shares listed in Milan and a portfolio of government bonds.

APPENDIX 1

The classification of mutual funds

In Italy mutual funds are classified in two different ways: by the Bank of Italy and by Assogestioni (the Italian mutual funds association). The Bank of Italy classifies them in three main institutional categories (bond funds, balanced funds and equity funds) according to the funds' investment objectives stated in the prospectus, but does not distinguish funds which invest in Italian securities from those which invest mainly in foreign securities. The classification used by Assogestioni distinguishes between Italian and international funds and groups funds into 20 different categories (see Table A.l); however, this classification was introduced only recently (in 1995), and different grouping criteria have been used during the last ten years. Moreover, both classifications are only indicative, as managers can significantly modify the fund's investment policy ex-post. It is thus not clear ex-ante which funds should be used in the analysis in order to form groups of funds with a homogeneous investment policy. In this work we have therefore classified funds using cluster analysis, on the basis of the similarity of their portfolio holdings.[36]

The analysis has been conducted using the SAS Cluster Procedure, which minimises the differences inside each cluster and maximises the differences between different clusters. In order to estimate the optimal number of clusters, for each fund we calculated the percentages of the following categories of assets in its portfolio:

1) Italian government securities
2) Italian corporate bonds
3) Italian convertible bonds

[36] Sharpe (1992) distinguishes between "internal" methods of style determination, based on portfolio shares and "external" methods based on returns. See also Christopherson (1995) and Trzcinka (1995).

4) Foreign bonds
5) Italian equities
6) Foreign equities
7) Liquid assets (CDs, bank deposits, etc.)
8) Other financial assets.

Using the eight classes of assets, the number of clusters has been estimated on the basis of the test suggested by Sarle (1983), which reaches a maximum in correspondence with the optimal number of clusters.[37] The analysis has been performed on the basis of the average proportion in the funds' portfolio of the 8 asset categories in the whole period 1986-1995 and in two subperiods (1986-1989 and 1990-1995). For the entire period and for the second subperiod the test statistic indicates that the optimal number of clusters is equal to 4 (in both cases the maximum value of the test between 1 and 50 clusters is obtained when the number of groups is equal to 4; see Figure A.l). 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: the test hits a local maximum when the number of clusters is equal to 7 and reaches higher and increasing values when the number of clusters is higher than 15.

The four groups which have been identified by the cluster analysis closely match a 4-level aggregation of the ex-ante classification used by the Assogestioni: the first

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[37] The test of Sarle (1983) compares the expected value of the ratio (R^2) between the variance inside each cluster and the total variance under the hypothesis that the data represent random drawings from a single k-dimensional uniform distribution (null hypothesis), where k is the number of variables considered in the analysis (in our case 7, the proportion of the 7 categories of assets in each fund's portfolio) with the actual value of the same ratio for the sample under consideration. Positive values of the test indicate the possible presence of clusters, i.e. sampling from a mixture of a k-dimensional normal distribution with equal variances and equal sampling probabilities. For a Monte Carlo analysis on the performance of the test in selecting the optimal number of clusters see Sarle (1983).

Table a.1

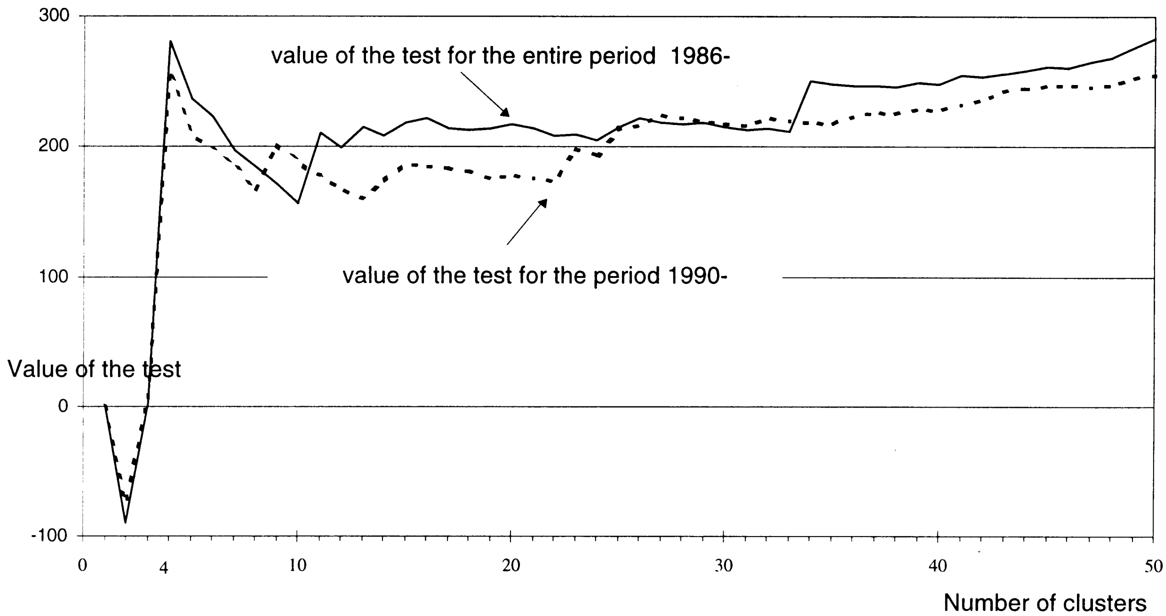
ITALIAN MUTUAL FUNDS: THE ASSOGESTIONI CLASSIFICATION

The Table reports the classification used by the Italian mutual funds association (Assogestioni) in 1995.

EQUITY FUNDS	ITALIAN	(1) ITALIAN: Italian equities >50%, Italian securities >60%
	INTERNATIONAL	(2) INTERNATIONAL: equities >50%, foreign securities >60%
	SPECIALIZED	(3) ITALIAN: equities >60%, Italian securities 100%
		(4) EUROPEAN: European equities >60% foreign securities >60%
		(5) AMERICA: American equities >60%, foreign securities >60%
		(6) PACIFIC: Asian and Oceanian equities >60%, foreign securities >60%
		(7) EMERGING COUNTRIES (EC): EC equities >60%, foreign securities >60%
		(8) OTHERS: equities >60%
BALANCED FUNDS	ITALIAN	(9) ITALIAN: bonds 50%-85%, Italian securities >60%
	INTERNATIONAL	(10) INTERNATIONAL: bonds 50%-85%, foreign securities >60%
BOND FUNDS	MIXED	(11) MIXED ITALIAN: bonds >85%, Italian securities >60%
		(12) MIXED INTERNATIONAL: bonds >85%, foreign securities >60%
	ALL BONDS	(13) ITALIAN: bonds 100%, Italian securities >60%
		(14) INTERNATIONAL: bonds 100%, Italian securities >60%
	SPECIALIZED	(15) SHORT TERM: Italian bonds with average maturity <24 months 100%
		(16) ITALY: Italian bonds 100%
		(17) DM: bonds 100%, German Mark securities >70%
		(18) US DOLLAR: bonds 100%, US Dollar securities >70%
		(19) YEN: bonds 100%, Japan Yen securities >70%
		(20) OTHERS: bonds 100%

Figure A.1

Test of Sarle (1983) on the number of clusters in the Italian mutual funds sector



cluster (*Italian equity funds*) includes the funds which belong to categories 1, 3 and 9 of Table A.1; the second (*International equity funds*) includes categories 2, 4, 5, 6, 7, 8, and 10; the third (*Italian bond funds*) includes the funds in categories 11, 13, 15 and 16 and the fourth (*International bond funds*) includes categories 12, 14, 17, 18, 19 and 20. For only 9 of the 290 funds considered is the correspondence between the classifications obtained by cluster analysis and that used by Assogestioni violated.[38] Table A.2 shows the high correspondence between the two classifications. The clustering of funds with respect to Italian equities, foreign securities and government bond holdings is shown in Figure A.2.

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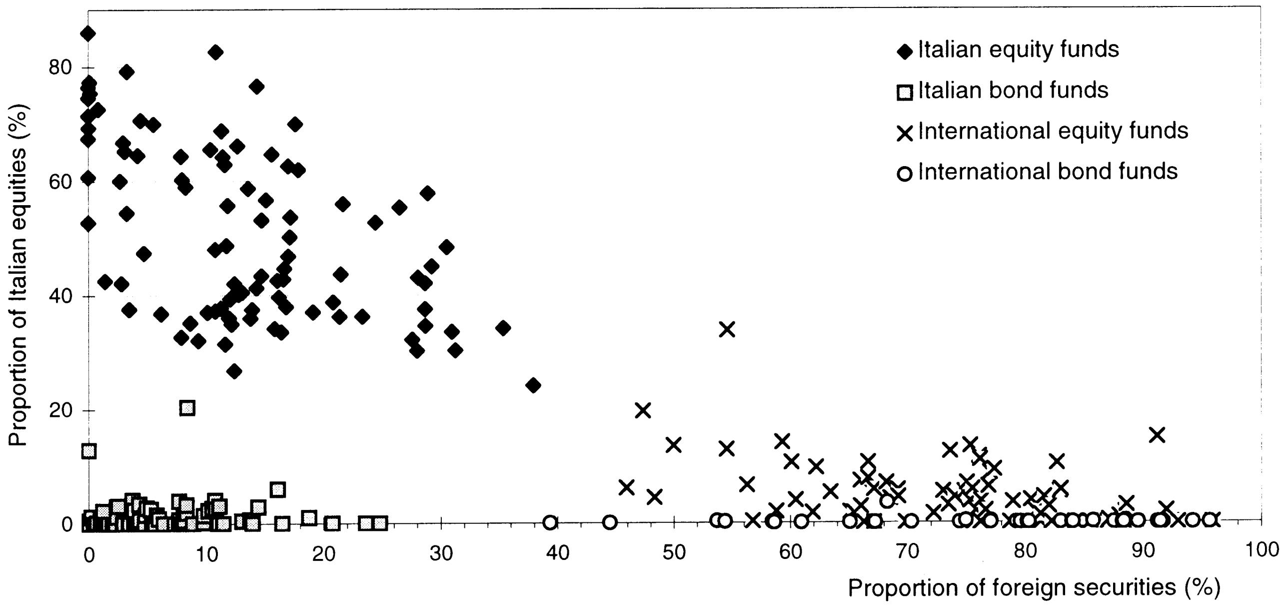
38 In the cluster procedure we used all the funds which were active before 1994 (293 funds), excluding 3 funds for which the data set was not complete. Our statistical classification differs from that of Assogestioni for 6 international equity funds (classified *ex-post* as Italian equity funds) and for 3 Italian bond funds (classified as international bond funds).

Figure A.2

PERCENTAGE COMPOSITIONS OF THE PORTFOLIO OF ITALIAN MUTUAL FUNDS CLASSIFIED WITH CLUSTER ANALYSIS



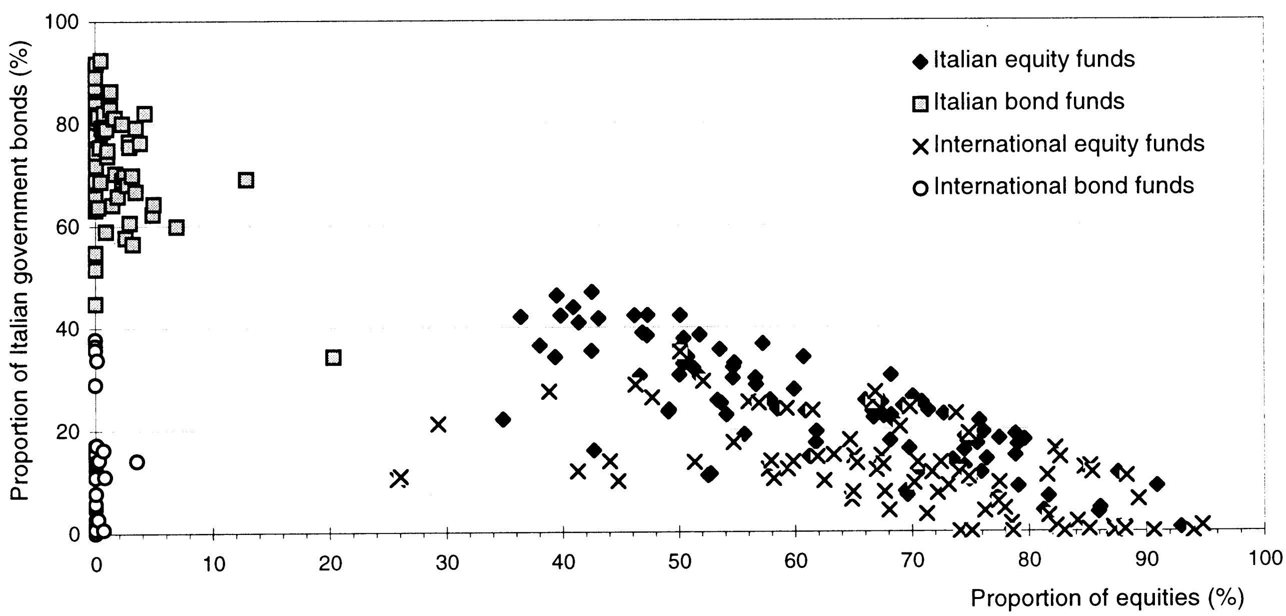


Table a.2

PORTFOLIO OF THE ITALIAN MUTUAL FUNDS BY CATEGORY

The table shows the average percentage weight of the main categories of securities in the portfolio of Italian mutual funds in the period from January 1990 to June 1995. Only funds which were active in January 1994 are included. For each group of funds the first column (1) shows the portfolio weights obtained classifying the funds on the basis of the 4-level aggregation of the *ex-ante* classification used by the Italian mutual funds association (Assogestioni), while the second column (2) shows the same figures obtained using the cluster technique.

	Italian equity funds		International equity funds		Italian bond funds		International bond funds	
	(1) Assogestioni	(2) Cluster	(1) Assogestioni	(2) Cluster	(1) Assogestioni	(2) Cluster	(1) Assogestioni	(2) Cluster
Italian government bonds	24.5	24.3	12.4	11.8	74.6	75.1	13.9	13.5
Italian corporate bonds	2.1	2.1	0.8	0.6	3.9	3.9	1.6	1.5
Italian convertible bonds	1.9	1.9	0.4	0.2	1.4	1.4	0.4	0.3
Foreign bonds	2.1	2.2	9.6	10.0	6.7	5.9	74.2	74.3
Italian equities	51.0	50.5	7.6	4.9	1.0	1.2	0.2	0.1
Foreign equities	10.7	11.2	60.9	64.0	0.1	0.1	0.1	0.1
Liquid assets	0.5	0.6	0.2	0.2	1.4	1.4	0.4	0.4
Other financial assets	7.2	7.1	8.1	8.2	11.0	11.0	9.3	9.9
Number of funds	88	94	85	79	85	84	32	33

APPENDIX 2

The computation of gross returns

In this Appendix we explain the details of the computation of "net" and "gross" returns. We define q_0 as the unit value of the fund shares at the beginning of the first period and q_t, (t=1,...T) as the unit value of the funds shares at the end of period t, obtained as the ratio of the funds' Net Asset Value (NAV) at the end of the month to the number of outstanding shares (n_t):

(A2.1) $$q_t = \frac{NAV_t}{n_t}.$$

In the absence of cash flows in or out of the fund, the fund's rate of return would be simply the rate of change of q_t, i.e. $R_t = \frac{q_t}{q_{t-1}} - 1$. The first outflow to correct for is the dividend flow paid by the fund to its unit holders. The return in month t is therefore measured as:

(A2.2) $$R_t^* = \frac{q_t + d_t}{q_{t-1}} - 1 = \frac{q_t^*}{q_{t-1}} - 1.$$

where d_t is the dividend per unit share paid by the fund in month t.

Correction for bank fees. As we discussed in the text, for the sake of comparison with available benchmarks, custody and administration costs should be added back to the funds' returns to obtain what we have called "net" total returns. Let C_B denote the amount of fees paid to the bank which acts as the custodian of the funds' assets, as stated in the funds' annual report. Assuming that such costs are calculated monthly as 1/12th of the yearly costs, we define c_t, the unit cost, as the ratio between total costs and the number of outstanding shares:

(A2.3) $c_t = \frac{1}{12}\frac{C_B}{n_t} = \frac{1}{12}\frac{C_B}{NAV_t} q_t$.

The "net" rate of return, corrected for bank fees, is therefore equal to:

(A2.4) $R_t^{**} = \frac{q_t + c_t}{q_{t-1}} - 1 = \frac{q_t^{**}}{q_{t-1}} - 1 = R_t + \frac{C_B}{12NAV_t}(1 + R_t)$.

Note that if the fund pays dividends at time t, the "net" return is:

$$R_t^{**} = \frac{(q_t + d_t + c_t)}{q_{t-1}} - 1 = R_t^* + \frac{C_B}{12NAV_t}(1 + R_t) .$$

Following the rules set by the Bank of Italy, funds compute the impact of administration costs and management fees on unit values daily. Therefore, a better approximation of the "net" return is obtained by making the cost series have the same pattern as the ratio between each month's assets and the average yearly assets ($\overline{NAV}$), i.e.:

(A2.5) $c_t = \frac{C_B}{n_t}\frac{NAV_t}{12\overline{NAV}} = \frac{1}{12}\frac{C_B}{\overline{NAV}} q_t$

so that the rate of return is equal to:

(A2.6) $R_t^{**} = \frac{q_t + c_t}{q_{t-1}} - 1 = \frac{q_t^{**}}{q_{t-1}} - 1 = R_t + \frac{C_B}{12\overline{NAV}}(1 + R_t) \qquad t > 1.$

Correction for management fees. "Gross" returns are defined as net returns augmented by the management fees paid by the fund to the management company. Let C_S be the annual amount of management fees as stated in the fund's annual report. Proceeding as before we define the management unit cost as:

(A2.7) $$s_t = \frac{1}{12}\frac{C_S}{n_t} = \frac{1}{12}\frac{C_S}{NAV_t} q_t .$$

The "gross" rate of return is therefore equal to:

(A2.8) $$R_t^{***} = \frac{q_t + c_t + s_t}{q_{t-1}} - 1 = \frac{q_t^{***}}{q_{t-1}} - 1 = R_t^{**} + \frac{C_S}{12NAV_t}(1 + R_t) .$$

Letting the monthly management costs vary in the same way as the monthly value of NAV in (A2.5), we obtain:

(A2.9) $$R_t^{***} = \frac{q_t + c_t + s_t}{q_{t-1}} - 1 = \frac{q_t^{***}}{q_{t-1}} - 1 = R_t^{**} + \frac{C_S}{12\overline{NAV}}(1 + R_t) \qquad t > 1 .$$

This is the formula which has been used in this paper to compute "gross" rates of return.

APPENDIX 3

Data sources and the estimation of the factor scores

In this Appendix we describe the sources of the data and the methods used to construct the variables employed in the paper

Stock price indices. Two stock price indices were used in the analysis, the equally-weighted and value-weighted indices of all the shares listed on the Milan Stock Exchange (Ew-Mse and Vw-Mse). Returns were calculated as the monthly logarithmic change in prices, adjusted for dividend payments and for changes in the capital structure due to script issues and rights issues, etc. The data were drawn from the Bank of Italy share price database.

Government bond price index. The returns on Italian government bonds have been computed as the simple average of the returns on the most important categories of Italian government bonds - CCTs *(Certificati di Credito del Tesoro,* long-term index-linked bonds) and BTPs *(Buoni Poliennali de1 Tesoro,* long-term fixed-coupon bonds) - net of withholding tax. The data were collected from the monthly statistics published by the Bank of Italy in the *Supplement0 al Bollettino Statistico, I1 Mercato Finanziario.* Returns have been calculated as the monthly logarithmic changes in the total return index (which is adjusted for coupon payments).

Real estate index. The real estate index is the index of the unit market value of houses in Italy, provided since 1965 by *Il Consulente Immobiliare* and elaborated by Nucci (1996). The data are semi-annual and have been transformed to monthly frequency using a cubic spline. The index includes only changes in the market value of real estate (capital gains) but ignores rents.

The risk-free rate is the rate of return on BOTs (*Buoni Ordinari del Tesoro*, Treasury bills) net of withholding tax. We assume a flat term structure between one and three months.

The factor scores of the 5-factor APT model were estimated using maximum likelihood factor analysis (MLFA). We first calculated the covariance matrix S of the monthly returns of the 104 shares which were continuously listed on the Milan Stock Exchange from December 1983 to June 1995. Subsequently, we used MLFA to decompose the covariance matrix into the 104 x 5 factor loading matrix Γ and the 104 x 104 residual risk matrix Φ:

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

The 104x1 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):

$$\begin{aligned} &\underset{wj}{\text{Min}}\ w_j'\Phi w_j \qquad j = 1,\ldots\ldots,5 \\ &s.t.\ \ w_j'\Gamma_k = 0 \quad \text{for } j \neq k \\ &\qquad w_j'\iota\ = 1 \end{aligned}$$

where ι is a vector of ones and Γ_k is the vector of the loadings of each security to factor k (i.e. the k_{th} column of the loading matrix Γ). 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 and fund portfolio holdings have been drawn from the Bank of Italy mutual funds database and were cross checked with the data reported by I1 Sole 24-Ore. Data on bank fees (the fees paid by the fund to the bank which acts as a custodian of the fund's assets), management fees (the fees that each fund pays every year to the management company, including incentive fees), the taxes paid by the fund, and the residual item "other expenses" have been drawn from the Bank of Italy's data base and from the funds' annual reports *(rendiconto annuale).*

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