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Do Direct Stock Market Investments Outperform Mutual Funds? A Study of Finnish Retail Investors and Mutual Funds[1]

ABSTRACT

Earlier studies of mutual fund performance have not been able to exclusively show that it is profitable to invest in the stock market through mutual funds. Most studies are concerned with how mutual funds perform in relation to a benchmark index. We take a different approach and compare actual investment performance of retail investors (individual private investors) when they invest directly in the stock market, to the investment performance of mutual funds. The relative costs and efforts of constructing a well diversified portfolio are expected to be inversely related to portfolio size. To investigate if direct investments in the stock market are more suitable to larger portfolios, we categorize retail investors according to their portfolio size. Using randomly drawn samples of smallest, medium and largest investors of the active largest third of investors in Finnish shareholdings data for the period January 1995 to May 2000 we find the following: The smallest active investors underperform mutual

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funds. Medium size active investors perform similarly to mutual funds before transaction costs and taxes, but net of transaction costs and taxes medium size investors underperform mutual funds. The largest investors outperform the mutual funds both before and after transaction costs and taxes. We also find that investment strategies of large investors stand out as different while the other two groups of investors apply similar strategies that produce close to the average market return.

Keywords: *retail investors, mutual funds, transaction costs, taxation*
JEL classification: G11, G15

1. INTRODUCTION

Earlier studies of mutual fund performance have not been able to exclusively show that it is profitable to invest in the stock market through mutual funds. This even if there are funds that perform consistently well over long time periods. Early studies by Sharpe (1966) and Jensen (1968) evaluate 34 US mutual funds during the time period 1954–1963 and 115 US mutual funds during the time period 1945–1964 respectively. Both studies find that the funds underperform the benchmarks.

The literature following these two articles has developed strongly and as a representative recent study we propose Daniel, Grinblatt, Titman and Wermers (1997) who construct a large database of 2500 US equity funds for 1975–1994. Compared to benchmarks of matching stocks they find some stock selection ability but no timing ability by fund managers. Some funds clearly outperform their benchmarks but the average performance is close to the benchmarks. In a number of studies of the European mutual fund markets it is not uncommon to find that the funds tend to outperform their benchmarks. Otten and Bams (2002) investigate a survivorship bias controlled sample of 506 funds from the five most important mutual fund countries in Europe (France, Germany, Italy, Netherlands and UK) over the period 1991–1998. Their results suggest that mutual funds, and especially small cap funds, add value. In a study of both equity funds and bond funds on the Finnish market during 1993–2000, Sandwall (2001) applies a conditional asset pricing model and observes performance persistence for mutual funds on the developing mutual fund market in Finland. Sandwall (2001) concludes that the persistence in performance decreases as the market evolves and becomes more competitive. In light of the international evidence it appears that mutual funds perform better in smaller and less developed markets. Otten and Bams (2002) suggest that the relatively small importance of mutual funds in less developed markets is the reason for this. In Europe when mutual funds hold less than 11% of the domestic equity markets it is easier to outperform the market as an industry, than in the US where mutual funds hold almost 30% of the domestic equity market.

One factor contributing to the underperformance of mutual funds in some earlier studies might be that they do not take into account all transaction costs and tax effects that might

make the mutual fund performance weak in comparison to a benchmark index that is free of costs. Kvist (1997) studies mutual funds in Finland and eliminates entry, management and exit costs of mutual funds to make them more comparable to the benchmark index. The reason for such an approach is that these costs are most likely even higher for an investor that purchases stocks directly in the stock exchange and thus it is unfair to judge fund performance after costs. The funds still perform worse than the benchmark index when paid costs such as management fees, depository fees and transaction costs of the fund are added to the performance.

An alternative to investments in mutual funds is to invest directly in stocks and we consequently study the differences in costs of investing in these alternatives. Studying the Finnish tax legislation we can make no general conclusions regarding how taxes affect the profitability of investments in mutual funds as opposed to direct investments in stocks. There are both tax advantages and disadvantages of direct investments in stocks compared to mutual funds. The increase in value of a mutual fund share consists of capital gain and received dividends. This way a retail investor (private households investing directly in stocks) will be taxed for a capital gain on both capital gains and dividends when the stocks in the fund are sold. Due to the avoir fiscal system a retail investor pay no or very little tax on dividend income from direct investments in stocks. Crucial for the impact of taxes on direct investments is the followed investments strategy. An active investment strategy decreases the profitability of direct investments due to capital gains tax and a market timing strategy might in fact be executed in the most tax effective way through mutual funds. A long-term investment strategy in high dividend yield stocks again might be executed more efficiently through direct investments. On the other hand, to be able to follow an active investment strategy and be completely flexible, the only viable alternative is direct investments in stocks. This even if mutual funds offer some low cost options for active investors with opportunity to switch between funds focusing on different strategies and market sectors.

Direct transaction costs on mutual fund investments consist of management fees and front load (typically a percentage fee charged on the invested amount). Direct transaction costs on share investments are brokerage fees and share depository fees. Generally the front loads and management fees paid on investments in mutual funds are higher than the brokerage fees paid on direct share investments while the depository expenses are lower for mutual fund investors since they are carried by the fund. Since an investment in a mutual fund is one transaction while several transactions are needed to form a diversified portfolio through direct investments this increases the costs for the direct investment alternative. A certain size of the investment portfolio is required to make the direct investment alternative more attractive with regards to direct transaction costs.

The performance of mutual funds is usually compared to a benchmark index. In this study we take a different approach. Instead of assessing mutual fund performance vs. a benchmark, we compare actual investment performance of retail investors when they invest directly in the stock market to the investment performance of mutual funds. Mutual funds however have legal and regulatory restrictions of their activities such as limitations to what type of instruments they can invest in and a limit of a maximum of 10% of the capital invested in one single company. (Most of the restrictions on type of investments such as derivatives have been lifted.) These restrictions will have a negative impact on the return of the funds, particularly in comparison to a benchmark index that is not limited by the same restrictions. In theory an individual investor, institution or retail, have better opportunities to track an index than a mutual fund. This is of interest, since according to the capital asset pricing model the average investor achieve the best risk/return relationship by mimicking the market index.

Since we expect that investments directly in the stock market are more cost effective when a portfolio is larger, we also look at the performance of groups of investors with portfolios of different size. (As reported in Table 1 the average transaction costs and taxes as percentage of portfolio value is 23% for small 27% for medium and 21% for large investors in our sample, where a much larger part of the costs for large investors are taxes.) We compare the investment performance of the size grouped retail investors to a selection of both large and small capitalization funds to take into account that direct investments tend to be oriented towards smaller capitalization stocks. We calculate detailed transaction and tax costs for both for the direct investments and mutual funds to make them comparable.

We investigate a randomly drawn sample of smallest, medium and largest investors of the active largest third of investors in Finnish shareholdings data for the period January 1995 to May 2000. During this period there have been no major institutional changes to the mutual fund industry in Finland that need to be considered in the analysis. We find that the smallest active investors underperform mutual funds. Medium size active investors perform similarly to mutual funds before transaction costs and taxes, but net of transaction costs and taxes medium size investors underperform mutual funds. The largest investors outperform the mutual funds both before and after transaction costs and taxes. We also find that investment strategies of large investors stand out as different while the other two groups of investors apply similar strategies that produce close to the average market return.

The remainder of the paper is organized as follows. Section 2 presents the methods, hypotheses, data, sample selection and descriptive statistics. Section 3 presents the results. Section 4 summarizes the findings and presents the conclusions.

2. METHODS, HYPOTHESES, DATA, SAMPLE SELECTION AND DESCRIPTIVE STATISTICS.

2.1 Methods

We calculate gross and net returns for three samples of investors drawn from a database including all trades for all investors in the Finnish market over the period January 1995 to May 2000. A majority of the retail investors in this database are passive investments in one or two stocks. We argue that these passive investors do not follow a conscious investment strategy and they should not be compared to mutual funds that spend every moment trying to achieve the optimal risk-return relationship within the restrictions of the fund's investment strategies. This is why we first extract the largest third of the portfolios in the database based on the average size of the portfolios. We further divide this sample into three sub-samples based on size, since we have concluded that transaction costs affect investments differently depending on the capital invested. The first sample consists of smaller, the second of midsize and the third of large portfolios. We calculate the net returns of these portfolios that take into account, transaction costs, depository fees, and capital gains tax. An aggregated portfolio for each group is formed and a daily time-series of the net value for this portfolio is calculated. The relationship between the time-series of portfolio returns and daily time-series of equally weighted returns for a selection of mutual funds is analyzed. The return on mutual funds is calculated for two groups, large-cap funds that invest in the whole Finnish market and small-cap funds that focus on small capitalization companies. The small-cap funds are included to determine if retail investors overweight small-cap stocks as have been found in earlier studies. This tendency is shown in a study of individual US investors by Barber and Odean (2000 and 2001). The inclusion of the small-cap funds also gives an opportunity to determine more exactly how well retail investors perform when they can be compared both to large-cap and small-cap returns. More details on the sample selection in section 3.4. The following equations are estimated:

$$R_{gross,i} = \alpha_{gross,i} + \beta_{1,i} R_{large\text{-}cap\ fund} + \beta_{2,i} R_{small\text{-}cap\ fund} + \varepsilon_i \quad (1)$$

$$R_{net,i} = \alpha_{net,i} + \beta_{1,i} R_{large\text{-}cap\ fund} + \beta_{2,i} R_{small\text{-}cap\ fund} + \varepsilon_i \quad (2)$$

$R_{gross,i}$ is the average return on the portfolios of the analyzed sample of either, small, medium or large retail investors before transaction costs and taxes while $R_{net,i}$ is the average return after transaction costs and taxes. $R_{large\text{-}cap\ fund}$ is the return on the sample of large-cap funds and $R_{small\text{-}cap\ fund}$ is the return on the sample of small-cap funds. The fund returns are after a 1 percent entry fee and management fees. ε_i is the error term for the estimation.

Alternative estimations of the relationship between the return for the sample of investors and the mutual funds is estimated where only the large fund returns are included in Equations

(3) and (4). These estimations are included to evaluate the effect of the inclusion of the small mutual fund returns. There are very few small-cap funds available during the sample period so the small-cap fund return is going to be based on fewer funds than the large-cap fund return. This should not be a serious problem since the difference in returns between funds with a similar strategy is marginal, and one fund is a good representative of other funds with the same benchmark. Large-cap and small-cap fund returns may however be highly correlated which justifies estimations of Equations (3) and (4) without the small-cap fund return.

$$R_{gross,i} = \alpha_{gross,i} + \beta_{1,i} R_{large\text{-}cap\ fund} + \varepsilon_i \quad (3)$$

$$R_{net,i} = \alpha_{net,i} + \beta_{1,i} R_{large\text{-}cap\ fund} + \varepsilon_i \quad (4)$$

Our main interest is the sign and significance of the intercept. If there are important omitted variables this might make the estimations of the coefficients weaker and possibly affect the intercept. Since a large part of the omitted variables should be picked up by the error term we do not believe that there is any great risk that the intercept term would take the wrong sign due to omitted variables. We have to be aware of the risk that the size and significance of the intercept term is affected by omitted variables when we interpret the results.

A detailed description of the calculations of returns before and after transaction costs is provided in the Appendix and a summary of the cost estimations is included in Table 1.

2.2 Hypotheses

To test if retail investors outperform mutual funds with their direct stock market investments we estimate Equations (1) through (4). If the intercept in the estimation is insignificant or negative direct stock market investments do not outperform mutual funds. If the intercept in the equation is significantly positive direct investments outperform mutual funds. Equations (1) and (3) measure the difference in returns before transaction costs. Equation (2) and (4) measures the difference in returns net transaction costs. If the intercept is positive for Equations (1) and (3), comparing gross returns, and insignificant or negative for Equations (2) and (4), comparing net returns, the reason for the difference in performance between gross and net is either excessive activity or not very cost effective investment strategies. If the intercepts are significant across gross and net transaction costs any difference in performance between direct investments and mutual funds is due to a more successful investment strategy during the period. The hypotheses are presented in Equations (5), (6) and (7).

$$H0: \text{If } \alpha_{gross,\,i} \leq 0 \text{ then } R_{gross,\,i} \leq R_{large\text{-}cap\ fund} \text{ and } R_{gross,\,i} \leq R_{small\text{-}cap\ fund} \quad (5)$$

$$H1: \text{If } \alpha_{gross,\,i} > 0 \text{ then } R_{gross,\,i} > R_{large\text{-}cap\ fund} \text{ or } R_{gross,\,i} > R_{small\text{-}cap\ fund}$$

TABLE 1. Descriptive statistics for randomly selected sample of investors.

	Sample of Small Portfolios	Sample of Medium Portfolios	Sample of Large Portfolios
Buy transactions (no)	**405**	**687**	**1431**
Sell transactions (no)	**192**	**331**	**785**
Average investments per account during period(FIM)	**45 020**	**110 186**	**1 010 595**
Average realizations per account during period(FIM)	**25 449**	**70 949**	**994 415**
Average portfolio value per account (FIM)	**20 695**	**40 310**	**991 204**
End of period portfolio value per account (FIM)	**41 606**	**83 664**	**1 935 914**
Average purchases (FIM)	**11 116**	**16 039**	**70 622**
Average sales (FIM)	**13 254**	**21 435**	**126 677**
Average Taxes (FIM)	**3444**	**8853**	**196 287**
Transaction costs (FIM)	**322**	**837**	**9 927**
Depository fees (FIM)	**1031**	**1217**	**2 407**
Total costs 1995–00 as % of average portfolio	**23.18%**	**27.06%**	**21.05%**
Tax debt end of period as % of portfolio	**8.89%**	**4.91%**	**18.58%**

The table reports aggregate values for all randomly selected holding accounts in each size group. A description of how returns, taxes and transaction costs are estimated and calculated is provided in Appendix. 5.94573 FIM corresponds to 1 EURO.

$$H0: \text{If } \alpha_{net,\,i} \leq 0 \text{ then } R_{net,\,i} \leq R_{large\text{-}cap\ fund} \text{ and } R_{gross,\,i} \leq R_{small\text{-}cap\ fund} \quad (6)$$

$$H1: \text{If } \alpha_{net,\,i} > 0 \text{ then } R_{net,\,i} > R_{large\text{-}cap\ fund} \text{ or } R_{net,\,i} > R_{small\text{-}cap\ fund}$$

$$H0: \text{If } \alpha_{gross,\,i} \leq 0 \text{ and } \alpha_{net,\,i} \leq 0 \text{ then underperformance due to investment strategy} \quad (7)$$

$$H1: \text{If } \alpha_{gross,\,i} > 0 \text{ and } \alpha_{net,\,i} \leq 0 \text{ then underperformance due to transaction costs}$$

$$H2: \text{If } \alpha_{gross,\,i} > 0 \text{ and } \alpha_{net,\,i} > 0 \text{ then outperformance due to investment strategy}$$

To analyze if there are significant differences in investment behavior between different size investors, we estimate pair-wise systems where the intercepts for two investor samples at a time are set to be equal. If the coefficients in these estimations are significant, it indicates that there are consistent differences in investment strategies for the different size groups of investors. These estimations are performed for both excluding and including transaction costs.

The hypotheses are presented in Equations (8), (9) and (10). These hypotheses are tested as two-sided since we are here interested in if the strategies of the investor groups are equal or not and have no expectations for the sign of the inequality. (This as opposed to the tests of hypotheses (5), (6) and (7), where we investigate if the intercept of one investor group is larger than the intercept of another group.)

$$H0: \text{If } \alpha_{small} = \alpha_{large}, \text{ similar investment strategies, small and large} \quad (8)$$

$$H1: \text{If } \alpha_{small} \neq \alpha_{large}, \text{ different investment strategies, small and large}$$

$$H0: \text{If } \alpha_{medium} = \alpha_{large}, \text{ similar investment strategies, medium and large} \quad (9)$$

$$H1: \text{IF } \alpha_{medium} \neq \alpha_{large}, \text{ different investment strategies, medium and large}$$

$$H0: \text{If } \alpha_{small} = \alpha_{medium}, \text{ similar investment strategies, small and medium} \quad (10)$$

$$H1: \text{If } \alpha_{small} \neq \alpha_{medium}, \text{ different investment strategies, small and medium}$$

2.3 Data

In this study we use data on all changes in share ownership in the Finnish Central Share Depository [FCSD] during January 1995 through May 2000. The sample is an updated version of the data used in Grinblatt and Keloharju (2000 and 2001) and the same data as in Karhunen and Keloharju (2001). This dataset represents more than 99% of all share holdings registered in Finland. The share holdings, or book-entry, data provides two major advantages in comparison to investor level data from other markets. Firstly the book-entry data represents the complete set of investors and thus is a full cross-section of the whole investment community in the market. Secondly the book-entry data includes details on trade date and trade price which makes it possible to determine exactly on what day and at what price a transaction on the market resulted in a change in ownership in the central share depository. In this study we focus on book-entry accounts for retail investors. Investment companies are thus excluded. The book-entry data does not include detailed information on mutual fund investments. In additions to the central depository data we also use data on all daily closing prices for common stock and mutual fund units listed on the Helsinki stock exchange. Mutual funds that have been listed during the whole period 1995–2000 and that have been available to retail investors are included in the estimations.

2.4 Sample selection and descriptive statistics

During the 1995 to 2000 period there have been about 1 million holding accounts in the central share depository. It is a great opportunity to take advantage of such a large data sample,

but due to that the transaction cost and tax effects of each transaction has to be calculated individually it is impossible to include all accounts. We calculate the average size of these portfolios during the period and the largest third of the accounts are selected for our study. These are selected to avoid totally passive accounts that hold a few stocks perhaps because they have been received as gifts or during public listings of co-operative companies where the account holder has been a member. The market value of the smallest portfolio to be included in the largest third is FIM 5604.20 on average during the period, thus the sample still contains the full range of different size portfolios. The selected sample of approximately 350 000 active accounts is divided into three parts according to size and from each of these three parts a group of 100 accounts is randomly drawn using a random number generator. The large size of the dataset leads to that representative samples can be drawn in a random selection. Westerholm and Ollila (2003) report that the characteristics a random selection from the central depository very similar to the characteristics of the full dataset. The three groups of sampled accounts are used to represent, small investors, medium size investors and large investors.

Two groups of mutual funds are combined into portfolios, large-cap funds that invest in the whole Finnish market and small-cap funds that focus on small cap companies. We include 7 mutual funds in the equally weighted large-cap portfolio of funds. There is only one pure small cap mutual fund that has been listed during the whole investigated period and thus this fund alone represents the small-cap fund portfolio. The difference in returns between funds with a similar investment strategy is marginal, and one fund is a good representative of other funds with the same benchmark. This is why we see no problem with the different number of funds in the two samples.

In Table 1 aggregated descriptive statistics for the three groups of randomly selected accounts is reported. The descriptive statistics support that the desired division according to size has been achieved. Distinct differences between portfolio size, trade size and transaction costs for the groups can be detected. The number and size of transactions increase, while transaction costs decrease with portfolio size, indicating that it is less costly to manage a large portfolio. Interesting is the two smaller groups have realized profits more quickly while the largest group hold on to the profitable stocks. Larger portfolios appear to be long term investors while the middle size group seems to consist of the most active traders. Table 2 reports descriptive statistics for the daily time series of the portfolios of sample accounts and the portfolios of large and small mutual funds. The standard deviation for all investor groups is higher than for the mutual funds. The kurtosis is lower for the investor accounts than for the mutual funds. The mutual funds thus have a lower volatility in returns and the return distribution is concentrated around the mean value. This indicates that the portfolios of retail investors have been less diversified and as such are more volatile than the well diversified mutual fund portfolios.

TABLE 2. Descriptive statistics on the daily time-series data for size groups of investor accounts and large-cap and small-cap mutual funds.

Investors / Funds	Mean	Standard Deviation	Skewn.	Kurt.	Min value	Max value
Small Net Return	0.057%	1.411%	–0.58	3.83	–8.34%	6.43%
Small Gross Return	0.072%	1.407%	–0.58	3.89	–8.33%	6.43%
Medium Net Return	0.071%	1.415%	–0.55	3.81	–8.27%	5.97%
Medium Gross Return	0.085%	1.415%	–0.54	3.83	–8.26%	5.96%
Large Net Return	0.125%	1.447%	–0.54	3.52	–7.50%	6.85%
Large Gross Return	0.134%	1.446%	–0.53	3.51	–7.49%	6.85%
Large Fund Portfolio	0.087%	1.123%	–0.89	5.67	–7.41%	5.57%
Small Fund	0.113%	1.220%	–0.44	13.19	–9.71%	8.07%

These are the statistics for the daily time series for each size group of investors, the large cap mutual funds and the small-cap mutual fund.

Here we can already see that large investors on average outperform the mutual funds while medium size investors achieve about the same return as large-cap mutual funds and small investors underperform the mutual funds on average.

3. FINDINGS

In a correlation analysis not reported here the correlation between the two independent variables large-cap fund and small-cap fund is 0.78. If these variables are included in one equation the estimates may be weakened by multicollinearity. Our analysis focuses on the sign and significance of the intercept however and the correlation is a major problem only to the extent it affects the intercept. In addition to the Equations with only the large-cap funds we report results when both fund types are included, since this increases the aspects of the model. In Durbin-Watson tests not reported here, the statistic lies between 2.15 and 2.58 for all equations and indicates no autocorrelation in the time-series. In F-test of Equations (1) through (4) the models are all significant on 1 percent level. The F-values are reported together with the regression results in Tables 3 and 4. The F-tests support the models that include only one fund variable. In the following we base our conclusions on the models with only the large cap fund variable, but we still report our observations when the small cap fund is included.

The estimations of the relationship between investor returns and mutual fund returns, Equations (1) through (4), are reported in Tables 3 and 4. Studying the coefficients for large-cap funds and small-cap funds, we find that the coefficient for large-cap funds is close to one for small and medium size investors. The coefficient for large-cap funds is clearly higher for the large investors (1.27) and here also the small-cap fund takes a significantly negative value (–

TABLE 3. Estimations of relationship between investor gross returns and mutual fund returns.

Investors	Model	Variable	Coefficient	t-value	p-value	N	R^2	F-value
Small	(1)	Large-Cap Fund	1.0097000***	29.70	0.000	1351	0.6061	1037.14
		Small-Cap Fund	–0.0405910	–1.30	0.195			
		Intercept	–0.0001069	–0.44	0.658			
	(3)	Large-Cap Fund	0.9755000***	45.51	0.000	1351	0.6056	2071.54
		Intercept	–0.0001231	–0.51	0.610			
Medium	(1)	Large-Cap Fund	0.9345000***	26.45	0.000	1351	0.5796	929.34
		Small-Cap Fund	0.0298400	0.92	0.359			
		Intercept	0.0000099	0.04	0.968			
	(3)	Large-Cap Fund	0.9596800***	43.11	0.000	1351	0.5794	1858.05
		Intercept	0.0000218	0.09	0.931			
Large	(1)	Large-Cap Fund	1.2656000***	40.65	0.000	1351	0.687	1479.39
		Small-Cap Fund	–0.2514900***	–8.78	0.000			
		Intercept	0.0005363**	2.43	0.015			
	(3)	Large-Cap Fund	1.0534000***	52.23	0.000	1351	0.6691	2727.93
		Intercept	0.0004361*	1.92	0.055			

* denotes significance on 10% level ** denotes significance on 5% level
*** denotes significance on 1% level.

TABLE 4. Estimations of relationship between investor net returns and mutual fund returns.

Investors	Model	Variable	Coefficient	t-value	p-value	N	R^2	F-value
Small	(2)	Large-Cap Fund	1.0145000***	29.650	0.000	1351	0.603	1024.92
		Small-Cap Fund	–0.0458710	–1.457	0.145			
		Intercept	0.0002506	–1.031	0.303			
	(4)	Large-Cap Fund	0.9757700***	45.230	0.000	1351	0.603	2046.02
		Intercept	–0.0002689	–1.108	0.268			
Medium	(2)	Large-Cap Fund	0.9370600***	26.480	0.000	1351	0.578	924.05
		Small-Cap Fund	0.0254520	0.782	0.435			
		Intercept	–0.0001290	–0.513	0.608			
	(4)	Large-Cap Fund	0.9585300***	42.990	0.000	1351	0.578	1848.02
		Intercept	–0.0001189	–0.4737	0.636			
Large	(2)	Large-Cap Fund	1.2662000***	40.590	0.000	1351	0.687	1477.24
		Small-Cap Fund	–0.2505900***	–8.731	0.000			
		Intercept	0.0004410**	1.991	0.047			
	(4)	Large-Cap Fund	1.0547000***	52.210	0.000	1351	0.669	2726.22
		Intercept	0.0003411	1.501	0.134			

* denotes significance on 10% level ** denotes significance on 5% level
*** denotes significance on 1% level.

0.25). It appears that the performance of smaller to medium sized investors follows the large-cap fund performance closely, the net returns are however similar to or weaker than the return on the large cap funds. It appears that portfolios of large investors manage to outperform the large-cap funds while they do underperform in relation to the small cap fund. These observa-

tions are the same for gross and net returns. The observations regarding small cap funds have to be interpreted carefully due to the high correlation between large- and small cap-funds.

To answer our research question if retail investors achieve better returns on their direct stock market investments than what they would have received on mutual funds we study the intercept in our estimations of Equations (1) through (4). If the intercept in the estimation is insignificant or negative investors underperform mutual funds. If the intercept in the equation is significantly positive the investors outperform mutual funds. As reported in Tables 3 the coefficient is insignificant for small and medium size investors while it is positive and significant for large investors when we look at gross returns. The null hypothesis (5) cannot be rejected for small and medium investors while it is rejected for large investors. The significance is higher when Equation (1), that includes the small-cap mutual fund, is estimated. These results indicate that small and medium size investors do not outperform mutual funds but the intercept being insignificant indicates that the returns are not significantly lower either. The intercept is significant for large investors which supports the notion that these investors do in fact outperform large-cap funds, but since the small-cap fund coefficient is negative there are only a minority of investors that perform better than the small-cap fund. These investors drive up the average return for large investors, which is higher than the return of the small cap fund as reported in Table 2.

When we include transaction costs in Tables 4 the intercepts for small and medium size investors are still insignificant but approaching significantly negative for the group of small investors. The intercepts decrease for all investors when transaction costs are included and it appears that at least the small and mid size groups would have done better with less trading activity. The intercept is positive and significant for large investors for both models with and without a small-cap fund, when we look at gross returns. The intercept is positive and significant only for the model with a small-cap fund included, when we look at net returns. The null hypothesis (6) cannot be rejected for small and medium investors while it is rejected for large investors when the small-cap fund is included in the estimated model. Supported by the higher average return for large investors than for large and small-cap funds, we conclude that these results show that large investors do outperform mutual funds when they invest directly in the market also when transaction costs and taxes are considered. The highest F-values are also achieved when Equations (3) and (4) are estimated for the group of large investors. The advantage of the large investors is decreased by transaction costs and taxes, but it is possible that their investment strategies would be hard to implement without incurring these costs.

The null hypothesis (7) cannot be rejected for small investors while it can be rejected for medium and large investors. This indicates that small investors underperform mutual funds due to their choice of investment strategy. The H1 hypothesis can be rejected only for large

investors. This indicates that medium investors underperform mutual funds due to transaction costs, while large investors outperform mutual funds as a result of their choice of investment strategy.

To analyze if there are significant differences in investment behavior between different size investors, we estimate pair-wise systems where the intercepts for two investor samples at a time are set to be equal. Equations (1) and (3) are estimated for gross returns and Equations (2) and (4) for net returns. If the coefficients in these estimations are significant, it indicates that there are consistent differences in investment strategies for the different size groups of investors. The comparisons of gross returns are reported in Table 5 and net returns in Table 6. In gross returns as well as net returns the trading strategies differ between small investors and large investors as well as between medium and large investors. We focus on models (3) and (4) including only the large fund variable. The null hypotheses (8) and (9) are rejected while the null hypothesis (10) is not rejected both before and after transaction costs. These results show that the investment strategies of large investors are significantly different from the strategies of small and medium sized investors.

TABLE 5. T-test of the difference between size group strategies in gross returns.

Test	Model	Test value	Std Err	t-value	p-value	N
Small = Medium	(3)	–0.000122	0.000183	–0.666098	0.505410	1351
Small = Large	(3)	–0.000692**	0.000253	–2.733021	0.006320	1351
Medium = Large	(3)	–0.000570**	0.000249	–2.289360	0.022140	1351
Small = Medium	(1)	–0.000117	0.000179	–0.653449	0.513520	1351
Small = Large	(1)	–0.000643**	0.000251	–2.558239	0.010570	1351
Medium = Large	(1)	–0.000526**	0.000250	–2.105134	0.035370	1351

*** denotes significance on 10% level ** denotes significance on 5% level**
***** denotes significance on 1% level.**

TABLE 6. T-test of the difference between size group net returns and strategies.

Test	Model	Test value	Std Err	t-value	p-value	N
Small = Medium	(4)	–0.000150	0.000183	–0.820521	0.411990	1351
Small = Large	(4)	–0.000610**	0.000256	–2.380446	0.017360	1351
Medium = Large	(4)	–0.000460*	0.000255	–1.802240	0.071620	1351
Small = Medium	(2)	–0.000145	0.000179	–0.809184	0.418480	1351
Small = Large	(2)	–0.000559**	0.000255	–2.193755	0.028340	1351
Medium = Large	(2)	–0.000414	0.000257	–1.614865	0.106460	1351

*** denotes significance on 10% level ** denotes significance on 5% level**
***** denotes significance on 1% level.**

4. CONCLUSIONS

In this study we do not address the traditional question if mutual funds do or do not outperform the benchmark index. Instead we compare actual investment performance of retail investors (individual private investors) when they invest directly in the stock market to the investment performance of mutual funds. Since we expect direct investments in the stock market to be more cost effective compared to mutual funds when a portfolio is larger, we look at the performance of groups of investors with portfolios of different size. On samples of small, medium and large investors randomly drawn from Finnish shareholdings data for the period January 1995 through May 2000 we find the following: Small investors underperform mutual funds and medium size investors perform similarly to mutual funds before transaction costs and taxes, but net of transaction costs and taxes medium size investors underperform mutual funds. Large investors outperform mutual funds both before and after transaction costs and taxes. We also find that investment strategies of large investors stand out as different while the other two groups of investors apply similar strategies that produce close to the average market return. This is also what would be expected, since according to the capital asset pricing model the average investor achieve the best risk/return relationship by mimicking the market index. These findings emphasize the importance for investors to choose the investment vehicle that gives them the lowest transaction costs and taxes in relation to the size of the investment portfolio. It is also the first study to show that mutual funds provide a beneficial service to small and mid-size Finnish investors, as a more cost effective investment alternative than direct stock market investments. ■

APPENDIX

Description of calculation of returns before and after transaction costs

Each size group of investor portfolios is valued using daily closing prices or latest traded price if some stock has not been traded that day. This way the gross value ($V_{g,t}$) for each size group of accounts is calculated for each trading day during the period. Daily dividend payments are calculated based on the number of stocks held in each size group and included in ($D_{g,t}$) on the ex-dividend date. The dividends are applied without a tax adjustment, since the companies pay the tax. We calculate the daily inflows ($I_{g,t}$) of freed up capital from sales and outflows ($O_{g,t}$) of committed capital for purchases. The inflow of capital from sales is deducted to adjust for the increase in market value caused by this freed up capital. Likewise the outflow of invested capital is added to adjust for the decrease in market value caused by the committed capital. We thus create three time series of the daily market value of the combined portfolios of size classified retail portfolios using Equation (11).

$$R_{gross\ g,t} = (V_{g,t} - V_{g,t-1} - I_{g,t} + O_{g,t} + D_{g,t}) / V_{g,t-1} \tag{11}$$

Transaction costs are estimated at 0.5% and used to calculate the value of daily transaction costs per size group ($TC_{g,t}$). (There are no official statistics on brokerage fees in Finland. The standard brokerage fee used to be 1% on traded value but during the 1990s larger volume and higher competition have lowered fees on large trades to between 0.1% and 0.2%. Based on brokerage fees published by banks and discussions with market participants, we propose that a transaction cost of 0.5% of traded value is a reasonable estimate of average actual brokerage fees charged from retail investors over the investigated period when we also allow for a bid-ask spread).

Depository costs are estimated to be FIM 100 per share per year and the daily depository costs per size account are denoted ($DC_{g,t}$). (Depository costs vary widely, but we propose that our estimate of FIM100 per share per year is a reasonable estimate of the average fee paid by retail investors.)

Capital gains tax are calculated for each individual depository account and summed over the three size groups of accounts to achieve the daily tax costs ($T_{g,t}$). (As capital gains tax we use the official capital gains tax charged by the tax office at the time of the sale of a stock.)

Deducting the capital gains tax and transaction cost and adding the dividend measures to the daily inflows ($I_{g,t}$) and outflows ($O_{g,t}$) of capital from purchases and sales, the daily net return ($R_{net\ g,t}$) time-series are created using Equation (12).

$$R_{net\ g,t} = (V_{g,t} - V_{g,t-1} - I_{g,t} + O_{g,t} - T_{g,t} - TC_{g,t} - DC_{g,t} + D_{g,t}) / V_{g,t-1} \tag{12}$$

The returns for the mutual fund portfolios are simply the day-to-day changes in the unit price, which already include the management fees and other costs affecting the return of the fund. The returns of mutual funds are adjusted by 1% at the start of the investigated period to allow for the front-end subscription fee paid upon investment in most mutual funds. (Based on fees published by mutual funds we propose that 1% is a reasonable estimate of the average front-end subscription fee)

See Table 1 for a summary of the cost estimations.

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