## Investor protection

# The impact of charges on mutual fund returns

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This article provides metrics to analyse the impact of ongoing fees, one-off charges and inflation on the returns of mutual funds. Preliminary evidence for the EU fund industry suggests that over the three–year horizon, from 2013 to 2015, ongoing fees, one-off charges and inflation reduced the returns available to investors by 29% of gross returns on average or, in absolute terms, 252bps. While reductions vary across jurisdictions, asset classes and client types, they apply to all market segments: Relative return reductions range from 11% for passive equity fund shares to 44% for retail fund shares in bond mutual funds. Absolute reductions vary from 74 to 398bps, respectively. Relative and absolute return reductions for actively managed and retail fund shares tend to exceed those of passively managed and institutional fund shares. In general, these reductions are driven mainly by total expenses, while sales fees act as a further driver. Investors' real returns are further reduced by inflation. The PRIIPs/MiFID framework will provide additional cost information, including distribution fees, to be taken into account, with particular consideration of the impact such costs could have on return reductions. In addition, we evaluate whether investors do indeed take fund charges and net returns into account when making investment decisions. Despite the impact of fees and charges on the net outcome to investors, these costs do not seem to be reflected in investor choices, given that aggregate net flows to EU fund shares evidently react hardly at all to management fees, and even less so to cost-adjusted net returns.

## Introduction

This article proposes a methodology to measure aggregate cost-adjusted returns on mutual funds. First, the impact of fees and load charges on investor returns is analysed. Preliminary results support the notion that management fees and subscriptions, as well as redemption charges, and also inflation, substantially reduce returns on fund shares. A second, ancillary step analyses the impact of charges on fund flows. Aggregate investments in mutual funds are, at best, weakly price- and cost-sensitive.

## Data and methodology

We employ a number of measures to analyse the impact of charges on returns on investments in mutual funds (RoI). These include:

- gross returns on the underlying portfolios;
- returns net of a fund share's total expenses, but including distributed income and
- returns net of expenses and charges, i.e. the second measure reduced by charges levied by fund managers on the acquisition and disposition of fund shares;[2]
- real returns net of all expenses and charges, i.e. the third measure reduced by inflation costs.

These metrics are constructed using data obtained from the Thomson Reuters Lipper database covering the EU mutual fund universe for the period January 2013 to December 2015. To avoid biases due to recent low interest rates, we complement these metrics with equivalents for the period from January 2005 to December 2015. As variables, we use entity-specific share-class data on total net assets (TNA), annual returns (gross, $r^{G}$, net of expenses, $r^{nE}$, net of expenses/charges, $r^{nEC}$, and real returns net of expenses/charges, $\bar{r}^{nEC}$), and annual net flows (flow). EU inflation figures are sourced from Eurostat. All these data are quarterly. In addition, we employ static information on asset

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[2] These measures exclude cost components borne by investors but not charged by fund managers, such as brokerage costs, account costs, charges by financial advisors, transaction costs levied by brokers, dealers and others, and finally also taxes. Inclusion of these cost components is left to future analysis. Therefore, they may conceptually deviate from the new rules specified in PRIIPs/MiFID II to be put in place from 01/01/2018.

types, domiciles, client types, fund strategies, and fees and charges levied by funds.

Total expenses and returns net of total expenses are directly available from our data sources.[3] To incorporate one-time load charges, such as sales (FL) or redemption fees (BL),[4] we weigh respective one-off charges with the absolute value of asset-weighted net flows.[5] Hence, our net returns decompose as:

$$r_j^{net} = r^G - exp - charges_j \quad j \in (FL, FL+BL),$$

with respective reductions in returns through expenses and charges computed as:

$$exp = (r^G - r^{nE})$$

$$charges_j = \left|\frac{net\ flows}{TNA}\right|\left(r^{nE} - r_j^{nEC}\right) \quad j \in (FL, FL+BL).$$[6] [7]

This approach assumes for each fund share that net flows correlate perfectly with gross flows, and accepts the resulting downward cost bias as inevitable, since gross flows are not available.[8] On the other hand, the partial employment of maximum load fees, whenever actual loads are not available, creates an upward bias, which tends partially to offset the first bias.[9] This effect is substantiated by our ignoring possible discretionary load fee reductions granted to attract clients.

Real returns net of charges, expenses and inflation (IC) are computed as:

$$\overline{r}_j^{net} = r^G - exp - charges_j - IC \quad j \in (FL, FL+BL).$$

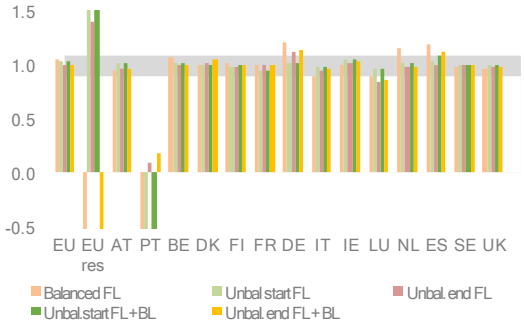
We report TNA-weighted averages across the EU mutual fund industry and its various segments, using two approaches:

- a balanced panel requiring full data for all relevant variables for the entire observation horizon, and
- an unbalanced panel simultaneously requiring full data for all relevant variables in at least one period.

All figures presented use the entire data available for all funds matching the respective panel. Hence, our sampling encompasses the full data universe. With regard to sample sizes, the unbalanced panel presents data on 20,731 EU funds in 1Q13 and on 40,133 in 4Q15. The balanced approach reports data for 18,623 EU funds.

## Sample representativeness

V.1
Relative sample deviations in rates of return
**Samples representative up to +/- 10%**




Note: Relative deviations of sample from population in the average rate of gross returns. Balanced, unbal. start and unbal. end denote the balanced panel, the beginning of the unbalanced panel and its end respectively. FL and BL denote sales and redemption fees. Grey area marks the region between 0.9 and 1.1, that is the region where sample fund return do not differ from population return more than 10%
Sources: Thomson Reuters Lipper, ESMA.

We illustrate the representativeness of our sample for the two different sampling approaches by analysing deviations in samples from respective populations on fund returns (V.1) and industry size (V.2).

[3] Total expenses include all fund expenses as reported by funds, including performance fees. Potential differences in national interpretations of related EU legal concepts for individual expense categories are not necessarily factored in. For details on expense categories please refer to Lipper, 2011.

[4] Sales (redemption) fees are defined as one-off fees expressed in percent of share prices and charged when the share is sold (redeemed) by the fund. See Thomson Reuters Lipper, 2011.

[5] We follow a different approach from e.g. Davydoff and Klages, 2014, who assume a holding period of 5 years for factoring in the effect of load charges. We argue that a data-driven measure should adequately reflect the aggregate impact of load charges.

[6] *TNA*-weighted net flows are computed as a piecewise function. The denominator of the weight in a given period is the start value in the case of negative net flows and the end value in the case of positive net flows. In addition, we use a threshold value of 1.5 for the absolute value of this variable, dropping all fund shares with a higher value from the analysis.

[7] Our method does not explicitly account for discounts received by investors. Such discounts would be more likely for large (institutional) investors and could therefore bias the respective figures upward. In terms of the computation of sales fees, we recalculated from fee-adjusted returns provided in the data source, while redemption fees were used directly, not recomputed from respectively adjusted returns, as the data available for the latter appeared to be of low quality.

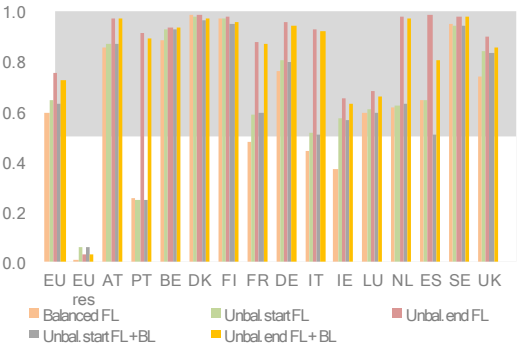
[8] We acknowledge the restrictive nature of this assumption and the resulting potential underestimation of the impact of fees and charges, as net flows need not necessarily correlate perfectly with gross flows.

[9] Our data source, Thomson Reuters Lipper, offers a combination of actual and maximum load fees reported, using maximum loads to substitute for actual ones if the latter data field is empty. It draws on prospectuses and KID documents usually stating maximum amounts of entry charges. These maximum charges may not always reflect the level of actual charges applied. Maximum redemption fees are used for roughly 20% of the fund shares included and remain below 3.5% in 85% of these cases.

Regarding fund returns, on average EU funds reporting data on charges adequately represent the respective return metrics of related universes. Average returns in samples for the EU as a whole, as well as for the majority of individual countries, are within a bound of +/- 10% around respective values for corresponding subgroups of the entire fund population.

Regarding the size of the fund industry, in most instances the samples represent the majority of respective industry segments of the entire fund population in terms of the number of funds (more than 50%) and in respect of the total assets they manage (more than 60%, not explicitly reported). Exceptions are samples for PT and residual EU countries, for which we do not claim representativeness. Minor deviations in single criteria for other countries are offset by the remaining criteria for these countries.

V.2
Relative sample deviations in fund numbers
**Most sample segments cover more than 50%**




Note: Relative deviations of sample from population, number of funds. Balanced, unbal. start and unbal. end denote the balanced panel, the beginning of the unbalanced panel and its end respectively. FL and BL denote sales and redemption fees. Grey area marks the region when the ratio sample over population is between 0.5 and 1.
Sources: Thomson Reuters Lipper, ESMA.

By the same criteria, our results are representative for most fund types, except for alternative mutual funds (Alt) and real estate (RE), for which all our samples show strong deviations from the respective EU mutual fund populations (up to 80% deviations in average returns and coverage).

Breaking down samples further reduces their representativeness, as fund numbers for individual sample segments decline, except for major geographic market segments. For asset class breakdowns and for institutional and passive market segments in particular, representative preliminary results are only available for a minority of markets.

We present results exclusively for the unbalanced sample, as all results are qualitatively robust to a switch to a balanced panel. In addition, an unbalanced panel has the advantage of including more data in the analysis.

## Cost-adjusted fund returns in the EU

As a first step, we analyse the impact of fees included in the total expense ratio (TER), i.e. fund charges designed to cover the costs of administrating and managing funds,[10] on fund returns. Averaged across mutual fund shares and the observation period from 13 January 2016 to 15 December 2016, the TER reduced returns on EU fund shares by 13%. Depending on the market segment considered, returns net of total expense fees are 5 to 25% lower than gross portfolio returns. Expressed in absolute terms, absolute average return reductions vary between 16 and 188bps across countries and asset classes.

As a second step, we factor in the impact of loads. For sales fees, the average relative reductions in fund returns vary across different countries, asset classes and investor types between 7 and 34%. This adds a further absolute reduction in fund returns of between 1 and 77bps to the profit reductions caused by the TER. The respective EU average for the relative reduction of returns through TER and sales fees stands at 19%. Next, we factor in redemption fees, which trim another 0 to 86bps from gross returns. On average, TER and all load fees thus reduce the returns on an EU mutual fund share by 20%.[11]

Finally, inflation cuts the returns available to investors by an additional 26 to 149bps, equivalent to 0.4 to 8.5 percentage points (ppt) of gross returns, bringing the average real net return on an EU fund share to 6.32ppt, 29% less than its respective nominal gross return.

Reductions in fund returns show considerable geographic heterogeneity across the EU. The lowest relative reductions due to TER are

[10] We employ the TER definition by Thomson Reuters Lipper, which conceptually resembles the TER definition of UCITS as opposed to the ongoing charges to be included in the UCITS IV KIID. One of the main differences between the two concepts is the inclusion of performance fees in the TER.

[11] Our load reduction of 55bps for the average EU fund share is of the same order as the respective 31bps reported in Investor Economics (2012) for a sample of Canadian funds and quite close to the estimate of 50bps in Bogle, 2014. Similarly, our average TER reduction of 119bps is of roughly the same size as the average 100bps reported for European funds in Holdt, 2016.

observed in NL and SE, where additional losses generated by load fees are also close to zero (in absolute terms 2-6 bps), as funds frequently do not charge such fees. On average, the most pronounced reductions materialise in AT, IT and LU, with relative reductions due to TER and loads reaching up to 28% of respective gross portfolio returns. Substantial contributions by loads to average relative RoI reductions are observed for LU and BE, where loads add up to 16 ppt of the overall shrinkage in RoI. While in most cases the major part of this additional reduction is generated by sales fees, redemption fees tend to exceed sales fees in BE.

V.3
**Reduction in fund returns – TER and load charges[12]**

Average rate of, and relative reductions in Return on Investment

| | Absolute returns | | | | | Relative return reductions | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Gross | Net of expenses | Net of expenses and sales charges | Net of expenses, sales and redemption fees | Net of expenses, sales and redemption fees and inflation | Net of expenses | Net of expenses and sales charges | Net of expenses, sales and redemption fees | Net of expenses, sales and redemption fees and inflation |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | $r^{G}$ | $r^{nE}$ | $r^{net}_{FL}$ | $r^{net}_{FL+BL}$ | $\bar{r}^{net}_{FL+BL}$ | $(r^{G}-r^{nE})/r^{G}$ | $(r^{G}-r^{net}_{FL})/r^{G}$ | $(r^{G}-r^{net}_{FL+BL})/r^{G}$ | $(r^{G}-\bar{r}^{net}_{FL+BL})/r^{G}$ |
| **Geographical heterogeneity** | | | | | | | | | |
| EU | 8.84 | 7.65 | 7.13 | 7.11 | 6.32 | 13.4% | 19.3% | 19.8% | 28.7% |
| AT | 6.50 | 5.24 | 4.66 | 4.66 | 3.16 | 19.4% | 28.4% | 28.4% | 51.4% |
| BE | 10.25 | 8.70 | 7.93 | 7.07 | 6.27 | 15.1% | 22.6% | 31.0% | 38.8% |
| DE | 9.15 | 7.82 | 7.37 | 7.37 | 6.54 | 14.6% | 19.4% | 19.5% | 28.6% |
| DK | 9.06 | 7.85 | 7.71 | 7.83 | 7.42 | 13.4% | 14.9% | 15.2% | 19.6% |
| ES | 6.21 | 4.99 | 4.77 | 4.63 | 4.37 | 19.5% | 23.1% | 26.7% | 30.8% |
| FI | 8.58 | 7.45 | 7.33 | 7.35 | 6.18 | 13.2% | 14.6% | 16.0% | 29.3% |
| FR | 5.83 | 4.92 | 4.56 | 4.54 | 3.96 | 15.6% | 21.7% | 22.0% | 31.9% |
| IE | 7.83 | 7.05 | 6.54 | 6.44 | 6.15 | 10.0% | 16.5% | 17.0% | 20.8% |
| IT | 6.54 | 5.06 | 4.85 | 4.80 | 4.22 | 22.6% | 25.9% | 27.7% | 36.4% |
| LU | 7.62 | 6.35 | 5.61 | 5.56 | 4.77 | 16.6% | 26.3% | 27.2% | 37.5% |
| NL | 11.68 | 10.67 | 10.64 | 10.61 | 9.52 | 8.6% | 8.9% | 9.2% | 18.5% |
| SE | 11.65 | 10.54 | 10.52 | 10.52 | 10.07 | 9.6% | 9.7% | 9.7% | 13.6% |
| UK | 13.84 | 12.37 | 11.82 | 11.80 | 10.39 | 10.6% | 14.6% | 14.7% | 24.9% |
| **Asset classes/Investor type** | | | | | | | | | |
| Equity Ret | 15.54 | 13.82 | 13.18 | 13.15 | 12.21 | 11.1% | 15.2% | 15.4% | 21.5% |
| Equity Inst | 14.62 | 13.67 | 13.18 | 13.07 | 12.43 | 6.5% | 9.8% | 10.6% | 15.0% |
| Bond Ret | 5.96 | 4.83 | 4.12 | 4.07 | 3.33 | 18.8% | 30.8% | 31.9% | 44.3% |
| Bond Inst | 6.12 | 5.52 | 5.17 | 5.08 | 4.25 | 9.8% | 15.6% | 16.6% | 30.2% |
| Mixed Ret | 9.39 | 7.68 | 7.15 | 7.13 | 6.24 | 18.2% | 23.9% | 24.5% | 33.9% |
| Mixed Inst | 9.26 | 8.13 | 7.58 | 7.50 | 6.74 | 12.2% | 18.2% | 19.1% | 27.3% |
| MMF Ret | 1.42 | 1.15 | 0.94 | 0.92 | 0.34 | 19.0% | 33.6% | 34.8% | 75.7% |
| MMF Inst | 2.89 | 2.73 | 2.69 | 2.68 | 2.15 | 5.4% | 7.0% | 7.3% | 25.6% |
| ETF | 11.69 | 11.31 | 10.76 | 10.36 | 9.84 | 3.2% | 7.9% | 11.3% | 15.8% |
| **Management type** | | | | | | | | | |
| Active | 8.67 | 7.46 | 6.92 | 6.90 | 6.12 | 14.0% | 20.2% | 20.7% | 29.7% |
| Passive | 13.12 | 12.65 | 12.49 | 12.44 | 11.55 | 3.6% | 4.8% | 5.2% | 11.9% |
| Active Equity | 15.49 | 13.76 | 13.09 | 13.04 | 12.14 | 11.2% | 15.5% | 15.9% | 21.7% |
| Passive Equity | 14.82 | 14.32 | 14.20 | 14.16 | 13.25 | 3.4% | 4.2% | 4.4% | 10.6% |

Note: The first five columns report sample averages of gross returns, returns net of charges, returns net of charges and front load fees, returns net of charges and all load fees and returns net of charges, all loads and inflation. The last four columns report the relative reductions in gross returns generated by charges, the total of charges and front loads, the total of charges and all load fees and, finally the total of charges, load fees and inflation. Formal definitions for the individual reductions are provided in the "Data and methodology" section in the article. Ret = Retail; Inst = Institutions; all data as of December 2015, in percentage points. The results presented are derived from unbalanced panels, taking into account all available data. Equivalent results using a balanced panel approach, i.e. requiring full data for all variables, do not significantly differ in most cases. Columns 1-3 and 6-8 are based on the sample for which front load data are available. Columns 4-5 and 8-9 build on the samples for which front and back load data are available.
Source: Thomson Reuters Lipper, Eurostat, ESMA.

Heterogeneity in the impact of expenses on returns and fees is considerably lower across the locations in which funds are marketed: Absolute (relative) reductions due to TER vary between 118 and 196bps (19 and 27%). Focusing on the same EU markets as above,[13] load charges increase these losses within a range of 202 to 293bps (31 to 41%), with UK, DK and IE at the lower end of the relative reduction spectrum.

The impact of charges on fund returns varies for different segments of the fund industry. Relative reductions in returns due to fees and loads are moderate for equity funds. Retail (institutional) equity funds experience reductions of 239bps/15% (155bps/11%) on average. Despite lower absolute reductions, bond fund investors lose on average a higher share of the available gross profits (32% in retail and 17% in institutional funds). Across all asset classes, the highest relative return reductions are experienced by retail investors (35%/48bps) in MMFs and the lowest by institutional investors in MMFs (7%/20bps).

These EU-wide results are matched by most individual country results, with equity funds generally experiencing lower reductions than bond and mixed funds. With the latter two, major national markets separate into two groups: In FR, IE and UK returns on bond funds are reduced less than on mixed funds, while in BE, DK, IT, LU, ES and SE the opposite holds true. In general, reductions range between 8% (SE equity funds) and 42% (bond funds in BE) of available gross returns. The exceptions are Swedish bond funds, which experience a 78% reduction in their returns, with particularly low gross returns on Swedish bond funds as the main driver. The returns on MMFs are massively reduced by fees and loads in FI, FR, DE and IT: by between 62 to 93% in relative terms, with loads acting as the major driver in FR and TER in FI, DE and IT.

On average EU-wide, annual expenses and one-time load fees reduce returns more markedly for retail clients (21%) than for institutional investors (13%). This holds across all asset classes, with the lowest relative differences observed for mutual funds following alternative and mixed investment strategies. Institutional and retail clients of MMFs on the other hand, face massive fee differences. Factoring in inflation costs as well, this pattern still holds across all major EU markets, with the exception of FI, FR and DE, where the impact of total reductions on fund returns is higher for institutional clients (V.4).[14] In contrast, IE, LU and DK show particularly elevated relative return reductions for retail investors.[15]

The results in Table V.3 illustrate that the average share in a passive EU fund outperformed its active peer not only in absolute gross returns, but also in terms of their reduction through fees and charges. This is partly because the passive fund industry is predominantly invested in equity markets, which on average offer higher risk premia. In detail, for active fund shares the reduction in returns due to fees, charges and inflation averaged 255bps of their annual performance, or 30% of gross returns. The respective reductions for passive funds amounted to 157bps or 12% of gross returns.[16] Active equity funds, however, do outperform their passive peers in terms of gross returns (15.49% vs. 14.82%). Expenses, charges and inflation still reduce returns substantially more for active equity funds (335bps or 22%) than for passive ones (157bps or 11%), leaving active equity funds with inferior net returns.[17] ETF shares

[12] Due to a printing error in the first published version of this document, the values in the last four rows of column five have been corrected in this version.

[13] The set of countries is adjusted to achieve comparability with the results for domiciles. For the entire set of markets, which includes the EU and some neighbouring markets, absolute reductions due to all fees reduce returns by 202 to 385bps, or in relative terms by 31 to 57%. The larger set of markets is due to the fact that the same fund can be marketed in several jurisdictions.

[14] Despite methodological differences and correction for the inclusion of inflation costs, our results fall within the intervals of cost reductions reported by Davydoff and Klages, 2014. The smaller size of our average effects is due to actual net flows below their implicit assumption of net flows of 20% of the investment per year.

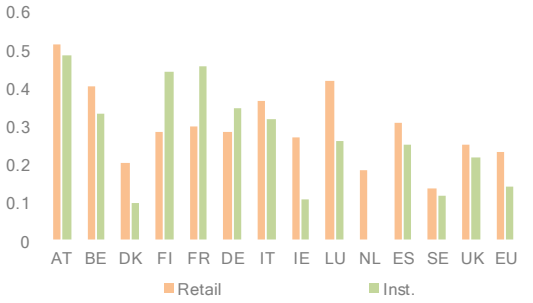
[15] If inflation is not factored in, the order of cost sizes reverses for FI and FR, while for DE costs for retail and institutional clients are of a similar size. This may be due to the change in the composition of subsamples over time, which also affects client-type-specific gross returns.

[16] Bogle's 2014 estimate of 257bps for the difference between the absolute reduction experienced by an active and a passive fund exceeds our equivalent excluding inflation, but includes additional cost components such as the drag of cash positions, etc. Holdt's 2016 estimate of 107bps difference between ongoing costs (net of taxes) for active and passive European funds exceeds our equivalent of 74bps for TER as well. The FCA's 2016 difference of 75bps for UK equity funds, closely matches our result for the average EU fund.

[17] Hence the differences in portfolio structures of actively and passively managed funds. In particular, the high proportion of funds with equity-focused portfolios in the

performed slightly less well than passive funds[18]: on average for the EU, they suffered an absolute reduction in their returns through fees, load charges and inflation by 185bps, equivalent to a relative reduction of 16%.

V.4
Relative return reductions through TER, loads and inflation
**Return reductions more severe for retail clients**




Note: Relative reductions in RoI generated by TER, front and back-load charges and inflation. Time averages across sample horizon, in ppt.
Sources: Thomson Reuters Lipper, ESMA.

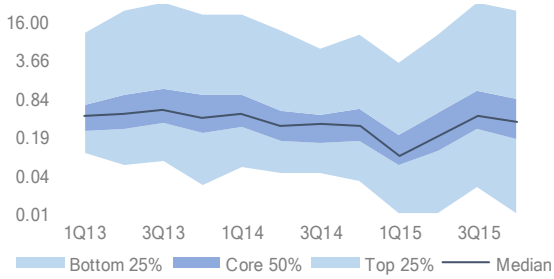
In terms of relative relevance, total expense fees dominate all other components, generating almost half of the overall reductions in returns suffered by EU fund clients. Sales fees make up a further 20%, leaving redemption fees with a mere contribution of around 2% and inflation with another 31%. IE and LU depart from this pattern, as sales fees account for up to 30% of the reduction in clients' returns. On the other hand, sales and redemption fees represent 10% maximum of the overall return reduction in DK, FI, SE and NL. Load fees are particularly important for ETFs, weighing in with almost 50% of their respective overall reduction in clients' returns, while for retail equity and mixed funds they shave off a mere fifth.

Results for the period from 1Q06 to 4Q15, both unweighted and asset-weighted time averages, confirm the robustness of our findings: relative reductions in gross returns generated by expenses, load charges and inflation consistently exceed respective values for the three-year horizon. This corroborates the relevance of costs for investors. Lower fees and higher gross returns, however, appear to have improved the situation for investors in recent years.

Looking at share classes, relative return reductions are generally quite heterogeneous. Around 10% of fund shares display very high relative reductions in their respective RoI (V.5).

Such massive reductions stem mainly from combinations of low gross returns on underlying portfolios, i.e. close to zero, and the presence of considerable load. In a situation where a fund client is confronted with an investment yielding gross returns close to zero the presence of discretionary load charges can therefore render investment and disinvestment extremely costly. These situations are more likely to occur in the current low interest rate environment, reinforcing the vulnerability of investors to low performance by their investments in the fund industry.

V.5
Dispersion of relative return reductions
**Substantial heterogeneity**




Note: Dispersion of relative reductions in ROI. Y-axis logarithmic scale using base of 4. Values of 0.01 indicate negative values in the original data. Negative values of this kind can be generated by deflation.
Sources: Thomson Reuters Lipper, Eurostat, ESMA.

## Aggregate net fund flows hardly cost- or return-sensitive

This section complements the results derived above by analysing whether net fund flows are sensitive to cost-adjusted fund returns and respective fees and charges. To estimate this, we employ the cross-sectional simultaneous equation model

$$\begin{pmatrix} r^{nEC} \\ flow \\ ter \end{pmatrix} = \beta_1 \begin{pmatrix} r^{nEC} \\ flow \\ ter \end{pmatrix} + \beta_2 D \begin{pmatrix} r^{nEC} \\ flow \\ ter \end{pmatrix} + \gamma X + \varepsilon$$

This comprises optimality conditions for 1) fund managers who maximise profits by adjusting the TER; 2) clients maximising returns on their investments by choosing their optimal net investment flow; and 3) the balance between the volume of fund shares offered and the demand by fund clients ensured by adjustments in the fund's net return. D represents the impact of various dummies on interaction variables used to distinguish contemporaneous effects of varying fund groups. Interaction groups include domiciles, asset types and retail/institutional

passive fund segment appears to contribute to results aggregated across all asset types.

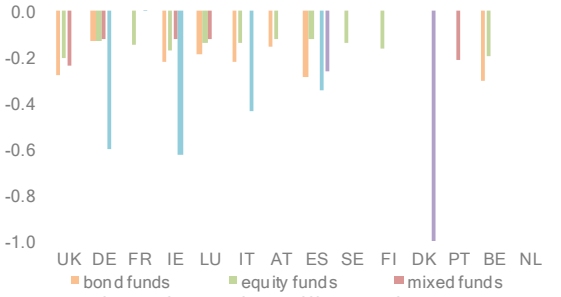
[18] ETFs differ substantially from other investment funds in terms of their issuance process and portfolio composition. For instance, fund shares of ETFs can be acquired or sold on primary or secondary markets. Hence, cost and return data on this fund type are not perfectly comparable with the data for other fund types.

share classes. X denotes the set of exogenous variables, which varies across model specifications and includes lags of endogenous variables, their squares, fund sizes and fund cost data. To cope with contemporaneously interdependent endogenous variables, the system is estimated using three-stage least squares estimation (TSLS).[19] Family averages or aggregates of the three endogenous variables across funds associated with the same investment portfolio serve as instrumental variables.

Results demonstrate the relevance of family returns, flows and TER: respective estimators are significant, positive and sizeable. Fund shares' net returns, flows and TER depend positively on their lags, with such effects more pronounced for TER than for fund flows and net returns. Fund share size weakly affects returns, with positive elasticity and a very small negative estimator for its square implying small and diminishing scale effects. Annual charges covering management costs, but not distribution costs, impact positively, but less than one-to-one, on TER[20] and have a tendency to be higher for more profitable fund shares. A positive alpha for active funds tends to be present as well, but significance is dependent on the model version employed.

Contemporaneous effects between endogenous variables remain weak and ambivalent, with results showing limited robustness across differing model versions. When lag structures are symmetric, flows react negatively to TER, significantly more so for share classes of retail investors. Their reaction to net returns is ambivalent: coefficients are positive for institutional share classes and negative for retail fund shares. These results are not persistent, as lagged TER influence flows positively[21], if at all, and lagged net returns display negative estimators of negligible sizes, which are not robust across all model versions.[22] When using asymmetric lag structures in order to remove potential multicollinearity of current and lagged TER, contemporaneous sensitivities disappear for institutional fund shares or, in the case of retail shares, are positive for TER and negative for cost-adjusted returns. Sensitivities to lagged net returns switch signs between the first and second lag and are of negligible size.[23] OLS estimators for the flow equation used to evaluate robustness lend some qualitative support to these results, while displaying less pronounced sizes.

V.6
Estimates for sensitivity of flows to TER
**Flows in some countries react negatively to TER**




Note: Impact of TER on flows, significant at 90%. Derived from benchmark model.
Sources: Thomson Reuters Lipper, ESMA.

In models with symmetric lag structures, net flows to bond funds appear more sensitive to TER than net flows to mixed or equity funds, with only moderate heterogeneity across countries. MMFs and commodity fund flows exhibit higher sensitivity to TER (V.6). Differences between retail and institutional share classes are less clear-cut: substantial differences exist only for commodity funds and MMFs, with retail clients appearing as the more sensitive customer group (V.7).[24]

[19] Details of this method are available in Zellner and Theil, 1962. Reported results were, according to Hansen-Sargan statistics, not exposed to overidentification issues.

[20] Econometric results reported thus far are significant on a 99% level and hold across all model versions employed.

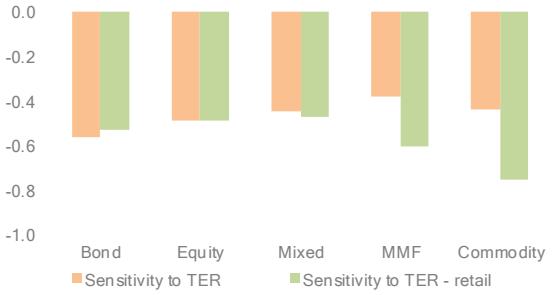
[21] Barber et al., 2005, report similar positive effects for operating expenses. In addition, our unreported result of weak evidence for a negative dependence of TER on lagged net flows similarly matches their respective results.

[22] These results contradict the findings of Barber et al., 2005.

[23] Our results, reported at 99% level, broadly fit with those of Bergstresser et al., 2009. They report relative flows reacting slightly negatively to expense ratios and unanimously positively to excess returns relative to benchmarks. As we employ returns instead of excess returns, the higher statistical strength of the respective estimators in Bergstresser et al., 2009, may be due to investors' orientation towards relative returns. In line with our results, their estimates for the effects of loads and sizes (cumulated from their fund and complex sizes) suggest ambivalent and only borderline significant results for respective flow sensitivities. Our positive flow sensitivity to contemporaneous returns for institutional share classes matches respective results for US equity funds in Edelen and Warner, 2001, which they explain through reversed causality.

[24] In models with asymmetric lag structures results are even more ambiguous. Significant TER coefficients found for individual countries are positive as often as negative and of negligible size.

V.7
Estimates for sensitivity of flows to TER
**Retail investors in MMFs and commodity funds sensitive to TER**




Note: Impact of TER on flows, significant at 90%. Derived from benchmark model.
Sources: Thomson Reuters Lipper, ESMA.

Negative coefficients appear only for retail fund shares in bond, money market and commodity funds and range between one-third and one-fifth of the sizes of their respective equivalents for symmetric models.[25] The sensitivity of net flows to cost-adjusted returns results shows no perceptible pattern across domiciles or asset classes. Again, OLS estimators support these results.

With regard to the convexity of flows in returns,[26] our results add yet more ambiguity. Splitting funds into performance quintiles, net flows to institutional fund share classes that outperform the industry appear to react negatively to returns and more sensitively than worse-performing funds. Estimates for flows' sensitiveness to TER appear positive and much stronger for institutional clients than retail clients

We interpret this evidence as reconfirmation of at best weakly cost-sensitive and even less return-sensitive aggregate investor demand functions. This impression tallies with market intelligence reported in Andersen et al., 2016. However, it does not necessarily imply that individual investors are cost- or return-insensitive. Aggregate demand for fund shares insensitive to costs and returns can also result from individual effects offsetting each other. Similarly, both sales and redemptions could be characterised by similar sensitivities, again cancelling each other out through netting.

## Conclusion

This article provides metrics to analyse the impact of ongoing fees and one-off charges on mutual fund returns. Our preliminary evidence delivers two key results:

— a substantial reduction in net returns available to investors, especially retail investors; and

— only weakly cost- or price-sensitive investment decisions by retail investors.[27]

Methodological limitations in our proposed metrics described in this article are linked chiefly to data availability. Transaction-level data on individual clients' transactions in fund shares could e.g. serve as a first step to the correction of biases in the calculation of cost-adjusted returns, which are generated by the use of aggregate net flow data or by assumptions about clients' average holding periods.

Similarly, such data would contribute to a more disaggregated analysis of the determinants of individual investors' demand for fund shares. In addition, data on fees and charges levied not by funds, but by brokers and investment advisers are currently not available on a consistent basis but would be necessary to provide a complete picture of the charges investors face. Finally, there may be merit in assessing at a later stage whether the results presented in this paper are confirmed when the fresh information on costs taken from the new PRIIPs/MiFID framework to be put in place in 2018 is available.

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[25] Effects discussed here are significant at the 90% level.

[26] This issue is actively discussed, e.g. Keswani et al., 2010, with the consensus that flows are convex in returns, i.e. the flows of higher-performing funds react more sensitively to returns.

[27] Similar results are reported in FCA, 2016, for the UK.

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