Journal of Behavioral and Experimental Finance 6 (2015) 56–66

Contents lists available at ScienceDirect

Journal of Behavioral and Experimental Finance

journal homepage: www.elsevier.com/locate/jbef

Full length article

Why you should care about investment costs: A risk-adjusted utility approach

Morten Tolver Kronborg *, Søren Fiig Jarner

ATP (Danish Labour Market Supplementary Pension Scheme), Kongens Vænge 8, 3400 Hillerød, Denmark
University of Copenhagen, Department of Mathematical Sciences, Universitetsparken 5, 2100 Copenhagen Ø, Denmark

ARTICLE INFO

Article history:
Received 6 October 2014
Received in revised form 15 January 2015
Accepted 11 March 2015
Available online 28 March 2015

JEL classification:
C61

Keywords:
Investment costs
Risk aversion
Indifferent compensation measure
Certainty equivalent

ABSTRACT

Under the assumption of zero correlation between cost ratios and expected investment returns we analyze the impact of proportional investment costs. We consider a constant relative risk aversion investor optimizing expected utility from terminal wealth and identify, in addition to the direct effect due to the additional costs incurred, an indirect effect. The indirect effect is due to lost investment opportunities and a less risky stock position induced by investment costs. By use of an indifferent compensation measure, defined as the minimum relative increase in the initial wealth the investor demands in compensation to accept incurring investment costs of a certain size, we quantify the impact of investment costs. We obtain for realistic parameters that the indirect effect is between half and the same size as the direct effect, and that the investment decision seems to be of very little importance compared to the size of the investment costs.

1. Introduction

Most investors seem primarily to focus on the ability of excellent stock picking, when deciding which fund should manage their savings. At the same time costs charged by funds seem to differ by a great deal. The average US equity mutual fund charges around 1.3%–1.5%, but cost ratios range from as low as 0.2 (index funds) to as high as 2%. In general, costs can vary substantially across comparable funds, and larger funds and fund complexes charge lower costs (see e.g. Khorana et al., 2008). Clearly, the argument for charging high costs is excellent stock picking. The managers of expensive funds are likely to claim that the additional return they are expected to generate (compared to any cheaper fund manager) more than compensates for the extra costs. However, the vast majority of the large literature finds that higher costs are not related to superior returns (see e.g. Gil-Bazo and Ruiz-Verdú, 2009, Carhart, 1997, Fama and French, 2010, Malkiel, 1995 and Malhotra and Mcleod, 1997).

In particular this is demonstrated by Gil-Bazo and Ruiz-Verdú (2009) who consider a data set including all open-end US mutual funds that were active in the 1961 to 2005 period. They consider a series of robustness checks consisting of checking for the impact of funds with extreme cost ratios and extreme risk-adjusted performance; the impact of small funds; exclusive focusing on funds for which annual operating costs account for 100% of all costs or focusing only on funds with loads; splitting time into subperiods; splitting mutual funds into categories. In all cases the conclusion of Gil-Bazo and Ruiz-Verdú (2009) stays the same: The hypothesis of a unit slope relation between risk-adjusted before-fee performance and cost ratios falls at any conventional significance level. In fact the expected "additional" before-fee return is, ironically, estimated by Gil-Bazo and Ruiz-Verdú (2009) to −0.63% per 1% increase of the cost ratio. In relation (Carhart, 1997), who using the same data set, concludes that higher costs depress investment performance while increasing fund companies'

* Corresponding author at: ATP (Danish Labour Market Supplementary Pension Scheme), Kongens Vænge 8, 3400 Hillerød, Denmark. Tel.: +45 48204537.
E-mail address: mtk@atp.dk (M.T. Kronborg).

http://dx.doi.org/10.1016/j.jbef.2015.03.004

profitability. Also Fama and French (2010) report that only very few funds produce benchmark-adjusted expected returns sufficient to cover their costs. One of the reasons that some funds are more expensive is due to the more actively managed investments. Huang et al. (2013) report, using a sample of 2979 US equity funds over the period between 1980 and 2009, that the top and bottom decile of funds on average change their annualized volatility by more than six percentage points. They also find, by use of a holding-based measure of risk shifting, that funds which alter risk perform worse than funds that keep stable risk levels over time, suggesting that risk shifting either is an indication of inferior ability or is motivated by agency issues. Summing up, it seems hard to prove that good performance is anything but a random phenomena.

Consequently, we analyze the impact of investment costs under the assumption of a zero correlation between the cost ratio and the expected investment return. However, note that the analysis also applies to the situation where we assume that funds can indeed generate (some) excess return, in which case, the cost ratio should be interpreted as the net-cost. The literature, e.g. the references above, seems only to focus on the loss in rate of return. However, the loss in rate of return simply induced by paying higher investment costs might not describe the actual loss suffered by the investor. A more sophisticated approach would be to take into account the risk aversion of the investor when evaluating the impact of investment costs, thereby also introducing a change in the investment strategy induced by investment costs. Introducing proportional investment costs and by use of utility functions, this is the approach taken in our paper. Two related papers, also taking the investor's risk aversion into account while considering proportional costs are Guillén et al. (2014) and Palczewski et al. (2013) (the latter analyzes the impact of transaction costs).

Guillén et al. (2014) consider a Value at Risk investor (VaR-investor) who invests in a Black–Scholes market concerned about a given α-percent quantile of the terminal wealth distribution. By introducing investment costs the investor is forced to invest less in the stock market in order to maintain the same α-percent quantile. Consequently, the loss in the geometric rate of return splits into two effects: (a) A direct effect due to the additional expense incurred and (b) an indirect effect due to a less risky stock position. Some of the capital the investor, prior to introducing investment costs, was willing to risk losing is now used to pay investment costs. The main drawback of the VaR-approach is that no monetary quantification of how much the investor actually suffers from investment costs seems to be possible. Focusing at the geometric rate of return seems a bit ad hoc since, in the first place, when deciding upon the investment strategy, the VaR-investor had no particular preferences for a high median. Using the geometric rate of return to measure the impact of investment costs also restricts the parameter space since for very risk seeking investors, introducing investment costs actually *increases* the geometric rate of return.

In contrast, Palczewski et al. (2013) use utility functions, but focus instead on the impact of transaction costs. They optimize expected utility from investing in a market consisting of a risk free asset and a risky asset modeled by a diffusion model with state-dependent drift. The effect of costs can again be divided into a direct and an indirect effect. This time the indirect effect is due to less trading in the asset portfolio. By calculating the indifference price, defined as the amount of money the investor is willing to pay up front to avoid incurring transaction costs, they find that in general the loss in utility due to proportional transaction costs is about twice as large as the direct expenses incurred.

Similar findings are offered by our paper for the case of proportional investment costs. We focus on a constant relative risk aversion (CRRA) utility optimizer who hands over his savings to a fund investing in a frictionless Black–Scholes market while being charged proportional investment costs. In contrast to the VaR-approach of Guillén et al. (2014) the change in investment strategy and, consequently, the change in geometric rate of return induced by a change in investment costs becomes independent of the investment horizon. The change in geometric rate of return is the same for both short and long term investors. As in Guillén et al. (2014) and Palczewski et al. (2013) we obtain a direct and an indirect effect of costs. In our case, the indirect effect is the sum of (1) lost investment opportunities, since the amount of money available for investment is reduced, and (2) the effect from a changed asset allocation induced by the change in costs. In order to quantify the financial impact of investment costs we calculate the indifferent compensation ratio (ICR), defined as the minimum relative increase in the initial wealth the investor demands in compensation to accept incurring investment costs of a certain size. For a CRRA utility optimizing investor the ICR is proved to be equal to the relative change in certainty equivalents. By comparing the ICR value to the financial value of accumulated investment costs, we find, similar to Palczewski et al. (2013), that the magnitude of the indirect effect exceeds the direct effect when considering a long-term investor (40 years horizon, i.e. investing for retirement). That is, the amount of money needed up front to be compensated for investment costs can be twice as big as the financial value of accumulated investment costs, i.e. the amount of money needed to replicate the cost expenses. For a short term investor we find that the magnitude of the indirect effect is half the size of the direct effect. In the words of Jens Perch Nielsen, this can be summarized by the catchy phrase: *The double blow of investment costs*. Finally, we undertake a study of whether the investment strategy or the size of investment costs is of most importance. Specifically, we study an investor facing high investment costs and an optimal investment strategy (w.r.t. his risk aversion profile) and ask which sub-optimal investment strategies the investor is willing to accept if he at the same time is offered lower investment costs. The conclusion is independent of the time horizon and very clear: The asset allocation is of very little importance compared to the size of investment costs.

The analysis is performed for a CRRA utility optimizing investor paying proportional investment costs. We have deliberately chosen CRRA utility and a simple fee model to highlight the points we wish to make without obscuring the analysis with technicalities. More complex fee structures can also be analyzed, see e.g. Janeček and Sîrbu