How should individual investors diversify? An empirical evaluation of alternative asset allocation policies ☆

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Abstract

This paper evaluates numerous diversification strategies as a possible remedy against widespread costly investment mistakes of individual investors. Our results reveal that a very broad range of simple heuristic allocation schemes offers similar diversification gains as well-established or recently developed portfolio optimization approaches. This holds true for both international diversification in the stock market and diversification over different asset classes. We thus suggest easy-to-implement allocation guidelines for individual investors.
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1. Introduction

Despite the recognized benefit of diversification as "the only free lunch in investment," individual investors seem to sometimes violate even its most basic principles. In fact, "these

discrepancies, or investment mistakes, are central to the field of household finance" (Campbell, 2006, p. 1554). In this paper, we derive easily implementable portfolio construction guidelines for individual investors. Our approach allows us to evaluate numerous competing strategies, both for international diversification in stock markets and (additional) diversification across asset classes. Specifically, we ask the following questions: From the perspective of individual investors in real-life situations, what is the most promising way to diversify? Do simple rules of thumb already provide a powerful remedy against widespread investment biases? Which heuristics are particularly efficient at realizing diversification potential? To what extent do these strategies underperform when benchmarked against sophisticated optimization models?

Empirical studies provide extensive evidence of individual investors making portfolio choices which are difficult to reconcile with standard financial theory. As such, households often fail to participate in the stock market at all (e.g., Campbell, 2006; Kimball and Shumway, 2010). Among those households that do invest in equities, many studies document further costly mistakes. First, individuals tend to prefer domestic over foreign investments, thereby foregoing the benefits of international diversification (French and Poterba, 1991; Grinblatt and Keloharju, 2001; Kilka and Weber, 2000). Second, many households own relatively few individual stocks, which may cause a significant exposure to idiosyncratic risk (e.g., Goetzmann and Kumar, 2008; Polkovnichenko, 2005). Third, data from online brokerage accounts show that many individuals are overconfident and trade too much (Odean, 1999; Barber and Odean, 2000).

Puzzling investment behavior is also observed when considering diversification over asset classes. Analyzing a large sample of retirement accounts, Agnew et al. (2003) show that most asset allocations are extreme (either 100% or zero percent in equities) and that there is inertia in asset allocations. Tang et al. (2010) conclude that most participants make inefficient portfolio investment choices in retirement plans. The failure of diversifying adequately over asset classes must be considered as particularly problematic as asset allocation has been shown to be the main determinant of portfolio performance (e.g., Brinson et al., 1986; Ibbotson and Kaplan, 2000).

To put it in a nutshell, risk-adjusted portfolios of most individual investors underperform even standard domestic stock market indices at a significant margin, and thus leave substantial room for improvement. But how should individual investors diversify? While academic research almost exclusively relies on the performance of various extensions of the Markowitz (1952) framework, we also concentrate on the relative investment value of heuristic diversification strategies.

This is particularly relevant for individual investors who typically will not have the knowledge and resources to implement complex optimization models. In addition, Markowitz-based approaches, while being optimal in theory, suffer from estimation error in expected returns, variances, and covariances when implemented in practice. There is a large amount of literature explicitly dealing with methods to improve the out-of-sample performance of these strategies, with partly disillusioning results. Recent studies focusing primarily on U.S. stock portfolios show that the estimation error is so severe that various optimization models are oftentimes unable to beat a naïve $1/N$ diversification strategy (e.g., DeMiguel et al., 2009b; Duchin and Levy, 2009; Tu and Zhou, 2009).[1]

Hence, it seems insufficient to limit the analysis to extensions of the Markowitz (1952) model. In the empirical analysis, we thus analyze the performance of 11 well-established or recently proposed mathematical optimization methods as opposed to a broad range of plausible heuristics.

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[1]The out-of-sample performance of an equally-weighted portfolio as compared to the performance of the standard Markowitz approach is in fact a longstanding and controversial debate in portfolio optimization. Early discussions include, for instance, Frankfurter et al. (1971), Brown (1979), Jobson and Korkie (1981). For a recent study arguing that optimized portfolios do outperform equally-weighted portfolios, see Kritzman et al. (2010).