



A two-step hybrid investment strategy for pension funds [☆]



Bernardo K. Pagnoncelli ^{a,*}, Arturo Cifuentes ^{b,c}, Gabriela Denis ^d

^a Escuela de Negocios, Universidad Adolfo Ibáñez, Diagonal las Torres 2640 oficina 533-C, Peñalolén, Santiago, Chile

^b Columbia Business School, Finance Division, New York, United States

^c CLAPES-UC, Santiago, Chile

^d Master of Applied Economics UCLA, United States

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ABSTRACT

We propose a two-step hybrid investment strategy suitable for pension funds. Our method consists of an active component (an optimization-based approach to decide the asset allocation), followed by a passive strategy (an index-based approach). We test our strategy with data from the Chilean pension system using two different risk metrics and we show that our approach, in three out of five cases, yields results that are better than those generated by the Chilean fund administrators. In the two cases where our approach underperformed we show that it was the result of excessively tight constraints set up by the regulator.

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1. Introduction

Pension funds are important actors in the global capital markets. For example, in the U.S., occupational pension funds (that is, funds sponsored by employers) manage assets equivalent to approximately 80% of the country's GDP (OECD, 2015). A study focused on sixteen major markets including the U.S., U.K., Japan and Canada, estimated that pension funds at the end of 2015 managed on average assets equal to 85% of their respective countries GDP (Watson, 2015). The same study indicated that such funds controlled approximately US\$ 36 trillion. By way of comparison, the market capitalization of all U.S. listed companies is close to US\$ 20 trillion (World Bank, 2014). Therefore, it is clear that in absolute and relative terms pension funds play a very influential role in the markets in which they operate.

Pension funds face three important challenges in the near and medium future: (1) a persistent low interest rates environment (this is particularly taxing for defined-benefits schemes); (2) a consistent longevity increase; and (3) an acute decline in fertility rates, a problem that affects mostly the pay-as-you-go (PAYG) systems.

From a structural viewpoint, most pension funds share certain common features. They all have mid- to long-term investment horizons; enjoy a rather stable inflow of funds; and invest primarily in equities and bonds. For example, at the end of 2014 U.S. pension funds had 63% of their portfolios invested directly in bonds and stocks (OECD, 2014). The total exposure to these assets was probably slightly higher since pension funds also invest in mutual funds which, in turn, hold these two types of assets. The exposure to alternative assets (such as mortgages, infrastructure loans, private equity, and structured products) was minor compared to the exposure to stocks and bonds. Although in general there has been a global trend to decrease the overall stocks-and-bonds holdings, and increase the positions in alternative assets, stocks and bonds remain

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* Corresponding author.

E-mail addresses: bernardo.pagnoncelli@uai.cl (B.K. Pagnoncelli), aocusa@gmail.com (A. Cifuentes), gaby.denis@gmail.com (G. Denis).

dominant. Considering the U.S., U.K., Australia, Canada, Japan, the Netherlands, and Switzerland the aggregate exposure of pension funds to stocks and bonds was 73% in 2014 (in 1995 was 89%) (Watson, 2015). Additionally, most pension funds have maximum and minimum constraints in terms of domestic and foreign exposure as well as by asset class. All these considerations put pension funds in a category of their own, as they are quite different from hedge funds, retail-oriented funds, and speculative funds focused on venture capital, commodities and distressed debt.

Consequently, considering the challenges that pension funds face, coupled with their sizes compared to their respective economies, it is apparent that studying the investment strategies of pension funds is a problem of financial and political significance. With that as background, our aim is to present an easy-to-implement investment strategy suitable for pension funds (or funds with mid- to long-term horizons). The strategy is based on a two-step process. Step 1 (active) consists of selecting the appropriate asset allocation proportions; and Step 2 (passive) is based on following an index within each asset class. Rebalancing (changing the asset allocation percentages) is done once a year, and we adopt a data-driven methodology, that is, we work directly with historical data without any assumptions regarding the distribution that originated the observations.

The next section reviews some basic concepts and trends related to investment strategies and risk metrics; then, we present our investment method; and the following section tests the performance of our method using historic data from the Chilean pension system. The final section presents the conclusions of this study.

2. Investment strategies and risk metrics

2.1. Investment strategies

The development of successful investment strategies has preoccupied humans since ancient times. It was only recently however that a solid conceptual framework to study such a problem was articulated by Markowitz (1952). The merit of Markowitz's paper is twofold: first, it demonstrated the importance of diversification; and second, it provided the basis for constructing the best portfolio for a given risk-tolerance level. The shortcomings associated with Markowitz formulation (also known as mean-variance or MV portfolios) are mainly practical than theoretical. They are related to the difficulties encountered when estimating returns and correlations—the basic inputs for solving the MV problem—and the sensitivity of the optimal solution to the MV problem (assets weights) to small variations in the inputs (Kolm, Tütüncü, & Fabozzi, 2014; Michaud, 1989).

In the 90s, Black and Litterman (1991, 1992) proposed a method, the Black-Litterman (BL) model, which attempted to overcome some of the difficulties associated with Markowitz's formulation by incorporating the investor's views into the MV optimization problem. In essence, the BL approach estimates the future returns of the relevant securities by combining the investor's views and the returns implied by the CAPM model (market equilibrium).

Markowitz's approach, including all its variations, has been primarily applied to choosing an optimal portfolio within a specific asset class (e.g. U.S. stocks) rather than selecting the appropriate asset mix (asset allocation) for a given risk-level. Arguably, asset allocation can be more important than selecting the individual assets within a specific asset class when building a diversified portfolio, as stated in Gary, Brinson, Hood, and Beebower (1995) and Tokat (2005).

Another topic that has received considerable attention in the literature is the passive versus active investment conundrum. Active investment refers to a strategy aimed at selecting the winners among a certain asset class (e.g. U.S. investment-grade corporate bonds) to outperform that market. Passive investment refers to a strategy based on mimicking a market index representative of that asset class (e.g. the SPUSCIG index). Sharpe articulated, probably better than anybody, the argument against active management by showing in a clear and concise manner the difficulties associated with beating the market consistently (and after taking fees into account) plus the challenges associated with identifying those managers who can beat the market consistently (assuming they exist) (Gökçen & Yalçın, 2015; Sharpe, 1991). While definitely not all managers are alike, it is not an easy task to distinguish skill from luck (Fama et al., 2010). Furthermore, identifying managers that have done well in the past seems to be a poor predictor of future success. In any event, and despite the claims of professional active managers, the empirical evidence overwhelmingly favors the passive approach (e.g. Malkiel, 2003). On the other hand, the case for active management is typically argued based on "philosophical" considerations rather than hard data. A good—albeit extreme—example is the article by Ellis (2015).

In recent years, there has been a significant shift from active to passive low-fee alternatives (Brodbeck, 2013). For example, in the global stocks segment, the proportion of assets that are actively managed has declined from almost 80%–70% in the last six years. And the top 200 pension funds are increasingly investing in instruments such as indices (Olsen, 2012; Roose, 2013). Overall, active strategies that were preferred in the past are losing ground. A key reason behind this shift—in addition to the inability to outperform the market continuously—is fees. Investors are becoming more sensitive to fees, and active funds charge considerably higher fees simply because they have more expenses: they have bigger staffs, need to fund their research, and rotate their portfolio more often (higher trading costs, Smith, 2015). Moreover, beating the market or an index on a regular basis is very hard or almost impossible to achieve (Sharpe, 1991). Morningstar reported that in the first semester of 2016 only 19% of the managers that invested in large-caps beat the S&P 500, while only 6% of the managers focused on growth stocks outperformed their corresponding benchmarks (McCrumm, 2016). Not surprisingly, active stock funds have lost US\$ 35 trillion to passive investment vehicles during the first semester of 2016. In the case of pension funds,

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