A minimum variance benchmark to measure the performance of pension funds in Mexico

Propuesta de un benchmark de mínima varianza para medir el desempeño de los fondos de pensiones en México

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Abstract

We propose the use of the minimum variance portfolio as weighting method in a strategy benchmark for pension funds performance in Mexico. By performing three discrete event simulations with daily data from January 2002 to May 2013, we test this benchmark's weighting method against the Max Sharpe ratio one and a linear combination of both benchmarks (minimum variance and Max Sharpe). With the Sharpe ratio, the Jensen's alpha significance test and the Huberman and Kandel' (1987) spanning test, we found that the three benchmarks have a statistically equal performance. By using Bailey's (1992) risk exposure, market representativeness and turnover benchmark quality criteria, we found that the min variance is preferable for the publicly traded Mexican defined contribution pension funds.

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Resumen

En el presente artículo proponemos el portafolio de mínima varianza como método de ponderación para un benchmark que mida el desempeño de fondos de pensiones en México. Se contrastó éste portafolio contra los logrados ya sea con la máxima razón de Sharpe o el resultante de una combinación lineal de ambos métodos. Esto se hizo con tres simulaciones de eventos discretos con datos diarios de enero de 2002 a mayo de 2013. Con la razón de Sharpe, la prueba de significancia de la Alfa de Jensen y la prueba de expansión de Huberman y Kandel (1987), se encontró que los portafolios simulados tienen una performance similar. Al utilizar los criterios exposición al riesgo, representatividad de los mercados objeto de inversiín y el nivel de rebalanceo propuestos por Bailey (1992), encontramos que el método de mínima varianza es preferible para medir el desempeño de fondos de pensiones en México.

Palabras clave: Modelos de simulación; Portafolio de mínima varianza; Fondos de pensiones

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Introduction

Pension savings in Mexico are among the most important private reserves in Mexico. The most used pension schemes in the country are the Defined Benefit (DB) and the Defined Contribution (DC) ones. The latter are also known in Mexico as SIEFOREs[1] and represent the most important private reserve in the country by following a life cycle investment regime. At June 30, 2013, this pension funds managed MXN$ 2.8 trillions in savings. According to Albo et al. (2007), the amount of savings in SIEFOREs, as of 2050, will be 23% of Mexican GDP. For further reference about SIEFOREs, a more complete review of the pension fund system in Mexico is given by IMEF (2006).

According to the previous facts, to measure the portfolio management performance of these pension funds is a vital task to do in order to secure the sustainable growth of their wealth in the long-term. A natural solution to this issue is to develop a market-cap weighted benchmark of all the publicly traded SIEFOREs in Mexico but unfortunately this sort of benchmark carries several theoretical and practical issues that will be considered in detail next. In a first review of asset pricing models critiques, Roll (1977) observed that the real market portfolio is unknown and proves that the CAPM tests and critiques cannot hold because the market portfolio proxy could be mean-variance inefficient. Despite this fact, he recommended the use of market-cap benchmarks as market portfolio proxies.

As we will note in the literature review, there have been several critiques to the use of this sort of benchmark and various proposals have been made, such as the use of fundamental indexing (for equity markets) or the use of the Max Sharpe ratio portfolio, the equally weighted (1/N) or the minimum variance portfolios. Also, some other theoretical proposals use a linear combination of the last two aforementioned cases. By the fact that there is no public performance benchmark for each type of SIEFORE in Mexico and departing from the aforementioned weighting methods, the present paper makes a first proposal to this issue: To use a minimum variance portfolio as benchmark (henceforth min variance for simplicity in the reading) to measure the performance

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