

A Life-cycle Analysis of Retirement Savings and Portfolio Choices: Optimal Asset Allocation and Location with Taxable and Tax-Deferred Investment

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DISSERTATION ABSTRACT

The expansion of Defined Contribution (DC) pensions provides households with an opportunity to save and make investments in a tax-favored fashion. Participants in the DC plans can enjoy the tax benefit from their contributions and investment earnings, but also get affected by the pension designs, such as employer matching policies, investment options and illiquid constraint. In my dissertation, I analyze theoretically and empirically the optimal saving and investment decisions of the households in those pension accounts, and show that the pension characteristics play important roles in explaining the households' behavior.

Essay 1: Retirement Savings and Portfolio Choices in Taxable and Tax-Deferred Accounts (Job Market Paper)

This study contributes to the analysis and understanding of household saving decisions and portfolio choices in both a taxable saving account and a tax-deferred pension account. I estimate a life-cycle model of optimal intertemporal consumption and portfolio choices, in which the pension account is detailed characterized by a list of Defined Contribution pension features, such as employer matching strategy, tax treatment, saving limit, and illiquid constraint. The findings of this paper strongly suggest that employer matches and other pension account designs play important roles in explaining the observed investment behavior of the households, who usually hold more equities in the tax-deferred pension account than those in the taxable account. This study also provides valuable insights in the effects of tax policy experiments and social insurance program changes.

Previous studies on asset allocation and location decisions suggest that people should hold equities (lower-taxed asset) in the taxable account and bonds (higher-taxed asset) in the tax-deferred account as a tax minimization strategy. However, this advice is at odds with observed portfolio choices of American households, who commonly hold a substantial amount of equities in the tax-deferred pension accounts. To explain the observed households' portfolio choices, I incorporate the pension account characteristics into an intertemporal life-cycle model of optimal consumption and portfolio choices, in the presence of a taxable saving account and a tax-deferred pension account. The solutions and simulated results suggest that the employer matching strategy increases the tax-deferred savings of households, resulting in a higher proportion of wealth held in the pension account. Therefore, investors tend to boost equity investments in the tax-deferred account to enjoy the higher returns and reduce equity holdings in the taxable account for precautionary saving purpose. This asset allocation strategy ends up with a lower equity investment in the taxable account, but a relative high equity holding in the tax-deferred pension account.

The structural model is estimated by the Method of Simulated Moments, using data from the Survey of Consumer Finances (1992 to 2007). After modeling the features of the U.S. DC pension system, the fitted model of my study is able to match the observed portfolio age-patterns in both the taxable and tax-deferred saving accounts. I find that equity ownership in the taxable account is increasing in age, from

around 25 percent at age 25 to about 60 percent before retirement, while in the tax-deferred account, the equity ownership rate remains at a very high level throughout the whole working life. With the estimated results, this study shows that after a 10 percent increase in the employer matching rate, the average equity proportion in the pension account is increased by 10 percent, while the equity proportion in the taxable account is decreased by 22 percent on average. In contrast, since the employer stock match exposes the households to a riskier situation in the pension account than the cash match, it causes the households voluntarily to hold less equity in the pension account, with an average decrease of 4 percent in equity ownership and 3 percent decrease in conditional equity proportions.

In response to the current discussion on privatizing Social Security program, this model provides a framework to analyze the consequences of transforming the Social Security taxes and payments to a tax-deferred retirement saving account. As the pension account becomes the only income source for retirement, households tend to value it more and make more tax-deferred savings, and they are likely to invest conservatively and hold about 25 percent more of pension wealth in relative safe assets (bonds).

Considering the size of this problem, parallel programming techniques as implemented in Message Passing Interface (MPI) are applied to make the problem computationally feasible.

Essay 2: Company Stock Investment in 401(k) Plans

Company stock investment in 401(k) pension plans has become an important but risky asset in retirement wealth. Previous studies on the determinants of company stock holdings focus on the past stock market performance of company stock, but ignore the characteristics of the retirement plans and individuals, such as company size, employer matches, other pension assets, and financial wealth information. In this study, I provide an empirical analysis of the factors that affect company stock holdings in 401(k) plans, by analyzing a broad list of company features, individual characteristics, and financial wealth information. My preferred estimates suggest that, different from general stocks which are sensitive to risk preference and total wealth, the decision of whether to hold company stock is more likely to be affected by the employer's characteristics and the availability of other investment opportunities. Individuals who work in larger companies and receive more employer matches in the retirement account are more likely to hold company stock in the retirement account, and they are less likely to hold company stocks when the wealth outside the pension account is large and they have other retirement accounts. In addition, I find that the company stock share in 401(k) account is decreasing with pension wealth and total net wealth, which indicates that less wealthy individuals are those who are more exposed to company stock risk.

Essay 3: Investment Choice and Savings in Defined Contribution Pensions

The striking growth defined contribution (DC) pensions have vastly expanded the number of individuals with some discretion regarding their retirement savings. One of the factors that may affect saving decisions is investment choice: namely the ability of the participant to direct the investment of the assets in the pension account. In most studies, people who report that they have control over assets allocation in pension plans do not distinguish the assets between the participant contribution and the employer contribution, but it is common for the employer's contribution to be constrained--often to company stock. In this study, I use the Health and Retirement Study (HRS) to estimate the impacts of unconstrained and constrained investment choices on participant saving levels in DC Pensions. The estimates and results indicate that participants with investment choice contribute over 3 percentage points more of their earnings into the defined contribution plan than people without choice, and people constrained in their investment contribute about 3 percentage points less in their retirement saving account. In addition, I find that male and lower income participants are more likely to contribute in a self-directed saving account.