

**Life-Cycle Portfolio Choice and Endogenous Retirement**  
**Dissertation Abstract**  
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For many investors, the decision to retire is one of the most important choices made over the lifetime. The decision to permanently leave the labor force depends on factors including, but not limited to: total wealth, potential future earnings, pension structure, bequest motive, and the investment environment. We identify the relative importance of these factors using a realistic life-cycle model. We determine the impact of endogenous retirement on savings and portfolio decisions and address recent conclusions concerning pre-retirement consumption and investment behavior. The model features a stochastic labor income process calibrated to Panel Study of Income Dynamics (PSID) data, asset return predictability driven by an observed aggregate state, and a discrete labor/leisure choice variable in which retirement is permanent.

This paper contributes to both the life-cycle savings/portfolio choice and endogenous retirement strands of literature. Stock and Wise (1990) and Lumsdaine, Stock and Wise (1992) study optimal retirement choice without consumption or portfolio decisions. Bodie, Merton and Samuelson (1992) consider life-cycle portfolio and consumption choice in a continuous time setting with endogenous labor supply, but do not explicitly consider retirement. Recently, Dybvig and Liu (2003), and Farhi and Panageas (2003) consider the effects of endogenous retirement on savings and investment decisions in a dynamic optimization setting. Both Dybvig and Liu and Farhi and Panageas conclude that investors with the option to choose retirement dates invest more aggressively near potential retirement. Furthermore, Farhi and Panageas conclude that investors not only hold more stock, but also save more overall to guarantee retirement. We address their findings in this paper and provide explanations for why our results differ.

We find that the ratio of total wealth-to-labor income is the primary determinant of the retirement decision and that at all ages, there exists a *critical* normalized wealth such that above this wealth, investors retire. Critical wealth is decreasing in age and sharply decreases when investors are eligible for reduced and full pension payments. Critical wealth is slightly higher in the aggregate state in which expected future risky stock returns are higher. This suggests that investors on the retirement margin postpone retirement during periods of high expected returns on equity. Labor income is a substitute for riskless bonds and serves as a hedge against portfolio risk. In periods of high expected returns, investors choose to hold more equity, and postpones retirement to use labor income as a hedge against return risk.

It is well known that human capital plays a large role in the determination of optimal equity proportion in financial portfolios. By endogenizing retirement, human capital becomes dependent on savings and investment rules, which depend in turn on human capital. We find that investors behave either more or less cautiously near retirement depending on the situation and not all agents invest more aggressively in stocks to target early retirement. This result is in contrast to the conclusions in Dybvig and Liu and Farhi and Panageas. In particular, mid-to-high wealth investors decrease equity proportion as potential retirement dates near while both sets of authors report that these investors should hold *more* equity near retirement. Their results differ from ours because the model considered in this paper includes substantially more background risk in the form of stochastic labor income and stochastic volatility of stock returns. If background risk is reduced, investors *do* invest more aggressively close to retirement.

We use Monte Carlo integration to estimate the first two moments of the retirement date and find that the expected time to retire corresponds with the date that *current* normalized wealth first exceeds critical wealth. We argue that this presents further evidence that endogenous retirement agents do not invest more aggressively to retire early. If such ‘threshold’ investing were present, the expected retirement date should be less than the date implied by current normalized wealth.

We also examine the welfare costs of imposing exogenous retirement at age 65 and report welfare losses as the percentage of current normalized wealth the investor must be given to equate lifetime utility with that of the endogenous retirement investor. Welfare losses are one measure of the option value of endogenous retirement, and are substantial for all investors who retire at age 65. In particular, sub-optimal exogenous retirement costs high wealth investors more than 50% of their beginning-of-period normalized wealth.

Finally, we consider the impact of asset return/labor income correlation and find that equity holdings are nearly completely crowded-out by increased labor income risk. If pension payments are stochastic and correlated with risky asset returns, the equity holdings for retired investors are crowded-out as well, although the level of crowding-out is much lower than for working investors. In either extension, the retirement decision is not significantly altered from the baseline case.