Spending rules for endowment funds
A dynamic model with subsistence levels

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Abstract Endowment fund managers face an asset allocation problem with several particularities: they are more interested in spending for current and future beneficiaries than growing value, although the trade-off between these two alternatives needs to be understood; they have to consider longest-term investment, typically an infinite horizon. We do address these allocation constraints in a dynamic framework where minimum subsistence levels (introducing the idea that a minimum spending amount needs to be made at every time period) are introduced in the objective function. We derive explicit formulas for the optimal spending stream, endowment value, spending rate and portfolio strategy in a simple Black/Scholes type economy. We analyze the effects of parameter changes on asset allocation decisions and provide simulations on bearish, median and bullish paths.

1. Introduction

Managers of endowment funds are particularly concerned about the downside risks of their investments because of their fiduciary responsibilities to balance today’s spending and future growth of the portfolio. They have to make sure they generate enough return to cover both the inflation and the spending rate. The main objective of university endowments could be stated as providing adequate spending for current and future beneficiaries while not eroding the principal value of the endowment as they face an infinite time horizon. Litvack et al. (1974) suggest that endowment funds should separate the investment decisions from the spending decisions of the university, protect the real value of the endowment fund and...
stabilize spendable income. The authors argue that the amount of dividends and interest earned in a given year would only be accidentally consistent with the amount that ought to be spent on the basis of general policy considerations if the endowment is invested for maximum total return. They recommend the use of spending rules based an average on the market value of endowment assets and show that it would have provided a slightly increased spending and a reasonably smoother spending stream. It should be noted however that spending requirements still apply when the return generated by the stock market is lower. An appropriate model for endowment funds should then include these characteristics whereby the asset allocation and spending decisions are coherently managed to satisfy the objectives in bull and bear markets.

In this paper, we address the following question: “What is the optimal asset allocation strategy which will maximize the expected utility of the beneficiaries of an endowment fund?” By the principles of prudence and fairness, fiduciaries of endowment funds have the obligation not to discriminate between generations. This dual goal of treating current and future beneficiaries of the endowment fairly and equally entails the endowment manager to take portfolio positions that should provide adequate spending today. The issue is to determine what an appropriate benchmark incorporating the trade-off between current spending and the growth of the corpus should be.

Merton (1993) has developed the first most significant continuous-time model to address the complicated problem of optimal investment strategies for endowment funds. The derivations are based on an intertemporal consumption and portfolio selection model. Optimal expenditures and allocation rules are derived in this very general framework that includes non-endowed funds as part of the university’s available resources. Dybvig (1999), using the results in Dybvig (1995) has also addressed the endowment fund problem in a continuous-time setting. He postulates that withdrawals from an endowment fund could be sustained by using TIPS (Treasury Inflation Protection Securities) in conjunction with a risky investment. The strategy proposed by Dybvig calls for lower spending rates than are commonly used by the endowments. This is necessary as he considers strategies that ensure that spending will never decline in value or, alternatively, strategies that ensure that spending will never fall faster than a pre-specified rate of decline in the spirit of the Duesenberry effect. He achieves this objective by separating the portfolio into committed and discretionary accounts, and in so doing, immunizing the committed part to fund committed spending. As the investment policy is similar to the constant proportions portfolio insurance strategy, the Dybvig strategy has a lower performance than a buy-and-hold strategy in volatile markets.

In this paper, we use a simple continuous-time model a la Black and Scholes (1973) and derive the essential characteristics of dynamic spending and allocation rules of endowment funds. The endowment fund is characterized by an HARA utility function with a minimum subsistence level that increases with the inflation rate. The optimal spending and portfolio allocation rules are derived explicitly which allows comparative static interpretations and numerical simulations. The utility from spending is defined in excess of the subsistence level, whereby the minimum future spending rate of the fund grows at a constant rate. A quick comparison of the model proposed here and that in Constantinides (1990) reveals that ours is a special case of the Constantinides habit formation model. In fact, subsistence level and habit formation are inherently related conceptually. Nevertheless, the issues addresses by both papers are completely different. Whereas Constantinides hoped to explain the equity premium puzzle using habit formation, we provide optimal spending and asset allocation policies in a “subsistence level” framework.