# Optimal Portfolio Choice under Regime Switching, Skew and Kurtosis Preferences

Massimo Guidolin
University of Virginia

Allan Timmermann
University of California, San Diego

JEL code: G12

**Abstract**

This paper proposes a new tractable approach to solving multi-period asset allocation problems. We assume that investor preferences are defined over moments of the terminal wealth distribution such as its skew and kurtosis. Time-variations in investment opportunities are driven by a regime switching process that can capture bull and bear states. We develop analytical methods that only require solving a small set of difference equations and thus are very convenient to use. These methods are applied to a simple portfolio selection problem involving choosing between a stock index and a risk-free asset in the presence of bull and bear states in the return distribution. If the market is in a bear state, investors increase allocations to stocks the longer their time horizon. Conversely, in bull markets it is optimal for investors to decrease allocations to stocks the longer their investment horizon.

Key words: Optimal Asset Allocation, Regime Switching, Skew and Kurtosis Preference.

## 1. Introduction

Optimal asset allocation has generated considerable interest in finance since the seminal papers by Merton (1969) and Samuelson (1969). Examples of recent studies include Ang and Bekaert (2001), Barberis (2000), Brandt (1999), Brennan, Schwarz and Lagnado (1997), Campbell and Viceira (1999, 2001), Kandel and Stambaugh (1996) and Lynch (2001). Only in very special cases such as under mean-variance or power utility with constant investment opportunities or under logarithmic utility can exact solutions to an investor's multi-period portfolio choice be derived in closed form. Unfortunately, the assumption of constant investment opportunities is at odds with considerable empirical evidence which indicates that asset returns are partially predictable.[1]

Faced with these limitations, recent papers have used numerical techniques such as quadrature methods (Ang and Bekaert (2001), Lynch (2001)) or Monte Carlo simulations (Barberis (2000)) to characterize optimal portfolio holdings. Unfortunately, these methods have their own limitations. Quadrature methods may not be very precise when the underlying asset return distributions are not

[1]See, e.g., Campbell (1987), Keim and Stambaugh (1986), Fama and French (1988) and Pesaran and Timmermann (1995).