The capital asset pricing model can be satisfied when the inflation risk premium is zero at all points in time

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Abstract

In this paper, I describe five solutions to the capital asset pricing model when the inflation risk premium is zero at all points in time. The paper ends with "The End"

Introduction

In a previous paper, I've described how the inflation risk premium can be zero at all points in time. In a previous paper, I've described inflation when the inflation risk premium is zero at all points in time. In this paper, I describe five solutions to the capital asset pricing model when the inflation risk premium is zero at all points in time.

The capital asset pricing model

The capital asset pricing model is defined by the equation

$$r_A(t) = r_f(t) + \beta_A(t)(r_M(t) - r_f(t))$$

where
$r_A(t)$ is the return on the asset as a function of time
$r_f(t)$ is the risk-free rate as a function of time
$r_M(t)$ is the return on the market portfolio as a function of time
$\beta_A(t)$ is the beta of the asset as a function of time

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In each of the solutions that follow, we use the same functional form of the return on the asset and the risk-free rate as used in the previous paper where I've described how the inflation risk premium can be zero at all points in time, i.e.

$$r_A(t) = \frac{e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\sigma}$$

$$r_f(t) = \left\{ \begin{array}{cc} 0 & t \leq 0 \\ 2\theta e^{-\frac{\theta^2 t^2}{\pi}} & t > 0 \end{array} \right.$$

The first solution to the capital asset pricing model

$$\beta_A(t) = -2$$

$$r_M(t) = \frac{3}{2}\left(\left\{ \begin{array}{cc} 2e^{-\frac{t^2\theta^2}{\pi}}\theta & t > 0 \\ 0 & t \leq 0 \end{array} \right. \right) - \frac{e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{2\sqrt{2\pi}\sigma}$$

The second solution to the capital asset pricing model

$$\beta_A(t) = -1$$

$$r_M(t) = 2\left(\left\{ \begin{array}{cc} 2e^{-\frac{t^2\theta^2}{\pi}}\theta & t > 0 \\ 0 & t \leq 0 \end{array} \right. \right) - \frac{e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\sigma}$$

The third solution to the capital asset pricing model

$$\beta_A(t) = \frac{1}{2}$$

$$r_M(t) = \frac{\sqrt{\frac{2}{\pi}}e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{\sigma} - (\left\{ \begin{array}{cc} 2e^{-\frac{t^2\theta^2}{\pi}}\theta & t > 0 \\ 0 & t \leq 0 \end{array} \right.)$$

The fourth solution to the capital asset pricing model

$$\beta_A(t) = 1$$

$$r_M(t) = \frac{e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\sigma}$$

The fifth solution to the capital asset pricing model

$$\beta_A(t) = \left\{ \begin{array}{cc} \frac{e^{-\frac{\Sigma}{2(t-M)}}(\frac{\Sigma}{t-M})^{3/2}}{\sqrt{2\pi}\Sigma} & t > M \\ 0 & t \leq M \end{array} \right.$$

$$r_M(t) = (\left\{ \begin{array}{cc} 2e^{-\frac{t^2\theta^2}{\pi}}\theta & t > 0 \\ 0 & t \leq 0 \end{array} \right.)(1 - \frac{1}{\left\{ \begin{array}{cc} \frac{e^{-\frac{\Sigma}{2(t-M)}}\sqrt{\Sigma}}{\sqrt{2\pi}(t-M)^{3/2}} & t > M \\ 0 & t \leq M \end{array} \right.}) + \frac{e^{-\frac{(t-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\sigma(\left\{ \begin{array}{cc} \frac{e^{-\frac{\Sigma}{2(t-M)}}\sqrt{\Sigma}}{\sqrt{2\pi}(t-M)^{3/2}} & t > M \\ 0 & t \leq M \end{array} \right.)}$$

The End