69,1971)
odel with
des (1976),
Liu and
009), Kallsen

rton model
g (2001),


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ns in Historical simulation (HS) models
Standard Chartered
VaR and ES is a function of empirical
ion, i.e. we need to interpolate PoT
probabilities should we assign to the order
hich grid of probabilities
hat probability should be assign to the biggest
ML) in our HS model e.g.
choices with VaR
17:24


David Hilbert


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Risk & Business Consulting.
Internal Audit.

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$\xi_y = (1-\xi)y < y$
$\xi \in (0,1)$

$(\Omega, \mathcal{F}, \mathbb{P})$
??

discrete-time


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Sophisticated manager

Corollary (3)

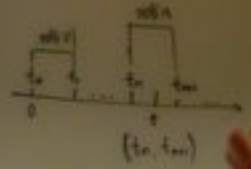
Let $\mu(x) \equiv \mu$, $\sigma(x) \equiv \sigma$ and $\gamma(x) := -\frac{r_2}{r_1 - r_2} e^{-r_1 x} + \frac{r_1}{r_2 - r_1} e^{-r_2 x}$. The value function of the sophisticated manager is

$$V_S(x; x_S) = \begin{cases} D_1 e^{r_1 x} + D_2 e^{r_2 x} + \alpha(C_1 e^{r_1 x} + C_2 e^{r_2 x}), & x \in [0, x_S], \\ V_S(x_S) + x - x_S, & x \in (x_S, \infty), \end{cases} \tag{18}$$

where s_1 and s_2 are the roots of (15),

$$C_1 = \frac{1 - P r_2 e^{r_2 x_S}}{r_1 e^{r_1 x_S} - r_2 e^{r_2 x_S}}, \quad C_2 = \frac{P r_1 e^{r_1 x_S} - 1}{r_1 e^{r_1 x_S} - r_2 e^{r_2 x_S}}, \tag{19}$$

$$D_1 = (1 - \alpha) \frac{1 - P s_2 e^{s_2 x_S}}{s_1 e^{s_1 x_S} - s_2 e^{s_2 x_S}}, \quad D_2 = (1 - \alpha) \frac{P s_1 e^{s_1 x_S} - 1}{s_1 e^{s_1 x_S} - s_2 e^{s_2 x_S}}. \tag{20}$$

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ries to exhibit the
1 : j).x_{k-1}).


A Primer on EC: quantities of interest


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16 50

Doob's submartingale inequality

For $\omega : \mathbb{R}_+ \longrightarrow \mathbb{R}$ càdlàg, running supremum $\overline{\omega}_t := \sup_{s \le t} \omega_s$, $t \ge 0$

Theorem

For all right-continuous submartingale M :

$$\mathbb{P}[\overline{M}_t \ge y] \quad \le \quad \inf_{\xi < y} \frac{\mathbb{E}[(M_t - \xi)^+]}{y - \xi}$$

Moreover, this inequality is sharpe in the sense that it holds with equality for some continuous martingale

Blackwell & Dubins 1963, Brown, Hobson & Rogers 1998


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d option prices