

69, 1971)
model with
des (1976),
Liu and
(2009), Kallsen

erton model
g (2001).

1102





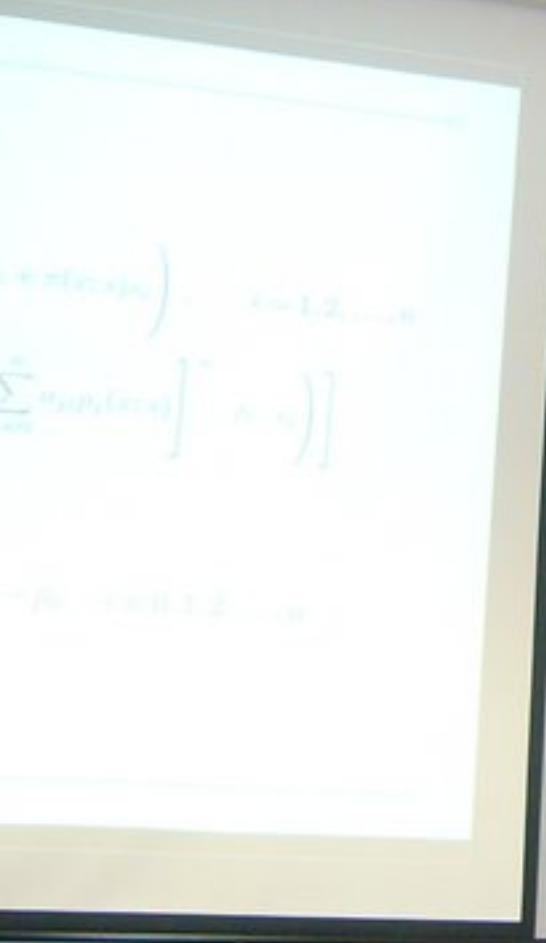




Assorted Dumpling

Lighter than average Bun

Coffee & Tea



11:30







David Hilbert (1862 – 1943) was one of the most influential mathematicians of the early 20th century. He developed ideas in many areas, and was instrumental in the development of one of the foundations of modern mathematics.

Hilbert adopted and was instrumental in the development of transfinite numbers. A famous result of his was his 1900 presentation of a list of 23 problems, which has influenced much of the mathematical research of the 20th century.

Hilbert and his 69 PhD students were instrumental in establishing rigor and precision in mathematics. He is also known for his work in mathematical logic and proof theory, and metamathematics.



ns in Historical simulation (HS) models



VaR and ES is a function of empirical
ion, i.e. we need to interpolate PoT

probabilities should we assign to the order
which grid of probabilities

that probability should be assign to the biggest
(μ) in our HS model e.g

choices with VaR

17:24







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periods

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ndt and

$$\sum_{t=0}^{\infty} y_t = (1-\varepsilon)y < y$$

$\varepsilon \in (0,1)$

$(0, F, \mathbb{P})$
L
??

discrete-time

continuous-

The Model:
A sequence of elements $\{x_i\}$ is called
a walk with discount factor γ and goal g , respectively
if the sequence satisfies $\forall i, x_{i+1} = \gamma x_i + g$ where g is the goal of
the walk given by
$$g = \gamma x_i + g$$

where x_i is the current element.
You can direct walks using policies. A policy
is a function $\pi: S \rightarrow A$ that maps a state to an action.
The first g in $\gamma x_i + g$ is the immediate
reward given by the state.
Discount factor
by a factor $\gamma < 1$, usually γ ranges in $[0, 1]$ with
1 representing the maximum value and 0 representing the
minimum value. A discount factor γ of 0 means that the
value of the state is 0.

09:06



Sophisticated manager

Corollary (3)

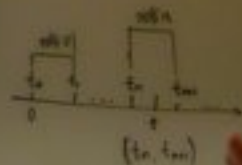
Let $\mu(x) \equiv \mu$, $\sigma(x) \equiv \sigma$ and $\gamma(x) := -\frac{\alpha}{\sigma^2} \frac{1}{x_1 - x_2} e^{-\gamma x} + \frac{\alpha}{\sigma^2} \frac{1}{x_2 - x_1} e^{-\gamma x}$.
 The value function of the sophisticated manager is

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

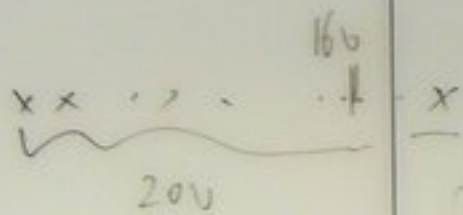
where x_1 and x_2 are the roots of (15),

$$C_1 = \frac{1 - Pr_2 e^{r_2 x_S}}{r_1 e^{r_1 x_S} - r_2 e^{r_2 x_S}}, \quad C_2 = \frac{Pr_1 e^{r_1 x_S} - 1}{r_1 e^{r_1 x_S} - r_2 e^{r_2 x_S}}, \quad (19)$$

$$D_1 = (1 - \alpha) \frac{1 - Pr_2 e^{r_2 x_S}}{x_1 e^{r_1 x_S} - x_2 e^{r_2 x_S}}, \quad D_2 = (1 - \alpha) \frac{Pr_1 e^{r_1 x_S} - 1}{x_1 e^{r_1 x_S} - x_2 e^{r_2 x_S}}. \quad (20)$$



15:23



$X \in L_v$
 $\psi_v(L_v)$
 $\psi_v(L_u + L_v(x))$
 $\psi_v = \psi_v \circ \psi_v^{-1}$
 $\psi_v^{-1} = \psi_v^{-1} \circ \psi_v$
 $\psi_v^{-1} \circ \psi_v = \text{id}$



tries to exhibit the

$(1 : j), x_{k-1}$

15:09



A Primer on EC: quantities of interest

- **ECap contributions** (e.g. ECapC of the i th obligor) are required in part in order to break down the overall ECap figure to the individual obligors (and/or etc.) within the portfolio. (Desirable: ECapC _{i} = $w_i \cdot \text{ECap}$ and ECap = $\sum_i \text{ECapC}_i$) (w_i is the total exposure of obligor i)
- **Incremental ECap** (IECap) i.e. the difference between the total ECap of the portfolio with and without a new loan, is frequently used for pricing purposes on an ex-ante basis.
- **Marginal ECap** (MECap) is the difference between the ECap of the total portfolio with and without an existing loan (or obligor).

ECapC and IECap can be computationally expensive and unstable!
Closed form approximation can provide consistent, quick and fairly accurate answer in many cases.





options

16:50



$$Q(R) = \text{affine } Q$$

$$Q(V) = \frac{Q(V)}{V} = \frac{Q(V)}{V} + L_V^V(x)$$
$$= \frac{Q(V)}{V} + L_V^V(x) + V$$
$$= \frac{Q(V)}{V} + L_V^V(x) + V$$



Doob's submartingale inequality

For $\omega : \mathbb{R}_+ \rightarrow \mathbb{R}$ càdlàg, running supremum $\bar{\omega}_t := \sup_{s \leq t} \omega_s$, $t \geq 0$

Theorem

For all right-continuous submartingale M :

$$\mathbb{P}[\bar{M}_t \geq y] \leq \inf_{\xi < y} \frac{\mathbb{E}[(M_t - \xi)^+]}{y - \xi}$$

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

Blackwell & Dubins 1963, Brown, Hobson & Rogers 1998

ing the crisis: An empirical likelihood
d option prices

13:59

