Tomas Björk: The pedagog

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University of Copenhagen
Conference in memory of Tomas Björk
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Unlike the two previous speakers, I didn't know Tomas Björk personally

But I have been a fly on the wall:

- Tomas Björk and Bent Jesper Christensen starting consistent term structure modelling; live at Hindsgavl '95
- Regime-switching with varying elegance; PhD-defense in Aarhus '98
- *Pointing with a Coke bottle*; Cph.'98
- "Damir Filipovic checked 56 Lie bracket cases manually"; PhD-course, Aarhus '01

Memento mori

Fischer Black is no longer alone

Every time I see a certain type of photo posted on social media, I think “Oh, no …”

But we live forever through our writings

Ragnar Norberg

Tomas Björk

Ole Barndorff-Nielsen

Stephen Ross

Peter Carr

Marc Yor

Mark Joshi

Mark Rubinstein

Mark Davis

Marco Avellaneda

…

Magnum opus

Arbitrage Theory in Continuous Time

1st edition '98, 4th edition '20

0th edition: Many claim midwifery,

- KTH
- KU-MATH
- ETH


Rolf Poulsen

Tomas Björk in Memoriam

The late Swedish financial mathematician influenced the author's views on quantitative finance enormously.

Third (red) and fourth (green) editions of the book (neither in mint condition)

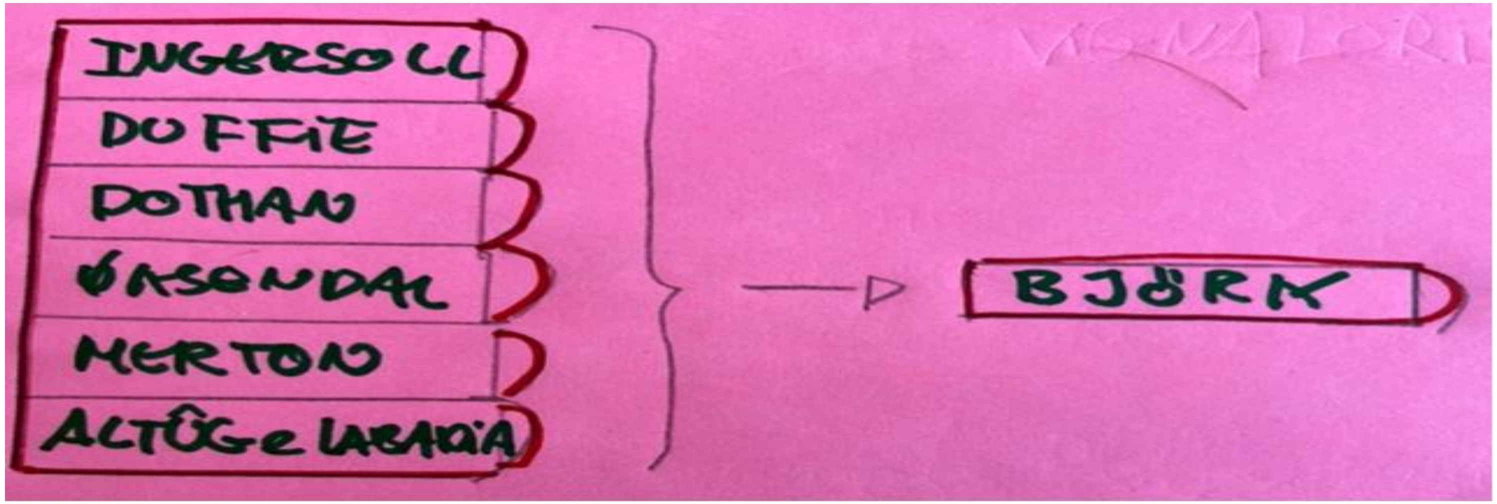
The book is a pedagogical masterpiece; it is written in a lucid style that makes continuous-time mathematical finance easy

12 WILMOTT magazine

E pluribus unum

When I was a student ('91-'99) we didn't have Björk

Since '00 I/we have been teaching 2-3 courses a year based on it at KU-MATH



Cur ita bonum est?

Arrogant causality: We teach directly from it at KU-MATH – and we are very picky! (Case: Lando & Poulsen (2022), "Finance 1 and Beyond")

Generic praise: Lucid exposition; explains why, not just how; gives the reader intuition – *yada-yada-yada*

The brilliant thing: Continuous-time finance made easy – but not too easy

Some books, papers, online sources are deceptively simple; irreproducible argumentation, "This is trivial if you don't think about it too carefully", what is a function of what?

Highlights from The Good Book

Chapter 6 on portfolio dynamics. It is *not* as obvious as it seems that $dV^{\phi} = \phi^{\top} dS$ is the self-financing condition in continuous time. Causes confusion to this day

Chapters 7 and 8 that address and fix a potential circularity when deriving the Black-Scholes pricing PDE

Björk's lemma

Helps us prove, construct, and analyse for instance

- HJM drift condition
- Musiela parametrization
- Cheyette Markovian representation
- Expectations hypotheses

Proposition 22.5

1. *If $p(t,T)$ satisfies (22.2), then for the forward rate dynamics we have*

$$df(t,T) = \alpha(t,T)dt + \sigma(t,T)dW(t),$$

where α and σ are given by

$$\begin{cases} \alpha(t,T) = v_T(t,T) \cdot v(t,T) - m_T(t,T), \\ \sigma(t,T) = -v_T(t,T). \end{cases} \tag{22.4}$$

2. *If $f(t,T)$ satisfies (22.3) then the short rate satisfies*

$$dr(t) = a(t)dt + b(t)dW(t),$$

where

$$\begin{cases} a(t) = f_T(t,t) + \alpha(t,t), \\ b(t) = \sigma(t,t). \end{cases} \tag{22.5}$$

3. *If $f(t,T)$ satisfies (22.3) then $p(t,T)$ satisfies*

$$dp(t,T) = p(t,T)\left\{r(t) + A(t,T) + \frac{1}{2}\|S(t,T)\|^2\right\}dt + p(t,T)S(t,T)dW(t),$$

where $\|\cdot\|$ denotes the Euclidean norm, and

$$\begin{cases} A(t,T) = -\int_t^T \alpha(t,s)ds, \\ S(t,T) = -\int_t^T \sigma(t,s)ds. \end{cases} \tag{22.6}$$

I also really like (plus shameless self-promotion)

Risk and Stochastics, pp. 43-67 (2019) No Access

Chapter 3: The Pedestrian's Guide to Local Time

Tomas Björk

https://doi.org/10.1142/9781786341952_0005 | **Cited by:** 0

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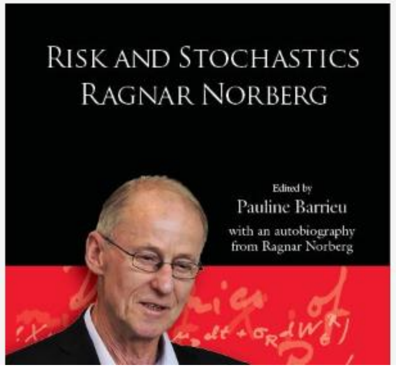
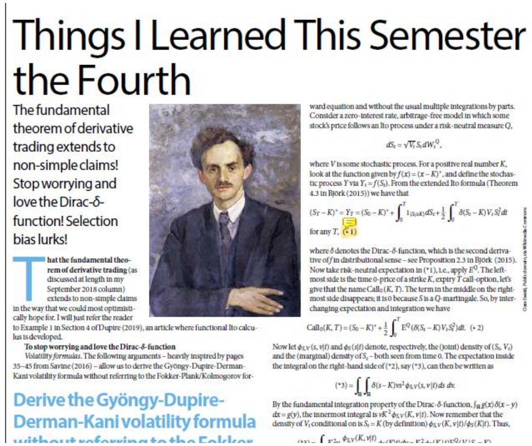


How I learned to stop worrying and love the Dirac-δ-function


Things I Learned This Semester the Fourth

The fundamental theorem of derivative trading extends to non-simple claims! Stop worrying and love the Dirac-δ-function! Selection bias lurks!

Derive the Gyöngy-Dupire-Derman-Kani volatility formula

September 14, 2022

My Wilmott Collection

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Published

The Fed Isn't Federal – And Other Odd Things in Finance, issue 88 (March 2017), pp. 34-45.

American π: Piece of Cake?, issue 91 (September 2017), pp. 12-13.

Binary Backwards, issue 94 (March 2018), pp. 20-21.

New editions: Sacrilegious or the ultimate tribute?

Could/would we in this room do it?
Possibly: Bourbaki-style; profits going to support of young finance scholars.

What would the family say? I guess *OUP* wouldn't mind.