

[Home](#) > [Decisions in Economics and Finance](#) > [Article](#)

# Reaching nirvana with a defaultable asset?

Published: 01 June 2017

Volume 40, pages 31–52, (2017) [Cite this article](#)



## [Decisions in Economics and Finance](#)

[Aims and scope](#) →

[Submit manuscript](#) →

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- > **Store and/or access information on a device**
- > **Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)



This is a preview of subscription content, [log in via an institution](#)  to check access.

### Access this article

Log in via an institution →

### Subscribe and save

✓ Springer+

from €37.37 /Month

- Starting from 10 chapters or articles per month
- Access and download chapters and articles from more than 300k books and 2,500 journals
- Cancel anytime

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **[privacy policy](#)** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

#### Store and/or access information on a device

#### Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

## Explore related subjects

Discover the latest articles, books and news in related subjects, suggested using machine learning.

[Behavioral Finance](#)[Capital Markets](#)[Mathematical Finance](#)[Microfinance](#)[Risk Theory](#)[Calculus of Variations and Optimization](#)

## Notes

1. Cox and Huang ([1989](#)) require the global Lipschitz continuity of the diffusive coefficient for the risky asset-value process [see Conditions A and B at p. 46 in Cox and Huang ([1989](#))]. By contrast, the diffusive coefficient in our setting is

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **[privacy policy](#)** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)[Reject optional cookies](#)[Manage preferences](#)

6. There are parameter values that make the investor with  $(\phi > 1)$  take a net short position in the risky defaultable asset.
7. Similar investment-horizon effects have been found in the literature on dynamic portfolio choice with a risky non-defaultable asset characterized by a mean-reverting drift and a constant volatility [see, for example, Koijen et al. (2009)].
8. The functions  $U$  and  $V$  are conjugate if and only if  $(U(w) = \inf_{y > 0} (V(y) + wy))$  and  $(V(y) = \sup_{w > 0} (U(w) - wy))$ .
9. The superscript  $(\left( \cdot \right)^{\{DS\}})$  refers to the notations of Delbaen

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

Branger, N., Larsen, L.S., Munk, C.: Robust portfolio choice with ambiguity and learning about return predictability. J. Bank. Finance **37**(5), 1397–1411 (2013)

[Article](#) [Google Scholar](#)

Buch, C., Eickmeier, S., Prieto, E.: Macroeconomic factors and microlevel bank behavior. J. Money Credit Bank. **46**(4), 715–751 (2014)

[Article](#) [Google Scholar](#)

Campi, L., Sbuelz, A.: Closed-form pricing of benchmark equity default swaps under the CEV assumption. Risk Lett. **1**, ISSN: 1740-9551 (2005)

Chodorow-Reich, G.: Effects of unconventional monetary policy on financial

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

Della Corte, P., Sarno, L., Tsiakas, I.: Volatility and correlation timing in active currency management. In: James, J., Marsh, I.W., Sarno, L. (eds.) Handbook of Exchange Rates. Wiley, Hoboken NJ, USA (2012).

doi:[10.1002/9781118445785.ch15](https://doi.org/10.1002/9781118445785.ch15)

Dell’Ariccia, G., Laeven, L., Marquez, R.: Monetary policy, leverage, and bank risk-taking. J. Econ. Theory **149**, 65–99 (2014)

[Article](#) [Google Scholar](#)

Detemple, J.B., Garcia, R., Rindisbacher, M.: A Monte-Carlo method for optimal portfolios. J. Finance **58**, 401–446 (2003)

[Article](#) [Google Scholar](#)

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

financial institutions. J. Finance **69**(2), 819–866 (2014)

[Article](#) [Google Scholar](#)

Gollier, C.: Discounting an uncertain future. J. Public Econ. **85**, 149–166 (2002)

[Article](#) [Google Scholar](#)

Gozzi, F., Russo, F.: Verification theorems for stochastic optimal control problems via a time dependent Fukushima–Dirichlet decomposition. Stoch. Process. Appl. **116**(11), 1530–1562 (2006)

[Article](#) [Google Scholar](#)

Guidolin, M., Timmermann, A.: Asset allocation under multivariate regime

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

Kim, T.S., Omberg, E.: Dynamic nonmyopic portfolio behavior. Rev. Financ. Stud. **9**, 141-161 (1996)

Klebaner, F., Lipster, R.: When a stochastic exponential is a true martingale. Extension of a method of benes. Theory Probab. Appl. **58**(1), 38-62 (2014)

Koijen, R.S.L., Rodríguez, I.C., Sbuelz, A.: Momentum and mean reversion in

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)



Lioui, A., Poncet, P.: International asset allocation: a new perspective. J. Bank. Finance **27**(11), 2203–2230 (2003)

[Article](#) [Google Scholar](#)

Liu, J.: Portfolio selection in stochastic environments. Rev. Financ. Stud. **20**, 1–39 (2007)

[Article](#) [Google Scholar](#)

Martin, I.: On the valuation of long-dated assets. J. Polit. Econ. **120**(2), 346–358 (2012)

[Article](#) [Google Scholar](#)

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

possible rate. J. Environ. Econ. Manag. **36**, 201–208 (1998)

[Article](#) [Google Scholar](#)

Weitzman, M.L.: On modeling and interpreting the economics of catastrophic climate change. Rev. Econ. Stat. **91**, 1–19 (2009)

[Article](#) [Google Scholar](#)

## Acknowledgements

We would like to thank the editors and two anonymous referees for their insightful comments and suggestions.

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

## 1.1 A.1 Proof of proposition [3.1](#)

The problem of utility maximization can be written as  $\max_{w \in \tilde{W}} \left( e^{\frac{1}{1-\phi} u(w)} \right)$  where  $u$  is defined as

$$u(w) = \sup_{\tilde{w} \in \tilde{W}} E[U(\tilde{w}_T)].$$

(A.1)

We apply to problem (A.1) the duality approach developed by Kramkov and Schachermayer (1999, 2003). To this aim, we observe that the utility function  $U$  satisfies Inada conditions [equation (2.4) in Kramkov and Schachermayer (1999)]. Let  $V$  denote the conjugate function<sup>8</sup> of  $U$ , that is  $V(y) = \frac{\phi}{1-\phi} y^{\frac{1-\phi}{\phi}}$  and define

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

$$\frac{1}{\phi} = w \frac{\eta^{-\frac{1}{\phi}}}{E \left[ \eta^{-\frac{1-\phi}{\phi}} \right]}. \end{aligned} \quad \square$$

The value function is then

$$\begin{aligned} J(w) &= \left( e^{rT} \right)^{1-\phi} E \left[ U(\tilde{W}^*) \right] = U(w e^{rT}) E \left[ \left( \frac{\eta^{-\frac{1}{\phi}}}{E \left[ \eta^{-\frac{1-\phi}{\phi}} \right]} \right)^{1-\phi} \right] \\ &= U(w e^{rT}) \left( E \left[ \eta^{-\frac{1-\phi}{\phi}} \right] \right)^{\phi} \\ &= U(w e^{rT}) \left( E \left[ \exp \left( \frac{1-\phi}{\phi} \int_0^T \sqrt{Y_t} dZ_t + \frac{1-\phi}{2\phi} \int_0^T Y_t dt \right) \right] \right)^{\phi} \\ &= U(w e^{rT}) F(T, y). \end{aligned}$$

$\square$

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

The random variable  $(L_{\{T\}})$  in (A.2) is the Radon–Nikodym density of a probability measure equivalent to  $(\mathbb{P})$ . In fact, Theorem<sup>9</sup> 2.3 in Delbaen and Shirakawa (2002) applied to  $(S^{DS}=Y, \rho^{DS}=0.5, r^{DS}=b>0, \sigma^{DS}=2\sqrt{c\phi}, \mu^{DS}=b+2a\sqrt{c\phi}),$  and  $(\theta^{DS}=a)$  implies that  $(\eta_{\{T\}}^{DS}=L_{\{T\}})$  is the Radon–Nikodym density of an equivalent probability measure  $(\hat{\mathbb{Q}})$  equivalent to  $(\mathbb{P}).$  Girsanov’s theorem implies then that

$$\begin{aligned} \hat{Z}_t &= Z_t - \int_0^t a \sqrt{Y_s} ds \\ \end{aligned}$$

(A.3)

is a  $(\hat{\mathbb{Q}})$ -Brownian motion. Thus,

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- Store and/or access information on a device**
- Personalised advertising and content, advertising and content measurement, audience research and services development**

Accept all cookies

Reject optional cookies

Manage preferences

(A.6)

where  $G(t, y)$  is a  $(\mathcal{C}^{\{1,2\}})$  function to be determined in such a way that  $(G(0,y)=1)$  and  $M$  is a  $(\{\hat{\mathbb{Q}}\})$ -martingale. In particular, Eq. (A.6) implies for  $(t=0)$  that  $(M_0=G(T,y))$  and for  $(t=T)$

$$\begin{aligned} M_T &= \exp \left( \frac{a^2 + a^2}{2} \int_0^T Y_t dt \right) G(0, Y_T) = \exp \left( \frac{a^2 + a^2}{2} \int_0^T Y_t dt \right), \end{aligned}$$

since  $(G(0,\cdot)=1.)$  The martingality condition  $(M_0 = E^{\{\hat{\mathbb{Q}}\}}[M_T])$  yields then

$$G(T,y) = E^{\{\hat{\mathbb{Q}}\}} \left[ \exp \left( \frac{a^2 + a^2}{2} \int_0^T Y_t dt \right) \right]$$

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

### Store and/or access information on a device

### Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

$$\begin{aligned} g(t) &= \frac{(a^2 + a)(e^{\sqrt{q}t} - 1)}{\sqrt{q} + b + e^{\sqrt{q}t}(\sqrt{q} - b)}. \end{aligned}$$

Since  $(M_t)$  has 0 drift in the Ito decomposition under  $(\hat{\mathbb{Q}})$ ,  $(M_t)$  is a  $(\hat{\mathbb{Q}})$  local martingale. To conclude that  $(M_t)$  is a martingale we define

$$\mathfrak{z}_t = \frac{M_t}{M_0},$$

which is a  $(\hat{\mathbb{Q}})$  local martingale as well, and show that  $(\mathfrak{z}_t)$  is a  $(\hat{\mathbb{Q}})$  martingale. To this aim, we first observe that process  $(\mathfrak{z}_t)$  is a stochastic exponential. In fact, Ito formula implies that

$$dM_t = e^{\frac{a^2 + a}{2} \int_0^t \dots}$$

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- Store and/or access information on a device
- Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

with

$$\begin{aligned} m_t &= \int_0^t 2\sqrt{c\phi} g(T-s)\sqrt{Y_s} d\hat{Z}_s. \end{aligned}$$

We apply Theorem 4.1 in Klebaner and Lipster ([2014](#)) to conclude that  $(\mathfrak{z}_t)$  is a true martingale. In particular, with Klebaner and Lipster notations (4.2) at page 44

$$\begin{aligned} a_s(y) &= b_s(y) = 2\sqrt{c\phi} \sqrt{y} \quad \text{from (A.5)} \\ \sigma_s(y) &= 2\sqrt{c\phi} g(T-s)\sqrt{y} \quad \text{from our def. of } m_t, \end{aligned}$$

we get

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **[partners](#)**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **[privacy policy](#)** for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)



## 1.3 A.3 Proof of proposition [3.3](#)

In what follows, we will mainly work under the martingale measure  $(\mathbb{Q}, \mathbb{P})$  whose density with respect to  $(\mathbb{P})$  is  $(\eta)$  in Eq. ([2.3](#)). We denote with  $(Z_t^\mathbb{Q})$  the  $(\mathbb{Q})$ -Brownian motion

$$Z_t^\mathbb{Q} = Z_t + \int_0^t \sqrt{Y_s} ds.$$

(A.10)

Before proving the result, we first list some technical lemmas.

### Lemma A.1

Let  $(L^* = \frac{L_T}{\eta})$  where  $(L_T)$  is given by ([A.2](#)). Then

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

$$\{Q\}\}\}\{d\{\mathbb{P}\}\}\}\{\frac{d\mathbb{Q}}{d\mathbb{P}}\}=\frac{d\{\hat{\mathbb{Q}}\}}{d\mathbb{Q}}, \end{aligned}$$$$

and from the definitions of  $\eta$  in (2.3) and of  $L$  in (A.2) that

$$\begin{aligned} L_T^*&=\frac{L_T}{\eta}=\exp\left(a\int_0^T\sqrt{Y_s}dZ_s-\frac{a^2}{2}\int_0^TY_sds+\int_0^T\sqrt{Y_s}dZ_s+\frac{1}{2}\int_0^TY_sds\right)\\&=\exp\left(\left(a+1\right)\int_0^T\sqrt{Y_s}dZ_s+\frac{1-a^2}{2}\int_0^TY_sds\right).\end{aligned}$$$$

From the definition of  $(Z_s^{\mathbb{Q}})$  in Eq. (A.10) we get

$$\begin{aligned} L_T^*&=\exp\left(\left(a+1\right)\int_0^T\sqrt{Y_s}\left(dZ_s^{\mathbb{Q}}-\sqrt{Y_s}ds\right)\right) \end{aligned}$$

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- Store and/or access information on a device**
- Personalised advertising and content, advertising and content measurement, audience research and services development**

Accept all cookies

Reject optional cookies

Manage preferences

Let  $(M_t)$  be the  $(\hat{\mathbb{Q}})$ -martingale defined in (A.6), namely

$$M_t = e^{\frac{a^2 + a}{2} \int_0^t Y_s ds} e^{Y_t g(T-t)}.$$

Then we have

$$dM_t &= 2\sqrt{c\phi(Y_t)} M_t g(T-t) d\hat{Z}_t \\ &= 2\sqrt{c\phi(Y_t)} M_t g(T-t) \left( dZ_t^{\mathbb{Q}} - \frac{1}{\phi(Y_t)} dt \right)$$

(A.12)

where  $(\hat{Z}_t)$  is defined in (A.3) and  $(Z_t^{\mathbb{Q}})$  in Eq. (A.10).

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

Accept all cookies

Reject optional cookies

Manage preferences

$$_{t}^{\ast})\sqrt{Y_t}dZ_t^{\mathbb{Q}}\end{aligned}$$$$

(A.13)

since  $(d\tilde{P}_t=\tilde{P}_t\sqrt{Y_t}\sigma _tdt+\tilde{P}_t\sigma _tdZ_t=\tilde{P}_t\frac{\xi }{\sqrt{Y_t}}dZ_t^{\mathbb{Q}})$  from (2.1) and (A.10).

Therefore, we look for the Ito representation of  $(\tilde{W}^{\ast }(t)=E^{\mathbb{Q}}[\tilde{W}^{\ast }|\mathcal{F}_t])$  to derive  $(\psi ^{\ast })$ . Denoting with  $(L_t=E\left[ L_T\Big | \mathcal{F}_t\right] )$  and  $(\eta _t=E\left[ \eta \Big | \mathcal{F}_t\right] )$ , we have

$$\begin{aligned} E^{\mathbb{Q}}\left[ \eta ^{-\frac{1}{\phi }}\Big | \mathcal{F}_t\right] &= \frac{E\left[ \eta ^{1-\frac{1}{\phi }}\Big | \right.} \end{aligned}$$

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- Store and/or access information on a device**
- Personalised advertising and content, advertising and content measurement, audience research and services development**

Accept all cookies

Reject optional cookies

Manage preferences



# About this article

## Cite this article

Battauz, A., De Donno, M. & Sbuelz, A. Reaching nirvana with a defaultable asset?. *Decisions Econ Finan* **40**, 31–52 (2017). <https://doi.org/10.1007/s10203-017-0192-x>

Received

07 October 2016

Issue Date

November 2017

DOI

<https://doi.org/10.1007/s10203-017-0192-x>

Accepted

18 May 2017

Published

01 June 2017

## Keywords

[Dynamic asset allocation](#)

[Duality-based optimal portfolio solutions](#)

[Convex duality](#)

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)



# Navigation

Find a journal

Publish with us

Track your research

## Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **[partners](#)**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **[privacy policy](#)** for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

**Store and/or access information on a device**

**Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)