



Download This Paper (Delivery.cfm/SSRN\_ID910218\_code327792.pdf?abstractid=910218&mirid=1)

Open PDF in Browser (Delivery.cfm/SSRN\_ID910218\_code327792.pdf?abstractid=910218&mirid=1&type=2)

★ Add Paper to My Library

Share: [f](#) [t](#) [✉](#) [🔗](#)

## A Three-Factor Yield Curve Model: Non-Affine Structure, Systematic Risk Sources, and Generalized Duration

*PIER Working Paper No. 06-017*

44 Pages

Posted: 21 Jun 2006

Francis X. Diebold ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=15004](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=15004))

University of Pennsylvania - Department of Economics; National Bureau of Economic Research (NBER)

Lei Ji ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=347191](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=347191))

University of Pennsylvania - Department of Economics

Canlin Li ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=154290](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=154290))

University of California, Riverside (UCR) - A. Gary Anderson Graduate School of Management

Date Written: March 9, 2004

### Abstract

We assess and apply the term-structure model introduced by Nelson and Siegel (1987) and re-interpreted by Diebold and Li (2003) as a modern three-factor model of level, slope and curvature. First, we ask whether the model is a member of the affine class, and we find that it is not. Hence the poor forecasting performance recently documented for affine term structure models in no way implies that our model will forecast poorly, which is consistent with Diebold and Li's (2003) finding that it indeed forecasts quite well. Next, having clarified the relationship between our three-factor model and the affine class, we proceed to assess its adequacy directly, by testing whether its level, slope and curvature factors do indeed capture systematic risk. We find that they do, and that they are therefore priced. Finally, confident in the ability of our three-factor model to capture the pricing relations present in the data, we proceed to explore its efficacy in bond portfolio risk management. Traditional Macaulay duration is appropriate only in a one-factor (level) context; hence we move to a three-factor generalized duration, and we show the superior performance of hedges constructed using it.

**Keywords:** Term structure; Yield curve; Factor model; Risk Management

**JEL Classification:** G1, E43, E47, C5

[Suggested Citation](#) >

[Show Contact Information](#) >



Download This Paper (Delivery.cfm/SSRN\_ID910218\_code327792.pdf?abstractid=910218&mirid=1)

Open PDF in Browser (Delivery.cfm/SSRN\_ID910218\_code327792.pdf?abstractid=910218&mirid=1&type=2)

## 16 References

1. F X Diebold , C Li

Forecasting the Term Structure of Government Bond Yields Posted: 2003

Crossref (<https://doi.org/10.3386/w10048>)

2. G Duffee

Term Premia and Interest Rate Forecasts in Affine Models

Journal of Finance , volume 57 , p. 405 - 443 Posted: 2002

Crossref (<https://doi.org/10.1111/1540-6261.00426>)

We use cookies that are necessary to make our site work. We may also use additional cookies to analyze, improve and personalize our content and your digital experience. For more information, see our [Cookie Policy](#)

<https://www.elsevier.com/legal/cookie-notice>)

A Three-Factor Model of Interest Rates

Mathematical Finance , volume 6 , p. 379 - 406 Posted: 1996

[Cookie Settings](#)

Accept all cookies

Load more

0 Citations

Fetch Citations

Do you have a job opening that you would like to promote on SSRN?

Place Job Opening (<https://www.ssrn.com/index.cfm/en/Announcements-Jobs/>)

Paper statistics

DOWNLOADS	831
ABSTRACT VIEWS	3,564
RANK	56,746

9 Citations

16 References



[https://plu.mx/ssrn/a/?ssrn\\_id=910218](https://plu.mx/ssrn/a/?ssrn_id=910218)  
Recommended Papers

- Specification Analysis of Affine Term Structure Models ([https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=225893&rec=1&srcabs=910218&pos=1](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=225893&rec=1&srcabs=910218&pos=1))  
By Qiang Dai ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=139423](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=139423)) and Kenneth J. Singleton ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=15716](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=15716))
- Specification Analysis of Affine Term Structure Models ([https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=139422&rec=1&srcabs=910218&pos=2](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=139422&rec=1&srcabs=910218&pos=2))  
By Qiang Dai ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=139423](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=139423)) and Kenneth J. Singleton ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=15716](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=15716))
- A No-Arbitrage Vector Autoregression of Term Structure Dynamics with Macroeconomic and Latent Variables ([https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=275437&rec=1&srcabs=910218&pos=3](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=275437&rec=1&srcabs=910218&pos=3))  
By Andrew Ang ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=94010](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=94010)) and Monika Piazzesi ([https://papers.ssrn.com/sol3/cf\\_dev/AbsByAuth.cfm?per\\_id=195429](https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=195429))

View more >

Feedback

Submit a Paper > (<https://hq.ssrn.com/submission.cfm>)

 (<https://www.facebook.com/SSRNcommunity/>)

 ([https://www.linkedin.com/company/493409?](https://www.linkedin.com/company/493409?trk=tyah&trklInfo=clickedVertical%3Acompany%2CentityType%3AentityHistoryName%2CclickedEntityId%3Acompany_493409%2Cidx%3A0)

[trk=tyah&trklInfo=clickedVertical%3Acompany%2CentityType%3AentityHistoryName%2CclickedEntityId%3Acompany\\_493409%2Cidx%3A0](https://www.linkedin.com/company/493409?trk=tyah&trklInfo=clickedVertical%3Acompany%2CentityType%3AentityHistoryName%2CclickedEntityId%3Acompany_493409%2Cidx%3A0)

 (<https://twitter.com/SSRN>)

(<http://www.elsevier.com/>)

Copyright (<https://www.ssrn.com/index.cfm/en/dmca-notice-policy/>)

Terms and Conditions (<https://www.ssrn.com/index.cfm/en/terms-of-use/>)

Privacy Policy (<https://www.elsevier.com/legal/privacy-policy>)

All content on this site: Copyright © 2023 Elsevier Inc., its licensors, and contributors. All rights are reserved, including those for text and data mining, AI training, and similar technologies. For all open access content, the Creative Commons licensing terms apply.

We use cookies to help provide and enhance our service and tailor content.

To learn more, visit [Cookie Settings](#).



(<http://www.relx.com/>)

(<https://papers.ssrn.com/sol3/updateInformationLog.cfm?process=true>)

We use cookies that are necessary to make our site work. We may also use additional cookies to analyze, improve, and personalize our content and your digital experience. For more information, see our [Cookie Policy](https://www.elsevier.com/legal/cookienotice) (<https://www.elsevier.com/legal/cookienotice>)

[Cookie Settings](#)

Accept all cookies