

Empirical Asset Pricing (PHDBA 239C)
Part II: Bond Risk Premia and Term Structure Models
Syllabus – Fall 2018

(Version: September 10, 2018)

Class: Tuesday 9:00-12:00 in Cheit 330
Website: bCourses.berkeley.edu
Office Hours: by appointment (F502)
Final: December 11 during class time

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Course Description

In this second part of the Ph.D. course “Empirical Asset Pricing” the focus is on the term structure of interest rates and its links with the macroeconomy. After reviewing basic concepts of fixed income securities and the evidence against the expectations hypothesis we will introduce and work with affine no-arbitrage models of the yield curve. Within this broad class of models you will get to know single- and multi-factor models, Gaussian and stochastic volatility specifications, models for real and nominal interest rates, and both reduced-form and structural macro-finance models. Using these models, we will investigate the predictability of interest rates and returns, the properties and determinants of risk premia, the effects of macroeconomic fundamentals and risks, and the central role of monetary policy, including its transmission to financial markets and unconventional policies during the recent zero-lower-bound period. In addition to our empirical, macro-finance investigation of government bond yield curves, we will study models that jointly price stocks and bonds in order to understand the underlying drivers of their respective risk premia. Finally, we turn to the international dimension and consider global linkages of interest rates, exchange rate puzzles and currency risk premia.

Our focus will be mainly empirical as we address questions such as how to estimate dynamic term structure models, how to measure bond risk premia, and how to identify and quantify links between financial markets and the macroeconomy. A solid background in econometrics and time series analysis is necessary, both to follow the lectures and to accomplish the assignments. After successful completion of this second part of the course, you will have a robust understanding of important stylized facts in bond markets and the underlying empirical methods, and you will be in a good position to embark on your own research of questions in financial markets and macro-finance.

Textbooks and other reference material

- Textbooks:
 - **Required:** John H. Cochrane. *Asset Pricing, Revised Edition*. Princeton University Press, 2009
 - **Required:** John Y. Campbell, Andrew Wen-Chuan Lo, and Archie Craig MacKinlay. *The Econometrics of Financial Markets*. Princeton University Press, 1997 (CLM)
 - **Recommended:** John Y. Campbell. *Financial Decisions and Markets: A Course in Asset Pricing*. Princeton University Press, 2017
 - **Recommended:** James D. Hamilton. *Time Series Analysis*. Princeton University Press, 1994
- Surveys:
 - Monika Piazzesi. Affine term structure models. In Yacine Ait-Sahalia and Lars Hansen, editors, *Handbook of Financial Econometrics*, volume 1, chapter 12, pages 691–766. Elsevier, 2010
 - Gregory R. Duffee. Forecasting interest rates. In Graham Elliott and Allan Timmermann, editors, *Handbook of Economic Forecasting*, volume 2, Part A, pages 385–426. Elsevier, 2013a
 - Gregory R. Duffee. Bond pricing and the macroeconomy. In Milton Harris George M. Constantinides and Rene M. Stulz, editors, *Handbook of the Economics of Finance*, volume 2, Part B, pages 907–967. Elsevier, 2013b
 - Refet S. Gürkaynak and Jonathan H. Wright. Macroeconomics and the term structure. *Journal of Economic Literature*, 50(2):331–367, 2012

Prerequisites

This course is intended for 2nd year Ph.D. students in finance and economics.

- **Required:** Discrete-Time Asset Pricing (PHDBA239A), Continuous-Time Asset Pricing (PHDBA239B), Econometrics (ECON240A and ECON240B)
- **Recommended:** Aggregate Economics (ECON234A), Time Series Econometrics (ECON241B)

Assessments

Problem Sets

There will be weekly problem sets. Some of the questions will require you to carry out empirical analysis or simulations using statistical software packages on your computer. You are free to use any software package, but I recommend R, Python or Matlab. It is okay to work in groups with your classmates, but you must turn in individual solutions. Late assignments are unacceptable and will not be graded.

Referee Report

You are required to write one short paper, a critical assessment of an unpublished and current working paper. Imagine that you are a referee for this paper that was submitted for publication to a top-tier finance or economics journal, and that you want to do your best to convey to the editor your scientific, impartial opinion of the strengths and weaknesses of the paper. Please read Berk, Harvey, and Hirshleifer (2017) for additional guidance on how to write referee reports. I will provide a list of papers to choose from, and you can also suggest a paper yourself. Make sure to confirm your choice of paper with me before writing your report.

The reports are due **in class on Tuesday, November 20.**

Final Exam

The final exam for PHDBA239C will be administered during class time on December 11, 2018. The exam will include questions from both Martin Lettau's first part and this second part of the course.

Grading Policy

Same as in Part I: final exam 60%, problem sets 20%, class participation/referee report 20%

Schedule and Reading List

(This schedule is tentative and subject to change.)

Class 1: Fixed-income securities and the yield curve (October 16)

- Bond prices, discount factors, yields, compounding frequencies
- Coupon bonds, duration, convexity
- LIBOR, swaps, futures, forwards
- Bootstrapping zero-coupon rates, Nelson-Siegel(-Svensson) model
- Principal component analysis
- Expectations hypothesis, different versions of EH, Jensen inequality effects
- Definitions of bond risk premia: term premium, expected excess returns, forward premium
- Evidence against the EH, predictive regressions, econometric issues
- Properties of yields: persistence, unit roots, cointegration, random walk forecasts

Required: CLM ch. 10, Bekaert, Hodrick, and Marshall (1997), Campbell (1995), Campbell and Shiller (1987, 1991), Cochrane and Piazzesi (2005)

Recommended: Campbell ch. 8.1-8.2, Diebold and Li (2006), Fama and Bliss (1987), Gürkaynak, Sack, and Wright (2007), Litterman and Scheinkman (1991), Shiller (1979)

Class 2: Affine dynamic term structure models (October 23)

- SDF and bond prices
- Single-factor models
- Canonical affine Gaussian model
- Normalization, identification, invariant transforms
- Estimation: maximum likelihood, JSZ, ACM, HW
- Stochastic volatility models, Dai-Singleton classification
- Model validation: excess returns, forecasting, term premium
- Relevance of no-arbitrage restrictions
- Empirical shortcomings and possible remedies
- Zero lower bound

Required: CLM ch. 11, Cochrane ch. 19, Ang and Piazzesi (2003), Dai and Singleton (2000), Duffee (2002), Joslin, Singleton, and Zhu (2011, JSZ)

Recommended: Campbell ch. 8.3, Adrian, Crump, and Moench (2013, ACM), Bauer, Rudebusch, and Wu (2014), Bauer and Rudebusch (2016), Dai and Singleton (2002, 2003), Hamilton and Wu (2012, HW), Kim and Wright (2005), Kim and Orphanides (2012), Wu and Xia (2016)

Class 3: Real interest rates and inflation risk (October 30)

- Fisher equation, evidence of (short-run/long-run) Fisher effect
- Pricing of real vs. nominal bonds: real/nominal SDF, affine term structure models
- Inflation-linked bonds, TIPS and swaps, TIPS-Treasury Bond Puzzle
- Inflation compensation, inflation expectations, inflation risk premium
- Hedging properties of real and nominal bonds and risk premia
- Term structure of inflation expectations, shifting endpoints

Required: Ang, Bekaert, and Wei (2008), Campbell, Sunderam, and Viceira (2017), Campbell and Viceira (2001), Gürkaynak, Sack, and Wright (2010)

Recommended: Campbell ch. 8.4, Abrahams, Adrian, Crump, Moench, and Yu (2016), Campbell, Shiller, and Viceira (2009), d'Amico, Kim, and Wei (2018), Christensen, Lopez, and Rudebusch (2010), Fleckenstein, Longstaff, and Lustig (2014), Kozicki and Tinsley (2001), Mishkin (1992), Rose (1988)

Class 4: Macroeconomic fundamentals and risks (November 6)

- Reduced-form macro-finance models of the yield curve
- Consumption-based/equilibrium models of the yield curve
- New Keynesian and DSGE models of the yield curve
- Evidence on unspanned macro risk, spanning puzzle
- Macro trends, structural change and learning: π_t^* and r_t^*

Required: Bauer and Hamilton (2018), Duffee (2011), Piazzesi and Schneider (2007)

Recommended: Bauer and Rudebusch (2017a), Bauer and Rudebusch (2017b), Cieslak and Povala (2015), Hördahl, Tristani, and Vestin (2006), Joslin, Le, and Singleton (2013), Joslin, Priebsch, and Singleton (2014), Ludvigson and Ng (2009), Rudebusch and Wu (2008), Rudebusch and Swanson (2012), Wachter (2006)

Class 5: Monetary policy and the business cycle (November 13)

- Implementation of monetary policy: past, present, future
- Policy rules
- Measuring monetary policy surprises and shocks
- Conundrum, comovement and excess sensitivity
- Response of nominal and real yields to monetary policy surprises
- Predictive power of the term spread for recessions
- Unconventional monetary policies, channels of QE, preferred habitat

Required: Ang, Piazzesi, and Wei (2006), Gürkaynak, Sack, and Swanson (2005a,b), Krishnamurthy and Vissing-Jorgensen (2011), Piazzesi (2005)

Recommended: Bauer and Rudebusch (2014), Diebold, Rudebusch, and Aruoba (2006), Estrella and Mishkin (1998), Hanson and Stein (2015), Hanson, Lucca, and Wright (2018), Kuttner (2001), Nakamura and Steinsson (2018), Rudebusch (2002), Swanson and Williams (2014)

Class 6: Term structures of equity and interest rates (November 20)

- Changing comovement of stock and bond returns, the “Fed model”
- Joint modeling of stocks and bonds with affine term structure models
- Determinants of equity and bond risk premia

Required: Bekaert, Engstrom, and Xing (2009), Lettau and Wachter (2011)

Recommended: Campbell ch. 9.4, Adrian, Crump, and Moench (2015), Bekaert and Engstrom (2010), Van Binsbergen, Brandt, and Koijen (2012), Koijen, Lustig, and Van Nieuwerburgh (2017), Lettau and Wachter (2007)

Class 7: International bond yields and exchange rates (November 27)

- Covered/uncovered interest parity, carry trade
- Evidence on international bond risk premia and currency risk premia
- International comovement of interest rates
- Global term structure models

Required: Backus, Foresi, and Telmer (2001), Engel (2014), Lustig and Verdelhan (2007)

Recommended: Campbell ch. 8.5, Bansal and Shaliastovich (2013), Chen and Tsang (2013), Diebold, Li, and Yue (2008), Fama (1984), Jotikasthira, Le, and Lundblad (2015), Lustig, Rousanov, and Verdelhan (2011, 2014)

Class 8: Review and discussion of current research (December 4)

No new material

Books for further reading

In addition to the papers and books referenced above, the following textbooks are useful for people that want to go deeper into the subject in their research or professional work.

- Damiano Brigo and Fabio Mercurio. *Interest Rate Models – Theory and Practice: With Smile, Inflation and Credit*. Springer Science & Business Media, 2007
- Damir Filipovic. *Term-Structure Models: A Graduate Course*. Springer, 2009
- Pietro Veronesi. *Fixed Income Securities: Valuation, Risk, and Risk management*. John Wiley & Sons, 2010
- Pietro Veronesi. *Handbook of Fixed-Income Securities*. John Wiley & Sons, 2016
- Francis X. Diebold and Glenn D. Rudebusch. *Yield Curve Modeling and Forecasting: The Dynamic Nelson-Siegel Approach*. Princeton University Press, 2013

References

- Michael Abrahams, Tobias Adrian, Richard K Crump, Emanuel Moench, and Rui Yu. Decomposing real and nominal yield curves. *Journal of Monetary Economics*, 84:182–200, 2016.
- Tobias Adrian, Richard K. Crump, and Emanuel Moench. Pricing the term structure with linear regressions. *Journal of Financial Economics*, 110(1):110–138, 2013.
- Tobias Adrian, Richard K Crump, and Emanuel Moench. Regression-based estimation of dynamic asset pricing models. *Journal of Financial Economics*, 118(2):211–244, 2015.
- Andrew Ang and Monika Piazzesi. A no-arbitrage vector autoregression of term structure dynamics with macroeconomic and latent variables. *Journal of Monetary Economics*, 50(4):745–787, May 2003.
- Andrew Ang, Monika Piazzesi, and Min Wei. What does the yield curve tell us about gdp growth? *Journal of Econometrics*, 131(1–2):359–403, March 2006.
- Andrew Ang, Geert Bekaert, and Min Wei. The term structure of real rates and expected inflation. *Journal of Finance*, 63(2):797–849, 04 2008.
- David K Backus, Silverio Foresi, and Chris I Telmer. Affine term structure models and the forward premium anomaly. *The Journal of Finance*, 56(1):279–304, 2001.
- Ravi Bansal and Ivan Shaliastovich. A long-run risks explanation of predictability puzzles in bond and currency markets. *Review of Financial Studies*, 26(1):1–33, 2013.
- Michael D. Bauer and James D. Hamilton. Robust bond risk premia. *Review of Financial Studies*, 31(2):399–448, February 2018.
- Michael D. Bauer and Glenn D. Rudebusch. The signaling channel for federal reserve bond purchases. *International Journal of Central Banking*, 10(3):233–289, September 2014.
- Michael D. Bauer and Glenn D. Rudebusch. Monetary policy expectations at the zero lower bound. *Journal of Money, Credit and Banking*, 48(7):1439–1465, 2016.
- Michael D. Bauer and Glenn D. Rudebusch. Interest rates under falling stars. Working Paper 2017-12, Federal Reserve Bank of San Francisco, November 2017a.
- Michael D. Bauer and Glenn D. Rudebusch. Resolving the spanning puzzle in macro-finance term structure models. *Review of Finance*, 21(2):511–553, March 2017b.
- Michael D. Bauer, Glenn D. Rudebusch, and Jing Cynthia Wu. Term premia and inflation uncertainty: Empirical evidence from an international panel dataset: Comment. *American Economic Review*, 104(1):1–16, January 2014.
- Geert Bekaert and Eric Engstrom. Inflation and the stock market: Understanding the fed model. *Journal of Monetary Economics*, 57(3):278–294, 2010.
- Geert Bekaert, Robert J. Hodrick, and David A. Marshall. On biases in tests of the expectations hypothesis of the term structure of interest rates. *Journal of Financial Economics*, 44(3):309–348, 1997.
- Geert Bekaert, Eric Engstrom, and Yuhang Xing. Risk, uncertainty, and asset prices. *Journal of Financial Economics*, 91(1):59–82, 2009.
- Jonathan B Berk, Campbell R Harvey, and David Hirshleifer. How to write an effective referee report and improve the scientific review process. *Journal of Economic Perspectives*, 31(1):231–44, 2017.
- Damiano Brigo and Fabio Mercurio. *Interest Rate Models – Theory and Practice: With Smile, Inflation and Credit*. Springer Science & Business Media, 2007.

- John Y Campbell. Some lessons from the yield curve. *Journal of economic perspectives*, 9(3):129–152, 1995.
- John Y. Campbell. *Financial Decisions and Markets: A Course in Asset Pricing*. Princeton University Press, 2017.
- John Y. Campbell and Robert J. Shiller. Cointegration and tests of present value models. *Journal of Political Economy*, 95(5):1062–1088, 1987.
- John Y. Campbell and Robert J. Shiller. Yield spreads and interest rate movements: A bird’s eye view. *Review of Economic Studies*, 58(3):495–514, May 1991.
- John Y. Campbell and Luis M. Viceira. Who should buy long-term bonds? *American Economic Review*, 91(1):99–127, 2001.
- John Y. Campbell, Andrew Wen-Chuan Lo, and Archie Craig MacKinlay. *The Econometrics of Financial Markets*. Princeton University Press, 1997.
- John Y. Campbell, Robert J. Shiller, and Luis M. Viceira. Understanding inflation-indexed bond markets. *Brookings Papers on Economic Activity*, pages 79–120, Spring 2009.
- John Y. Campbell, Adi Sunderam, and Luis M. Viceira. Inflation bets or deflation hedges? the changing risks of nominal bonds. *Critical Finance Review*, 6(2):263–301, 2017.
- Yu-chin Chen and Kwok Ping Tsang. What does the yield curve tell us about exchange rate predictability? *Review of Economics and Statistics*, 95(1):185–205, 2013.
- Jens H. E. Christensen, Jose A. Lopez, and Glenn D. Rudebusch. Inflation expectations and risk premiums in an arbitrage-free model of nominal and real bond yields. *Journal of Money, Credit and Banking*, 42:143–178, 2010.
- Anna Cieslak and Pavol Povala. Expected returns in treasury bonds. *Review of Financial Studies*, 28(10):2859–2901, October 2015.
- John H. Cochrane. *Asset Pricing, Revised Edition*. Princeton University Press, 2009.
- John H. Cochrane and Monika Piazzesi. Bond risk premia. *American Economic Review*, 95(1):138–160, March 2005.
- Qiang Dai and Kenneth J. Singleton. Specification analysis of affine term structure models. *Journal of Finance*, 55(5):1943–1978, October 2000.
- Qiang Dai and Kenneth J. Singleton. Expectation puzzles, time-varying risk premia, and affine models of the term structure. *Journal of Financial Economics*, 63(3):415–441, March 2002.
- Qiang Dai and Kenneth J. Singleton. Term structure dynamics in theory and reality. *Review of Financial Studies*, 16(3):631–678, 2003.
- Stefania d’Amico, Don H. Kim, and Min Wei. Tips from tips: the informational content of treasury inflation-protected security prices. *Journal of Financial and Quantitative Analysis*, 53(1):395–436, 2018.
- Francis X. Diebold and Canlin Li. Forecasting the term structure of government bond yields. *Journal of Econometrics*, 130:337–364, 2006.
- Francis X. Diebold and Glenn D. Rudebusch. *Yield Curve Modeling and Forecasting: The Dynamic Nelson-Siegel Approach*. Princeton University Press, 2013.
- Francis X. Diebold, Glenn D. Rudebusch, and Boragan S. Aruoba. The macroeconomy and the yield curve: A dynamic latent factor approach. *Journal of Econometrics*, 131(1):309–338, 2006.

- Francis X Diebold, Canlin Li, and Vivian Z Yue. Global yield curve dynamics and interactions: a dynamic nelson–siegel approach. *Journal of Econometrics*, 146(2):351–363, 2008.
- Gregory R. Duffee. Term premia and interest rate forecasts in affine models. *Journal of Finance*, 57(1): 405–443, February 2002.
- Gregory R. Duffee. Information in (and not in) the term structure. *Review of Financial Studies*, 24(9): 2895–2934, 2011.
- Gregory R. Duffee. Forecasting interest rates. In Graham Elliott and Allan Timmermann, editors, *Handbook of Economic Forecasting*, volume 2, Part A, pages 385–426. Elsevier, 2013a.
- Gregory R. Duffee. Bond pricing and the macroeconomy. In Milton Harris George M. Constantinides and Rene M. Stulz, editors, *Handbook of the Economics of Finance*, volume 2, Part B, pages 907–967. Elsevier, 2013b.
- Charles Engel. Exchange rates and interest parity. In *Handbook of international economics*, volume 4, pages 453–522. Elsevier, 2014.
- Arturo Estrella and Frederic S Mishkin. Predicting us recessions: financial variables as leading indicators. *Review of Economics and Statistics*, 80(1):45–61, 1998.
- Eugene F Fama. Forward and spot exchange rates. *Journal of monetary economics*, 14(3):319–338, 1984.
- Eugene F. Fama and Robert R. Bliss. The information in long-maturity forward rates. *American Economic Review*, 77(4):680–692, 1987.
- Damir Filipovic. *Term-Structure Models: A Graduate Course*. Springer, 2009.
- Matthias Fleckenstein, Francis A. Longstaff, and Hanno Lustig. The tips-treasury bond puzzle. *Journal of Finance*, 69(5):2151–2197, 2014.
- Refet S. Gürkaynak and Jonathan H. Wright. Macroeconomics and the term structure. *Journal of Economic Literature*, 50(2):331–367, 2012.
- Refet S. Gürkaynak, Brian P. Sack, and Eric T. Swanson. The sensitivity of long-term interest rates to economic news: Evidence and implications for macroeconomic models. *American Economic Review*, 95 (1):425–436, March 2005a.
- Refet S. Gürkaynak, Brian P. Sack, and Eric T. Swanson. Do actions speak louder than words? the response of asset prices to monetary policy actions and statements. *International Journal of Central Banking*, 1 (1):55–93, May 2005b.
- Refet S. Gürkaynak, Brian Sack, and Jonathan H. Wright. The u.s. treasury yield curve: 1961 to the present. *Journal of Monetary Economics*, 54(8):2291–2304, 2007.
- Refet S. Gürkaynak, Brian P. Sack, and Jonathan H. Wright. The tips yield curve and inflation compensation. *American Economic Journal: Macroeconomics*, 2(1):70–92, January 2010.
- James D. Hamilton. *Time Series Analysis*. Princeton University Press, 1994.
- James D. Hamilton and Jing Cynthia Wu. Identification and estimation of gaussian affine term structure models. *Journal of Econometrics*, 168(2):315–331, 2012.
- Samuel G Hanson and Jeremy C Stein. Monetary policy and long-term real rates. *Journal of Financial Economics*, 115(3):429–448, 2015.
- Samuel G. Hanson, David O. Lucca, and Jonathan H. Wright. Interest rate conundrums in the 21st century. unpublished working paper, June 2018.

- Peter Hördahl, Oreste Tristani, and David Vestin. A joint econometric model of macroeconomic and term-structure dynamics. *Journal of Econometrics*, 131(1–2):405–444, 2006.
- Scott Joslin, Kenneth J. Singleton, and Haoxiang Zhu. A new perspective on gaussian dynamic term structure models. *Review of Financial Studies*, 24(3):926–970, March 2011.
- Scott Joslin, Anh Le, and Kenneth J. Singleton. Why gaussian macro-finance term structure models are (nearly) unconstrained factor-vars. *Journal of Financial Economics*, 109:604–622, September 2013.
- Scott Joslin, Marcel Priebisch, and Kenneth J. Singleton. Risk premiums in dynamic term structure models with unspanned macro risks. *Journal of Finance*, 69(3):1197–1233, June 2014.
- Chotibhak Jotikasthira, Anh Le, and Christian Lundblad. Why do term structures in different currencies co-move? *Journal of Financial Economics*, 115(1):58–83, 2015.
- Don H. Kim and Athanasios Orphanides. Term structure estimation with survey data on interest rate forecasts. *Journal of Financial and Quantitative Analysis*, 47(1):241–272, February 2012.
- Don H. Kim and Jonathan H. Wright. An arbitrage-free three-factor term structure model and the recent behavior of long-term yields and distant-horizon forward rates. Finance and Economics Discussion Series 2005-33, Federal Reserve Board of Governors, 2005.
- Ralph Koijen, Hanno Lustig, and Stijn Van Nieuwerburgh. The cross-section and time series of stock and bond returns. *Journal of Monetary Economics*, 88:50–69, 2017.
- S. Kozicki and P.A. Tinsley. Shifting endpoints in the term structure of interest rates. *Journal of Monetary Economics*, 47(3):613–652, 2001.
- Arvind Krishnamurthy and Annette Vissing-Jorgensen. The effects of quantitative easing on interest rates: Channels and implications for policy. *Brookings Papers on Economic Activity*, pages 215–265, Fall 2011.
- Kenneth N. Kuttner. Monetary policy surprises and interest rates: Evidence from the fed funds futures market. *Journal of Monetary Economics*, 47(3):523–544, June 2001.
- Martin Lettau and Jessica A. Wachter. Why is long-horizon equity less risky? a duration-based explanation of the value premium. *The Journal of Finance*, 62(1):55–92, 2007.
- Martin Lettau and Jessica A. Wachter. The term structures of equity and interest rates. *Journal of Financial Economics*, 101:90–113, 2011.
- Robert B. Litterman and José Scheinkman. Common factors affecting bond returns. *Journal of Fixed Income*, 1(1):54–61, June 1991.
- Sydney C. Ludvigson and Serena Ng. Macro factors in bond risk premia. *Review of Financial Studies*, 22(12):5027–5067, 2009.
- H. Lustig and A. Verdelhan. The cross section of foreign currency risk premia and consumption growth risk. *American Economic Review*, 97(1):89–117, 2007.
- Hanno Lustig, Nikolai Roussanov, and Adrien Verdelhan. Common risk factors in currency markets. *The Review of Financial Studies*, 24(11):3731–3777, 2011.
- Hanno Lustig, Nikolai Roussanov, and Adrien Verdelhan. Countercyclical currency risk premia. *Journal of Financial Economics*, 111(3):527–553, 2014.
- Frederic S. Mishkin. Is the fisher effect for real? a reexamination of the relationship between inflation and interest rates. *Journal of Monetary Economics*, 30:195–215, 1992.
- Emi Nakamura and Jón Steinsson. High frequency identification of monetary non-neutrality: The information effect. *Quarterly Journal of Economics*, 2018.

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- Monika Piazzesi. Bond yields and the federal reserve. *Journal of Political Economy*, 113(2):311–344, April 2005.
- Monika Piazzesi. Affine term structure models. In Yacine Ait-Sahalia and Lars Hansen, editors, *Handbook of Financial Econometrics*, volume 1, chapter 12, pages 691–766. Elsevier, 2010.
- Monika Piazzesi and Martin Schneider. Equilibrium yield curves. In *NBER Macroeconomics Annual 2006, Volume 21*, pages 389–472. MIT Press, 2007.
- Andrew Kenan Rose. Is the real interest rate stable? *Journal of Finance*, 43(5):1095–1112, December 1988.
- Glenn D. Rudebusch. Term structure evidence on interest rate smoothing and monetary policy inertia. *Journal of Monetary Economics*, 49(6):1161–1187, 2002.
- Glenn D. Rudebusch and Eric T. Swanson. The bond premium in a dsge model with long-run real and nominal risks. *American Economic Journal: Macroeconomics*, 4(1):105–143, 2012.
- Glenn D. Rudebusch and Tao Wu. A macro-finance model of the term structure, monetary policy, and the economy. *Economic Journal*, 118(530):906–926, July 2008.
- Robert J. Shiller. The volatility of long-term interest rates and expectations models of the term structure. *Journal of Political Economy*, 87(6):1190–1219, December 1979.
- Eric T. Swanson and John C. Williams. Measuring the effect of the zero lower bound on medium- and longer-term interest rates. *American Economic Review*, 104(10):3154–3185, 2014.
- Jules Van Binsbergen, Michael Brandt, and Ralph Koijen. On the timing and pricing of dividends. *American Economic Review*, 102(4):1596–1618, 2012.
- Pietro Veronesi. *Fixed Income Securities: Valuation, Risk, and Risk management*. John Wiley & Sons, 2010.
- Pietro Veronesi. *Handbook of Fixed-Income Securities*. John Wiley & Sons, 2016.
- Jessica A. Wachter. A consumption-based model of the term structure of interest rates. *Journal of Financial Economics*, 79(2):365–399, 2006.
- Jing Cynthia Wu and Fan Dora Xia. Measuring the macroeconomic impact of monetary policy at the zero lower bound. *Journal of Money, Credit and Banking*, 48(2-3):253–291, 2016.