

BO YOUNG CHANG

Principal Economist / Économiste principale

Resolution and Crisis Preparedness / Section de la résolution et de la préparation liées aux crises

Financial Stability Department / Département de la stabilité financière

Bank of Canada / Banque du Canada

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EDUCATION

- PhD in Finance, McGill University, Montreal, Canada, 2011
- MSc in Mathematical Finance, University of British Columbia, Vancouver, Canada, 2002
- BSc (Honours) in Mathematics, Queen's University, Kingston, Canada, 2000

RESEARCH INTERESTS

- Empirical asset pricing
- Option pricing
- Risk management
- Downside risk
- Higher moments in probability distributions

PROFESSIONAL EXPERIENCE

2023-present **Principal Economist**

Resolution and Crisis Preparedness, Financial Stability Department, Bank of Canada

- I developed resolution plans designed to respond to a failure of a Canadian designated financial market infrastructure, as part of the Bank's role as the Canadian FMI resolution authority. My main responsibility included acting as a lead in building stress testing capabilities of the team.

2019-2023 **Principal Analyst**

Debt Management Division, Financial Markets Department, Bank of Canada

- I advised the Government of Canada in setting its domestic debt strategy. My main responsibility involved working with the Canadian Debt Strategy Model (MATLAB) to support the government's debt strategy decisions.

2018-2019 **Senior Analyst**

Debt Management Division, Funds Management and Banking Department, Bank of Canada

- I advised the Government of Canada in setting its domestic debt strategy. My main responsibility involved working with the Canadian Debt Strategy Model (MATLAB) to support the government's debt strategy decisions.

- 2017-2018 **Senior Analyst**
Operational Risk Division, Financial Markets Department, Bank of Canada
- I validated the Bank's model for constructing the Government of Canada yield curve for zero-coupon bonds (originally developed by David Bolder).
 - I reviewed the application of the yield curve model in the Bank's bond buyback and switch operations.
 - I contributed to the development of a model validation framework that was undertaken to support the department's initiative to establish a new model risk management framework.
- 2015-2016 **Senior Economist**
Market Risks and Vulnerabilities Division, Financial Markets Department, Bank of Canada
- I developed a pricing model for the NHA-MBS (National Housing Act Mortgage-Backed Securities) for the purpose of the Bank's collateral valuation. I led the development of the model and worked closely with the traders in the Market Analysis and Operations division and the IT department to operationalize the model on the Market Data Management (MDM) system.
 - I contributed to the development of a monitoring framework for the shadow banking sector in Canada and co-authored a Bank of Canada Review article describing the framework.
- 2011-2014 **Senior Analyst**
Financial Market Policy Analysis Division, Financial Markets Department, Bank of Canada
- I developed a set of tools (MATLAB) to extract the probability distribution of asset prices using option prices. The tool was used to answer various policy questions pertaining to monetary policy and financial stability. Examples include: (1) the probability of a large decline in the Euro during the European sovereign debt crisis of 2011-12, (2) the probability of the interest rate cut by the Bank of Canada in 2015, (3) the probability of a large decline in the oil price.
 - I developed a set of tools to compute the *realized volatility* using high frequency prices of interest rate futures (BAX futures) and the *implied volatility* using the price of options on interest rate futures (options on BAX futures). The tool was used to gauge the uncertainty around the monetary policy in Canada.
- 2002-2004 **Actuarial Analyst**
Eckler Partners Ltd., Toronto, Canada
I worked as an analyst in the pension investment consulting practice of the firm. Responsibilities included investment performance monitoring, investment manager search, research related to pension fund investment, and database maintenance.
- 2001 **Financial Software Developer**
Financial CAD Corporation, Vancouver, Canada

I examined different credit derivative products in the market and did a survey of existing valuation models for credit derivatives.

TEACHING EXPERIENCE

- Derivatives, Carleton University, Winter 2016
- Derivatives and Risk Management, McGill University, Summer 2009

DISSERTATION

Three Essays on Option-Implied Risk Measures and Equity Pricing

PUBLICATIONS

Katherine Brennan, Bo Young Chang, Alper Odabasioglu and Radoslav Raykov, 2025, “Stress Testing Central Counterparties for Resolution Planning,” *Bank of Canada Staff Analytical Note 2025-11*.

Bo Young Chang, 2023, “Estimating the Slope of the Demand Function at Auctions for Government of Canada Bonds,” *Bank of Canada Staff Discussion Paper 2023-12*.

Bo Young Chang and Greg Orosi, 2020, “A simple method for extracting the probability of default from American put option prices,” *Journal of Futures Markets*, 40 (10), 1535-1547.

Bo Young Chang, Jun Yang and Parker Liu, 2018, “The Cost of the Government Bond Buyback and Switch Programs in Canada,” *Bank of Canada Staff Analytical Note 2018-41*.

Bo Young Chang and Greg Orosi, 2017, “Equity Option Implied Probability of Default and Equity Recovery Rate,” *Journal of Futures Markets*, 37 (6), 599-613.

Bo Young Chang, Michael Januska, Gitanjali Kumar and André Usche, 2016, “Monitoring Shadow Banking in Canada: A Hybrid Approach,” *Bank of Canada Financial System Review*, December 2016, 23-37.

Bo Young Chang and Bruno Feunou, 2014, “Measuring Uncertainty in Monetary Policy Using Realized and Implied Volatility,” *Bank of Canada Review*, Spring 2014, 32-41.

Peter Christoffersen, Kris Jacobs, and Bo Young Chang, 2014, Chapter on Forecasting Using Option Prices, *Handbook of Economic Forecasting*, Volume 2, edited by Graham Elliott and Allan Timmermann, in the *Handbooks in Economics Series* edited by Kenneth J. Arrow and Michael D. Intriligator

Bo Young Chang, Peter Christoffersen, and Kris Jacobs, 2013, “Market Skewness Risk and the Cross-Section of Stock Returns,” *Journal of Financial Economics*, 107 (1), 46-68.

Bo Young Chang, Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, 2012, “Option-Implied Measures of Equity Risk,” *Review of Finance*, 16 (2), 385-428.

WORKING PAPERS

Bo Young Chang, Bruno Feunou, Jean-Sébastien Fontaine, and Sergii Pypko, 2016, “Common Idiosyncratic Variance and Global Risk Factors in Exchange Rates and Option-Implied Volatilities,” Working Paper, Bank of Canada.

Bo Young Chang and Bruno Feunou, 2013, “Measuring Uncertainty in Monetary Policy Using Implied Volatility and Realized Volatility,” Bank of Canada Working Paper 2013-37.

Bo Young Chang and Gregory Vainberg, 2010, “Option-Implied Risk around Mergers and Acquisitions”

Bo Young Chang, 2010, “Option-Implied Quantiles and the Expected Stock Market Return”

POLICY REPORTS

- Potential Impact of Removal of Government Bond Purchase Program on Government of Canada Bond Yields, Debt & Treasury Management Committee report, September 2020
- Review of Penalty Function and Minimum Issuance Constraints in Canadian Debt Strategy Model: Recommendation, Debt & Treasury Management Committee report, September 2018
- Framework for Model Validation in Financial Markets Department (draft), April 2018
- Model Validation: Yield Curve for Zero-Coupon GoC Bonds, January 2018
- Analysis of Bond Valuation Methods Used in Buyback/Switch Operations, November 2017
- Securities Lending Markets - Trends and Vulnerabilities, October 2016
- Shadow Banking Monitoring Note, October 2015
- Potential Impact of Minimum Haircuts on Repo Collaterals in Canada, September 2012
- Option-Implied Probability of a Large Decline in the Euro, July 2012

AWARDS / SCHOLARSHIPS

- Participation in the 5th Lindau Meeting of the Winners of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, granted to 450 most qualified young economists, August 2014
- Runner up for Whitebox Prize for Best Financial Research (\$5,000), Whitebox Advisors LLC, 2013
- Excellence in Teaching Award, Desautels Faculty of Management, McGill University, 2009
- PhD Management Research Award, Desautels Faculty of Management, McGill University, 2009
- American Finance Association (AFA) Travel Grant, 2008
- Fonds de recherche sur la société et la culture Doctoral Fellowship, 2008-2009
- Institut de Finance Mathématique de Montréal Doctoral Fellowship, 2005-2008
- Desautels Faculty of Management of McGill Doctoral Fellowship, 2004-2005
- Summer Internship, Mathematics of Information Technology and Complex Systems (MITACS), 2001
- Teaching and Research Assistantship, University of British Columbia, 2000-2002
- Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award, Queen’s University, 1999
- Nellie and Ralph Jeffery Award in Mathematics, Queen’s University, 1999

- The Susan Near Prize in Mathematics, Queen's University, 1998

ACADEMIC / PROFESSIONAL SERVICE

- Program committee, Northern Finance Association annual meeting (2016-2019)
- Program committee, Midwest Finance Association annual meeting (2014, 2018)
- Journal referee: Journal of Financial and Quantitative Analysis, Management Science, Journal of Banking and Finance, Journal of Futures Markets, Journal of Business and Economic Statistics, Quarterly Journal of Finance, Studies in Economics and Finance, Studies in Nonlinear Dynamics & Econometrics, European Financial Management, Journal of Empirical Finance

QUALIFICATIONS

- Languages: English (fluent), French (advanced, Bank of Canada level-5), Korean (native).
- Passed Courses 1-4 of the Society of Actuaries.
- Passed CFA Level I.
- Computer programming: MATLAB (advanced), R, Stata