Beomseok Seo

Ph.D., Economist, Bank of Korea
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EDUCATION

Ph.D., Statistics, **Penn State University**, University Park, PA — Aug 2016 - Aug 2021

- Thesis: Interpretable Statistical Learning: From Hidden Markov Models to Neural Networks.
- Advisor: Jia Li (Professor of Statistics and Computer Science)

B.A., Economics & Statistics, **Korea University**, Seoul, Korea — Mar 2005 - Feb 2011

EMPLOYMENT

Economist, *The Bank of Korea*, Seoul, Korea

- **Office of Economic Modeling and Policy Analysis**, — *Feb 2023 - Present*
  - Modeling for short-term forecasting and policy analysis
  - Writing short-term economic forecasting for Korean economic outlook (KEO)
- **Statistics Research Unit**, — *Jun 2021 - Jan 2023*
  - Natural language processing, big data modeling for financial markets and real economy
  - Developing and compiling news sentiment index (NSI), economic policy uncertainty index (EPU) of Korea
- **Economic Statistics Department, National Expenditure Statistics Team**, — *Feb 2013 - Jun 2016*
  - Time series modeling, developing statistics, and compiling GDP and expenditures
- **Financial Markets Department**, — *Jan 2011 - Feb 2013*
  - Time series modeling, volatility analysis for short-term financial markets
  - Writing weekly issue notes for monetary policy committee meeting

Adjunct Professor,

- **Dept. of Quantitative Applied Economics**, *Sungkyunkwan Univ.*, Seoul — *Sep 2023 - Present*
  - Teaching MA students "Big Data Analytics in Macroeconomics"
- **Dept. of Statistics**, *Korea Univ.*, Seoul — *Sep 2023 - Present*
  - Teaching MA students "Machine Learning for Finance and Economics"

Researcher, *Pennsylvania State University*, State College, PA

- **Dept. of Statistics**, — *Summer 2018, Summer 2020, & Summer 2021*
  - Researching high-dimensional unsupervised learning problems, working under Jia Li
  - Researching interpretable neural network models, working under Lynn Lin
- **Smeal College of Business**, — *Summer 2020*
  - Researching neural networks for longitudinal data, working under Lei Wang

- **Dept. of Political Science**, *Summer 2017*
  - Researching misclassified event-failure models, working under Bumba Mukherjee

Korea Army, Paju, Korea *Aug 2006 - Jul 2008*

RESEARCH INTERESTS

My research interests include a range of related problems in

- Interpretable statistical modeling and machine learning,
- Developing tools to better understand macroeconomics, finance, and monetary policy,
- Dealing with various text-related economic and financial problems.

PEER-REVIEWED JOURNAL ARTICLES

* Corresponding author

Beomseok Seo*, Younghwan Lee, Hyungbae Cho (2024) "Measuring News Sentiment of Korea Using Transformer." Korean Economic Review(SSCI), 40(1), 149-176.

Beomseok Seo*, Lynn Lin, Jia Li (2022) "Mixture of Linear Models Co-supervised by Deep Neural Networks." Journal of Computational and Graphical Statistics, 31(4), 1303-1317.

Beomseok Seo*, Lynn Lin, Jia Li (2021). "Block-wise Variable Selection for Clustering via Latent States of Mixture Models." Journal of Computational and Graphical Statistics, 31(1), 138-150.

Jia Li, **Beomseok Seo**, Lynn Lin (2019) "Optimal Transport, Mean Partition, and Uncertainty Assessment in Cluster Analysis." Statistical Analysis and Data Mining: The ASA Data Science Journal, 12(5), 359-377.

Seung Jun Shin, **Beomseok Seo***, (2024) "Real-Time Private Consumption Prediction Using Big Data." (in Korean). Korean Journal of Applied Statistics, 37(1), 13-38.

Jae Keun Yoo, Yujin Park, **Beomseok Seo***, (2024) "Using Noise Filtering and Sufficient Dimension Reduction Method on Unstructured Economic Data." (in Korean). Korean Journal of Applied Statistics. (Accepted)

WORK IN PROGRESS

Beomseok Seo*, (2024+) "Econometric Forecasting Using Ubiquitous News Text: Text-enhanced Factor Model." Bank of Korea Working Paper, 2023(10). In revision

Yuling Chang, **Beomseok Seo** (2024+) "Using Explainable AI to Envision the Future of Work and the Workforce." Submitted

Beomseok Seo*, Jia Li (2024+) "SEE-Net: Synced and Explanation-Enhanced Neural Network." Submitted

Young Joon Lee, Soohyon Kim, **Beomseok Seo**, Ki Young Park (2024+) "Measuring Monetary Policy Surprises Using Text Mining: The Case of Korea." Will be submitted soon

WORKING PAPERS

Beomseok Seo*, Hyungbae Cho, Dongjae Lee (2023) "Point and Risk estImation using an enSemble of Models for Nowcasting: Prism-Now." Bank of Korea Working Paper, 2023(27).
Will be submitted soon

Beomseok Seo* (2023) "Industry Monitoring Using AI Algorithm: Analyst Reports Text Mining", Bank of Korea Issue Note, 2023(5).
Will be submitted soon

Beomseok Seo*, Younghwan Lee, Hyungbae Cho (2022) "Machine-Learning-Based News Sentiment Index (NSI) of Korea", Bank of Korea Working Paper, 2022(15).

Beomseok Seo* (2021) "Interpretable Statistical Learning: From Hidden Markov Models to Neural Networks", Penn State University Ph.D Dissertation, State College, PA.

SELECTED CONFERENCE & SEMINAR TALKS

Bank of Korea, BOK Friday Lecture, Seoul *Feb 2024*
Czech National Bank (CNB), Macroeconomic Forecasting Division Seminar, Prague *Oct 2023*
European Central Bank (ECB), DG-E Wide Seminar, Frankfrut *Oct 2023*
Bank for International Settlements (BIS), Meeting with IDE and Machine Learning Community, Basel *Oct 2023*
The Korean Statistical Society & Bank of Korea Joint Forum 2022, Seoul *Sep 2022*
Central Bank Research Association (CEBRA) Conference 2022, Barcelona *Aug 2022*
Korea Information Society Development Institute (KISDI), Seoul *Jun 2022*
The Korean Statistical Society Conference (TKSS) 2022, Seoul *Jun 2022*
Korea University Dept. of Statistics, Seoul *May 2022*
Workshop on Data-Driven Future Prediction Policy Support Model Research by the Society for Economic, Humanities, and Social Studies, Seoul *May 2022*
Bank of Korea Statistics Forum 2021, Seoul *Nov 2021*
The Korean Statistical Society Conference (TKSS) 2021, Seoul *Nov 2021*
Ewha Womans University Dept. of Statistics 2021, Seoul *Oct 2021*
Computational and Financial Econometrics (CFE) 2019, London *Dec 2019*
Joint Statistical Meetings(JSM) 2019, Denver *Jul 2019*
Joint Statistical Meetings(JSM) 2018, Vancouver *Jul 2018*
50th Anniversary Conference of the Statistics Dept., State College *May 2018*

TEACHING EXPERIENCE

Adjunct Professor, *Korea University*, Seoul

- *Department of Statistics*
  - STA830, Machine Learning for Finance and Economics (MA in Statistics), *Fall 2023*

Adjunct Professor, *Sungkyunkwan University*, Seoul

- *Department of Quantitative Applied Economics*
  - QAE5009, Big Data Analytics in Macroeconomics (MA in Economics), *Fall 2023*

Instructor, *Penn State University*, State College, PA

- *Department of Statistics*
  - STAT200, Elementary Statistics (Undergraduate in Statistics), *Summer 2019, Summer 2021*

- STAT418, Introduction to Probability and Stochastic Processes (Undergraduate in Engineering), *Spring 2020*

FELLOWSHIPS, HONORS, AND AWARDS

Excellent Employee Award for Research from The Bank of Korea. *Jun 2023*

Teaching Fellowship offered by Penn State Univ. *Spring 2017 - Spring 2021*

Best Poster Award of The Statistics Dept. at Penn State Univ. *May 2018*

Graduate Study Fellowships awarded by The Bank of Korea. *Fall 2016 - Spring 2018*

Best Honors Scholarship in Korea University Dept. of Economics. *Fall 2010*

Academic Excellence Scholarship in Korea University Dept. of Economics. *Spring 2006, Fall 2009, Spring 2010*

ADDITIONAL TRAINING EXPERIENCE

Barcelona Graduate School of Economics, Summer School, Barcelona
- Time Series Vector Auto Regressive Models *Jul 2014*

IMF, Singapore Regional Training Institute, Singapore
- Financial Markets and Instruments *Dec 2012*

Advanced Mathematics Program of The Bank of Korea Academy, Seoul
- Stochastic Process, Real Analysis, Differential Equations *Mar 2012 - Dec 2015*

LANGUAGES

English, Korean (fluent)

PROGRAMMING LANGUAGES

Python/Tensorflow, R, SQL (advanced), MATLAB, C/C++, CSS (intermediate)

PROGRAMS

Text Indices Hub, *Interactive website*. (Launching initially takes several minutes.)
- Providing Theme Frequency in News Indices (TFNI), Text-based Business Confidence Indicators (TBCI).

MLM, *Python modules on GitHub*,
- Interpretable non-linear regression or classification based on ”Mixture of Linear Models Co-supervised by Deep Neural Networks”

HDclustVS, *R package on GitHub*,
- A Block-wise Variable Selection Method for High-dimensional Clustering via Latent States of Mixture Models

OTclust, *R package on CRAN*,
- Mean Partition, Uncertainty Assessment, Cluster Validation and Visualization Selection for Cluster