# 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

## RESEARCH INTERESTS

My research interests include a range of related problems in

  - Interpretable statistical modeling and machine learning,
  - Natural language processing and text mining,
  - Development of statistical tools for addressing economic and financial challenges.

## 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

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

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

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|---|---|
| *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* |

## EMPLOYMENT

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

- **Office of Economic Modeling and Policy Analysis**,                   *Feb 2023 - Present*
- **Statistics Research Unit**,                                          *Jun 2021 - Jan 2023*
- **Economic Statistics Department, National Expenditure Statistics Team**,   *Feb 2013 - Jun 2016*
- **Financial Markets Department**,                                      *Jan 2011 - Feb 2013*

**Adjunct Professor**,

- **Dept. of Quantitative Applied Economics**, *Sungkyunkwan Univ.*, Seoul   *Sep 2023 - Present*
- **Dept. of Statistics**, *Korea Univ.*, Seoul                          *Sep 2023 - Present*

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

- **Dept. of Statistics**,                           *Summer 2018, Summer 2020, & Summer 2021*
- **Smeal College of Business**,                                         *Summer 2020*
- **Dept. of Political Science**,                                        *Summer 2017*

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

## 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