

# Ekaterina Seregina

✉ ekaterina.seregina@email.ucr.edu • 🌐 seregina.info • 📧 ekat92

📍 900 University Avenue, Riverside, CA

## Education

### University of California, Riverside

PHD IN ECONOMICS

Riverside, CA

Sep 2016 – Jun 2021

### National Research University Higher School of Economics

MS FINANCIAL ECONOMICS

Moscow, Russia

Sep 2014 – Jun 2016

BS ECONOMICS

Sep 2010 – Jun 2014

**Research Area** Financial Econometrics · Asset Management · Portfolio Optimization · Machine Learning

## Research

[1] “SPARSE PORTFOLIO” [Job Market Paper]

[2] “OPTIMAL PORTFOLIO USING FACTOR GRAPHICAL LASSO” (with TH Lee)

Submitted to the Journal of Business & Economic Statistics

[3] “LEARNING FROM FORECAST ERRORS: A NEW APPROACH TO FORECAST COMBINATION” (with TH Lee)

Submitted to the International Journal of Forecasting

[4] “TIME-VARYING FACTOR GRAPHICAL MODELS”

[5] “PROJECTED FACTOR GRAPHICAL MODELS”

## Presentations

14th International Conference on Computational & Financial Econometrics (Paper [1])

Dec 2020

World Finance and Banking Symposium (Paper [2])

Dec 2020

European Winter Meeting of the Econometric Society (Paper [2])

Dec 2020

40th International Symposium on Forecasting (Paper [3])

Oct 2020

Department of Economics, UCR (Paper [1])

Oct 2020

Department of Finance, UCR (Papers [1]-[2])

Jun 2020

## Teaching

### University of California, Riverside

INSTRUCTOR

Summer 2019, 2020

Stock Market (35 students, Eval: 4.77/5) · Intermediate Macroeconomic Theory (40 students, Eval: 4.89/5)

TEACHING ASSISTANT

Sep 2017 – Jun 2021

Econometrics (PhD) · Macroeconomics (PhD) · Stock Market · Statistics · Intermediate Macroeconomics

### National Research University Higher School of Economics

Moscow, Russia

TEACHING ASSISTANT

Sep 2015 – Jun 2016

Corporate Finance · Financial Econometrics

## Honors & Awards

2020 Dissertation Year Program Award, UC Riverside

Riverside, CA

2019 Outstanding Teaching Assistant Award, UC Riverside

Riverside, CA

2016 University of California Dean's Distinguished Fellowship

Riverside, CA

2015 Research Grant from German Research Foundation (GR 4781/1-1)

Moscow, Russia

2015 Presidential Grant for Support of Young Russian Scientists

Moscow, Russia

## Additional Information

**SOFTWARE** R · Python · Matlab · SAS · STATA · MySQL · BigQuery · Bloomberg Terminal · Datastream · T<sub>E</sub>X

**MEMBERSHIP** AFA · FMA · SoFiE · AEA · ASA · IIF · AMS

## References

Jang-Ting Guo Professor, UCR Department of Economics ☎ +1 951 827-1588 ✉ guojt@ucr.edu	Jean Helwege Professor, UCR Department of Finance ☎ +1 951 827-4284 ✉ jean.helwege@ucr.edu	Tae-Hwy Lee (Chair) Professor, UCR Department of Economics ☎ +1 951 827-1509 ✉ tae.lee@ucr.edu	Aman Ullah Distinguished Professor, UCR Department of Economics ☎ +1 951 827-1591 ✉ aman.ullah@ucr.edu
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### SPARSE PORTFOLIO [*Job Market Paper*]

Sep 2020

The classical approach to portfolio optimization is notorious for (1) producing undesirable extreme long and short positions due to inaccurate estimation of asset weights and (2) its asset allocations are associated with non-negligible transaction costs, high turnover and large monitoring costs. To overcome these shortcomings, we develop a novel optimization approach which produces sparse wealth allocations. The proposed statistical method proceeds in two steps: first, it uses an  $\ell_1$ -penalty on the weight vector to select stocks, second, we apply de-biasing and post-lasso to obtain the optimal asset allocation weights. The main contribution is twofold: from the theoretical perspective, this paper establishes unbiasedness and consistency of the optimal sparse allocations in a high-dimensional setting, when the number of assets exceeds the sample size. We demonstrate the importance of the de-biasing step that has been overlooked in previous studies. From the empirical perspective, the application to the constituents of the S&P500 reveals that compared to the common strategy of holding all assets, our sparse portfolio strategy leads to lower risk, lower turnover, and higher out-of-sample Sharpe ratio. We illustrate that during several economic downturns including the dot-com bubble of 2000 and the financial crisis of 2007-09, our sparse de-biased estimator was the only model that produced positive cumulative excess return (CER) and did not exceed the target level of risk. In contrast, all non-sparse models produced negative CER and violated the risk constraint.

### OPTIMAL PORTFOLIO USING FACTOR GRAPHICAL LASSO [*with Tae-Hwy Lee*]

Sep 2020

This paper develops a framework for estimating a high-dimensional precision matrix which combines the benefits of exploring the factor structure of the stock returns and the sparsity of the precision matrix of the factor-adjusted returns. The proposed algorithm is called *Factor Graphical Lasso* (FGL). We study a high-dimensional portfolio allocation problem when the asset returns admit the approximate factor model. We demonstrate that FGL consistently estimates the optimal portfolio in high dimensions, even when the covariance matrix is ill-behaved. Our theoretical results and simulations demonstrate that the method is robust to heavy-tailed distributions. The empirical application uses daily and monthly data for the constituents of the S&P500 to demonstrate superior performance of FGL compared to the equal-weighted portfolio, index and some prominent precision and covariance-based estimators.

### LEARNING FROM FORECAST ERRORS: A NEW APPROACH TO FORECAST COMBINATION [*with Tae-Hwy Lee*]

Sep 2020

This paper studies forecast combination using the precision matrix estimation of forecast errors when the forecast errors admit the approximate factor model. This approach incorporates the facts that experts often use common sets of information and hence they tend to make common mistakes. This premise is evidenced in many empirical results. For example, the European Central Bank's Survey of Professional Forecasters (SPF) on Euro-area real GDP growth demonstrates that the professional forecasters tend to *jointly* understate or overstate GDP growth. Motivated by this type of stylized facts on forecast errors, we develop a novel framework which exploits the factor structure of forecast errors and the sparsity in the precision matrix of the idiosyncratic components of the forecast errors. An empirical application to forecasting macroeconomic time series in big data environment highlights the advantage of our approach in comparison with the existing methods of forecast combination.

### TIME-VARYING FACTOR GRAPHICAL MODELS

Sep 2020

At the beginning of COVID-19 outbreak, stock market was volatile, exhibiting sudden trend switches. As a result, using a long history of the past performance leads to large estimation errors. One efficient way to overcome this difficulty is to use the information extracted from higher frequency returns, e.g. daily data, to make longer term predictions of lower frequency returns, e.g. monthly data. Such strategy naturally augments the information set for the monthly data leading to decreased estimation errors and improved performance. This paper proposes to estimate the lower frequency precision matrix using higher frequency returns. In addition, we allow the dependence structure between stocks to change over time, which makes the proposed model more flexible. We call the proposed algorithm "Time-Varying Factor Graphical Model". Our model is solved using the alternating directions method of multipliers (ADMM), we derive closed-form solutions for the ADMM subproblems to further speed up the runtime.

### PROJECTED FACTOR GRAPHICAL MODELS

Sep 2020

Fundamental analysis and the mean-variance portfolio optimization are traditionally viewed as two alternative approaches to portfolio allocation. In this paper we develop a novel precision matrix estimator that integrates these approaches. The proposed algorithm is called "Projected Factor Graphical Models". Our method allows to incorporate the information on the companies' fundamentals, such as current earnings, growth in net operating assets and growth in financing, when deciding which stocks to include in the portfolio and how much to invest in these stocks. Using the fact that, at some point, the stock's market value will converge to its intrinsic value, we use the partial equilibrium returns model that governs the behavior of stock returns as a linear function of firm's characteristics. The latter is used to construct a precision matrix estimator for portfolio weights.