FORECAST ADJUSTMENT UNDER SHOCKS: SIMILARITY-BASED SOLUTIONS TO UNPRECEDENTED EVENTS

BY

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Statistics
in the Graduate College of the
University of Illinois Urbana-Champaign, 2024

Urbana, Illinois

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Abstract

This work examines various forecasting challenges under conditionals that are not ideal. In the first chapter, we develop a procedure for forecasting the volatility of a time series immediately following a news shock by exploiting series that have experienced similar shocks. By positing news shocks to be affine functions of exogenous risk proxies, we are able to express particular news shocks as random realizations of a common data-generating process. In our model, random effects induce excess volatility. Those excess volatilities are then estimated as fixed effects and aggregated to adjust the GARCH volatility forecast of the time series under study by an additive term. The adjusted and unadjusted forecasts are evaluated using the unobservable but easily-estimated realized volatility (RV). Asymptotic results are established for our excess volatility estimators as well as our adjustment estimator. Numerical simulations are provided to illustrate conditions and hyperparameters under which our method thrives. A detailed real data application for forecasting volatility after the outcome of the 2016 United States presidential election demonstrates the applicability of the method.

The second chapter dramatically abstracts from the comfort of a particular model and instead probes situations in which one's default times series forecasting model must be adjusted, augmented, or abandoned completely, generating second-order questions about algorithmic design and the role of human judgment, as well as the information leveraged for forecast adjustment. This work further systematizes and unifies the rich landscape of model adjustment and model correction methods, with a special focus on forecast adjustment under the presence of news shocks, when unanticipated events may give an observer reason to doubt the credibility of the default forecasting function. We demonstrate the usefulness of similarity-based methods in forecasting and present a general framework dubbed Similarity-based Parameter Correction (SPC). We highlight several specific time series models that can benefit from SPC, along with formal results for some of those special cases.

We close with a thorough discussion of the state of forecasting under non-ideal conditions and the directions in which it may find the most success.

Table of contents

List of Abbreviations

DGP	Data-Generating Processes
GARCH	Generalized Conditional heteroskedasticity

Chapter 1

Post-Shock Volatility Forecasting Using Similarity-based Shock Aggregation

1.1 Introduction

Reacting to a seemingly unprecedented event might involve the question: what, if anything, does it resemble from the past? Such might be the case with event-driven investing strategies, where the identification of the event could arise via the news pages or corporate communications and hence contains a qualitative, narrative element [**?**]. Matching a current crisis to past events is a problem with unsurprising statistical angles: identification, sample size, weighting, risk, and robustness, among many others.

Chapter 2

Conclusion

We begin by recalling two salient quotes from important figures in the econometrics and forecasting literature:

> [There exists] conflict between the intuitive notion that more relevant information should help in forecasting, and the hard reality that attempts to make it do so have not been uniformly successful [**?**]

> incomplete information by itself is unlikely to play a key role in forecast failure (except if that information would forecast breaks). Consequently, using large amounts of data may not correct one of the main problems confronting forecasters, namely location shifts, unless that additional information is directly pertinent to forecasting breaks [**?**]