

# MScFE 660 RISK MANAGEMENT

## Group Work Project # 3

[See grading rubric here.](#)

### Scenario

GWP3 is a continuation of the work you submitted for GWP1 and GWP2. That is, you are going to work towards the last two sections of your mini-capstone. Recall that each student individually reads the paper:

Alvi, Danish A. *Application of Probabilistic Graphical Models in Forecasting Crude Oil Price*. 2018. University College London, Dissertation.

<https://arxiv.org/abs/1804.10869>

By the end of GWP3, you will have a results and interpretation section. The results emphasize the findings of applying the methodology to the data, and assessing if the objective was fulfilled. The interpretation analyzes and evaluates the results and methodology.

When all GWPs are completed, the combined 3 projects look like a mini-capstone.

#### **Overview of GWPs**

**GWP 1:** Problem Formulation. Data Collection.

**GWP 2:** Methodology Description. Model Development.

**GWP 3:** Interpretation of Results. Improving the Model.

### Tasks

#### **Step 1**

Defining the datasets.

- a. Student A writes 1–2 pages defining the purpose of the training set.
- b. Student B writes 1–2 pages defining the purpose of the validation set.
- c. Student C writes 1–2 pages defining the purpose of the testing set.

**Note:** A group of 2 students, A and B work on student C's task, producing a total of 3 - 4 pages (instead of 6 pages).

## Step 2

As a group, the team writes up to 6 pages comparing the validation and testing sets and shows the allocation of the data to training, validation, and testing.

**Note:** Groups of 2 can write up to 4 pages.

## Step 3

Validating the Model. Each person re-reads Section 4.3 of the dissertation.

## Step 4

As a group, the team:

- a. runs "Re-running the Bayesian network using hill climbing", and
- b. confirms whether they were able to replicate the results of the paper.

## Step 5

Interpreting the results. As a group, the team:

- a. reports the accuracy of forecasting the price of crude oil, and
- b. develops a graphical way to display the results.

## Step 6

Assessing the contributions. As a group, the team:

- a. assesses the 8 proposed results (from Danish paper). For example, "First, it contributes to the original research of replacing EGARCH-M derived views with Bayesian Model derived views for the Black-Litterman model...";
- b. cites the specific pages, graphs, and results from the paper for each proposed result;
- c. reflects critically on whether the author's work accomplished what was proposed;
- d. if the group feels the author achieved this contribution, the group then indicates if/why they think this is important.

**Note:** Groups of 2 can focus on just five of these proposed results (from Danish paper).

## Step 7

Application. As a group, the team writes a non-technical version of the results as the "Discussion" section. In particular, the section should focus on what this study does

better, more quickly, or more cost-effectively than existing prediction models.

## Submission Requirements and Format

One team member submits the following on behalf of the entire group:

- **1 PDF document\*** of all writing EXCLUDING code
  - Remember these are going to be sections of the mini-capstone project. Make sure that the write-up is a cohesive, well-organized text instead of simply a question-and-answer format.
  - Use the available Report Template and fill out the required information on the first page
- **A zipped folder** including:
  - An executable Jupyter notebook\*\* that includes the code, its output, and the answer to each question along with the solution
  - A duplicate version of the Jupyter notebook above in PDF or HTML format. In order to include the output of the code, you must RUN the code before downloading the PDF.

*\* **Use Google Docs to collaborate.** Start by uploading the Report Template provided in the Course Overview. Once your report is completed, click File → Download → PDF Document (.pdf) to obtain the copy for your submission.*

*\*\* **Use Google Colab or GitHub to collaborate** in completing the executable Python program.*

**NOTE:** The PDF document must be uploaded **separately** from the zipped folder that includes any other types of files. This allows Turnitin to generate a similarity report.

## Rubric

Your instructor will evaluate your group submission for GWP3 using the following rubric:

Quantitative Analysis (Open-Ended Questions)	Technical and Non-Technical Reports	Writing and Formatting
40 Points	30 Points	20 Points
<p>The group is able to apply results, formulas, and their knowledge of theory to real-life finance scenarios by doing the following:</p> <ul style="list-style-type: none"> <li>• Providing all the necessary information to support their arguments.</li> <li>• Presenting arguments that reflect group discussion and research.</li> <li>• Using authoritative references to support a position and provide updated information.</li> <li>• Concluding with practical takeaways for more insightful financial decision-making.</li> </ul>	<p>Technical reports contain 3 parts:</p> <ol style="list-style-type: none"> <li>1. <b>code</b> for each question (be sure to explicitly state the question number),</li> <li>2. the corresponding output of that <b>code</b>, and</li> <li>3. <b><u>interpretations and/or recommended courses of action that reasonably follow from those results.</u></b></li> </ol> <p><b>Note:</b> Technical reports will include the technicalities of models, such as names, methods of estimation, parameter values, etc., and exclude generalities about the work done. It should NOT include names of Python code that were used.</p>	<p>A submission that looks professional should:</p> <ul style="list-style-type: none"> <li>• Include all items from the Submission Requirements and Format list</li> <li>• Include the axes, labels, and scales in graphs.</li> <li>• Be free of significant grammatical errors or typos.</li> <li>• Be an organized, well-structured, and easy-to-read document.</li> <li>• Include proper citations and a bibliography in MLA format.</li> </ul>
	<p>Non-technical reports contain 3 parts:</p> <ol style="list-style-type: none"> <li>1. clear explanation of results;</li> <li>2. the recommended course of action that follows; and</li> <li>3. the identification of factors that impact each portfolio.</li> </ol> <p><b>Note:</b> AVOID all references to model names, algorithms, and unnecessary details. Instead, focus on the investment decision.</p>	