# Academic Finance Project

## Context and Prior work

A previous consultant created a Python code that constructs the database that I use in my paper (see link below). The code, inputs, and outputs are in the folder (see link below).

The output databases have the implied expected returns of the 10 industry portfolios (asset classes). Results are calculated by model (M), fund manager (i), and time (t). The implied expected returns (IER) are calculated as follows:



rf1: Vector of risk-free rate (10x1)

μ: Vector of implied expected returns (10x1)

ΣM: Variance covariance matrix of industry portfolio returns(10x10)



βM: Betas (or factor loadings) matrix (10xK). The different factors models have different number of factors (K).

Σf: Variance covariance matrix of factors (KxK)

Σε: Variance covariance matrix of idiosyncratic risks (KxK)

ω: Vector of portfolio weights (10x1)

An example of the databases that are produced by the code is the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fund Manager | Time | IER Sector 1 | … | IER Sector 10 |
| … | … | … | … | … |
| … | … | … | … | … |

## Requirements

I am looking for help to extend the results of my paper. Specifically, I would like to recover the implied expected returns (IER) using a different portfolio choice model, which would imply a different expression for equation (11). Specifically, I would like to try the results of Zhao (2007). Specifically, Zhao finds that the optimal portfolio weights are given by:



where R is the expected return of the portfolio that is a weighted average of funds’ portfolio weights and implied expected returns (this is an unknown vector in this case), which would be the x\* in this case, and M is the expected return of the benchmark that is a weighted average using market portfolio weights that are known (see the data inputs below). Finally, the idea is to find which are the IER that makes x\* equal to observed portfolio weights taking all the other parameters as given. For example, we assume that λ=1.

Link to my paper: <https://www.dropbox.com/s/kfmp8xgvr3rgc29/Microfounding%20FamaMacbeth.pdf?dl=0>

Link to the folder:

<https://www.dropbox.com/sh/xzce65hb6sgl0k4/AAB5Os03M8pZRwC1hjdg4mkqa?dl=0>

Link to Zhao’s paper: <https://www.dropbox.com/s/yeyd81bjgfkfia5/zhao2007.pdf?dl=0>

Link to summarized results of Zhao’s paper: <https://www.dropbox.com/s/p3sw8ko04gy8efm/Resumen%20Zhao2007.docx?dl=0>

Data inputs:

* Funds portfolio weights: w.csv
* Risk free rate: r.csv
* Market portfolio weights: weights\_CRSP.csv
* Variance covariance matrix of factors:
  + mgarch\_var\_cov\_capm.csv
  + mgarch\_var\_cov\_ff3.csv
  + mgarch\_var\_cov\_ff3\_liq.csv
  + mgarch\_var\_cov\_ff3\_liq\_mom.csv
  + mgarch\_var\_cov\_ff3\_mom.csv
  + mgarch\_var\_cov\_ff5.csv
  + mgarch\_var\_cov\_macro.csv
* Variance covariance matrix of idiosyncratic risks:
  + Find the csv files in the folder /sig\_e\_m
* Betas by model:
  + betas\_ff3.csv
  + betas\_ff3\_liq.csv
  + betas\_ff3\_mom.csv
  + betas\_ff3\_mom\_liq.csv
  + betas\_macro.csv
  + kalman\_betas\_camp.csv
  + kalman\_betas\_ff5.csv