Testing Multiple Index Models to Predict the Returns of Fixed Income ETFs

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1. Objectives:

Models of different complexities can explain asset return. This study:

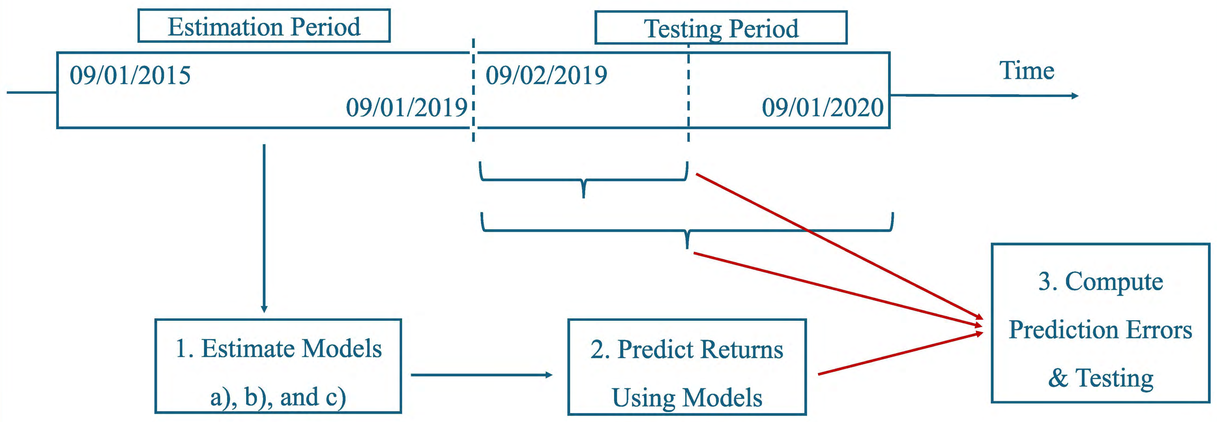
a) examines how variants of index models predict results in 6-month and 12-month periods out of sample

b) examines how variants of index models whether their predictions are biased

2. Methodology:

- Collect prices of ETFs and compute their returns
- Split the sample and use the first 48-month part to estimate the models:
  a) Single index model: $r_{it} = \alpha_i + \beta_i R_{Mt} + e_{it}$
  b) Three-factor model: $r_{it} = \alpha_i + \beta_{iM} R_{Mt} + \beta_{iSMB} SMB_t + \beta_{iHML} HML_t + e_{it}$
  c) Five-factor model: $r_{it} = \alpha_i + \beta_{iM} R_{Mt} + \beta_{iSMB} SMB_t + \beta_{iHML} HML_t + \beta_{iRMW} RMW_t + \beta_{iCMA} CMA_t + e_{it}$
- Use the estimated models to predict the return out of the sample for 6-month and 12-month periods
- Compare the predicted vs. the actual return
- Test to see whether the predictions were biased

Figure 1. Illustration of the methodology.



3. Data:

- Collected monthly price of 10 bond ETFs from 09/01/2015 to 09/01/2020 and computed the return
- Collected factors' monthly data from the Fama/French website from 09/01/2015 to 09/01/2020
- Estimated models by using the returns from 09/01/2015 to 09/01/2019 sub-period
- Tested out of sample for the following 6-month and 12-month periods

4. Results: Combining ten bond funds:

- Observed an upward trend in the absolute value of t-stat across the ETFs combination's models
  –> The accuracy of the model's prediction performance is worse for 12 months than for 6 months
- T-stats show that the mean of the prediction errors are not significant
  –> I do not find evidence of bias in the models

		6 months			12 months		
		Single index model	Three-factor model	Five- factor model	Single index model	Three-factor model	Five-factor model
ALL FUND	Average	0.0699	0.0479	0.0743	0.1202	-0.1807	-0.2847
	St.dev	1.2574	0.6696	0.9912	1.7290	1.8163	1.9054
	t-stat	0.4308	0.5543	0.5805	0.7613	-1.0898	-1.6370
	p-value	0.6698	0.5837	0.5661	0.4495	0.2802	0.1070

5. Conclusion:

- Models vary in complexity, yet none of them appears to be biased
- Future research should extend to other time periods and other assets