Variable Selection Tests of Asset Pricing Models

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ABSTRACT An asset pricing test is just variable selection confined to the intercepts. Framing the testing problem as variable selection facilitates development of a new Bayesian multivariate test that strikes a balance between the extreme of tests based purely on statistical significance (e.g., Gibbons, Ross, and Shanken (GRS) (1989)) and the extreme of tests based purely on economic significance (i.e., just look at the intercepts). Our procedure jointly tests for statistical and economic significance while explicitly accounting for the fact that, since all models are false, no model can satisfy a sharp null hypothesis. In addition, our most important prior represents the largest average pricing error considered economically insignificant. This prior’s simple interpretation is a key feature of our approach. We demonstrate our test on both simulated economies and actual data and compare it to the GRS test.

1 Overview

This chapter focuses on a Bayesian solution to one important problem in active asset management: testing asset pricing models. A well-specified model can be used to evaluate portfolio performance, estimate the cost of capital of firms, and identify mispriced securities. However, before we focus on our approach to testing asset pricing models, we provide a brief overview of the active asset management business and several interesting problems in asset management.

1.1 Asset Management Business

Asset managers invest the wealth of individuals, corporations, and endowments in an effort to increase the wealth of those organizations. Well over 2,000 firms compete to manage more than $1 trillion. While manager performance is often measured relative to a wide variety of benchmark portfolios depending on the particular expertise of the manager and intent of the portfolio, most active managers share the common goal of producing the highest returns possible for a given amount of risk.

The first decision facing most investors involves asset allocation or determining the proper mix of broad asset classes such as stocks, bonds, and
cash in their portfolio. Within each asset class, asset managers may further
determine which stock markets and bond markets should be overweighted
and which currency exposures should be hedged. In addition, the asset al-
location decision is often broadened to include other non-traditional asset
classes such as commodities and real estate. The second step involves secu-
rity selection or determining which individual stocks and individual bonds
to purchase in order to outperform specific stock and bond benchmarks.

Asset managers typically use a combination of two approaches to fore-
cast returns to asset classes and individual securities: 1) fundamental, and
2) quantitative. A manager using a fundamental approach might visit com-
panies and talk to management or listen to the arguments of economists. A
fundamental manager will synthesize the information he finds relevant in
making his investment decisions. A manager using a quantitative approach
builds return forecasting models based on purely objective indicators. In-
dicators are chosen as a function of their historical success and links to
financial theory. A quantitative manager lets his model synthesize the in-
formation he finds relevant in making his investment decisions. In practice,
most managers use some combination of fundamental and quantitative ap-
proaches.

1.2 Applied Asset Management Problems

The breadth of the investment decisions within the asset management busi-
ness presents researchers and portfolio managers with a wide variety of
applied problems particularly well-suited for applications of Bayesian solu-
tions. Next we briefly outline three problems for which Bayesian applica-
tions can represent extremely important applied tools. We then introduce
a fourth problem and its Bayesian solution which will be our main focus.

Forecasting Returns to Global Stock Markets

In this problem our goal is to develop a parsimonious model to forecast
stock market returns. Such a model can help portfolio managers allocate
funds among the various global stock markets depending on the relative
attractiveness of each market. Suppose, for example, we would like to fore-
cast stock returns for 22 global stock markets. Further, suppose we have
50 predictive variables with plausible links to financial theory (the right
hand side of a regression) that we will use to forecast returns on 22 stock
markets (the left hand side of a regression). We would like to select a small
subset of the indicators which significantly impact the returns of all 22 mar-
kets. In addition, we would like each chosen indicator’s sign to be identical
across all countries. Requiring the indicators to work across all markets is
a stringent standard that helps the model achieve robustness and guards
against overfitting indicators to individual countries. The requirement that
the sign be the same across countries appeals to the economic rationale of