15 Conclusion

We began the semester saying that asset pricing is the study of why the returns of different assets vary cross-sectionally and through time. Through the semester, we have derived several models that try to answer this question. Each of the models is representable as either a set of state prices, a pricing kernel, a risk-neutral probability measure, or a factor model. We have seen some of the benefits of each of these representations, and we have discussed the transformation from one representation to another. The models we have discussed (and their pricing kernel representations) include:

- Law of one price model (there exists an $m$)
- No-arbitrage model (there exists a strictly positive $m$)
- APT ($m = a + \sum_{i=1}^{k} b_k f_k$)
- CAPM ($m = a + br_m$)
- Consumption based model ($m = u'(C)$)
- Consumption CAPM: ($m = a + bC$)
- Continuous-time CAPM ($m = a + br_m$)
- Intertemporal CAPM ($m = a + br_m + cdX$)
- Black-Scholes option pricing model ($m = a + br_m$)
- Cox, Ingersoll, Ross term structure model

These are some of the most important and widely used models in asset pricing. Most other models out there are tweaks of these models in one way or another.
15.1 Directions for Future Research

While asset pricing is a relatively mature field for finance, there is much theoretical and empirical work to be done. This subsection briefly describes a few areas that I think are promising for future research. Most of these areas have been mentioned before in the notes.

15.1.1 Traditional Models

By traditional models I mean the class of models in which risk is rewarded with higher return and risk is measured by a covariance. Most research activity in asset pricing continues to look at traditional models. Of particular recent interest are models that price securities that have not been priced satisfactorily before, like swaps and defaultable bonds. I don’t know of any major asset types that have not been modelled, but such types may exist. Another interesting approach is to derive some of the implications of the most general models, like the simple no-arbitrage model, in different contexts.

In empirical research, people are still deriving tests of traditional models and characterizing their failures in various ways. Some still believe in the CAPM. However, tests of more general asset pricing propositions are probably more interesting than tests of the CAPM now. Another big research industry is the documentation of apparent anomalies in the data (i.e. the size effect, the book-to-market effect, reversals and momentum effects, etcetera).

15.1.2 Heterogeneous Agent Models

As mentioned previously, heterogeneous agent models are beginning to get more attention in finance, with good reason. A very weak point for economics in general is aggregation. Aggregation is of obvious importance to macroeconomists, so there are
lots of researchers working on these models. For heterogeneous agent models to have much to say, markets have to be incomplete. Section 7 of the notes lists a few related papers. Another recent paper of interest is by Constantinides and Duffie.\footnote{Constantinides, G. and D. Duffie, 1996, “Asset Pricing with Heterogeneous Consumers,” Journal of Political Economy, 104, 219-239.}

15.1.3 Psychological Models

A new class of asset pricing models based on psychological assumptions is beginning to emerge. Examples of papers that use psychology to explain returns are the papers by Jeremy Stein and Nick Barberis that were presented in our seminar series this semester. David Hirshleifer has written a couple of papers on overconfidence that look promising. Other interesting work includes that of Benartzi and Thaler\footnote{Benartzi, S., and R. Thaler, 1995, “Myopic Loss Aversion and the Equity Premium Puzzle,” Quarterly Journal of Economics, 110, 73-92.} and my own paper called “Explaining Returns with Loss Aversion.”

15.1.4 Information-Based Models

Yet another set of emerging models relies on asymmetric information to price assets. Models that use asymmetric information to explain prices often have a very “microstructure” flavor. These models may provide the best explanation for some of the asset pricing anomalies that we observe. If you are interested in pursuing asymmetric information asset pricing, a good paper to start with is a piece of Jiang Wang’s dissertation.\footnote{Wang, J., 1993, “A Model of Intertemporal Asset prices under Asymmetric Information,” Review of Economic Studies, 60, 249-282.}