

# Microfoundations of Financial Economics

*André Farber*

*Université Libre de Bruxelles*

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## Roadmap

References:

Danthine, J-P. and J. Donaldson, J., *Intermediate Financial Theory*, 2d ed. Elsevier, 2005 (DD)

Articles: see list below (250 pages in total– I guess the maximum that can be read in one week)

### Day 1 – Act 1 Certainty

We start with Fisher: 2 periods, certainty.  $p_0 = m x_1$  and  $m = \frac{1}{R^f}$

where  $m$  is the discount factor

We show that  $m$  is related to the marginal rate of substitution:  $m = \frac{U'_1(c_0, c_1)}{U'_0(c_0, c_1)}$

We verify that this relationship holds in a multiperiod setting.

### References

Not covered by DD but see Chap 1 – Appendix for an introduction to general equilibrium.

### Day 1 – Act 2 Uncertainty complete markets

We introduce Arrow Debreu securities (prices of contingent claims)  $q(s)$

We prove: No arbitrage  $\Leftrightarrow \exists q(s) > 0$  such that  $p(x) = \sum_s q(s)x(s)$

We show that this formula is equivalent to:

Pricing with a stochastic discount factor:  $p(x) = \sum_s \pi(s)m(s)x(s) = E(mx)$

Risk neutral pricing:  $p(x) = \frac{E^*(x)}{R^f}$

Beta pricing:  $p(x) = \frac{E(x)}{R^f + \lambda_m \beta_m}$

### References

DD Chap 2 (Asset Pricing – A Roadmap)

DD Chap 10 (Arrow-Debreu Pricing – Part II: the Arbitrage Perspective)

### Day 2 – Act 1 Decision under uncertainty

We first introduce Von Neuman – Morgenstern utility functions.

We define the main measures of risk aversion:

$$\text{Absolute Risk Aversion } ARA = -\frac{u''(W)}{u'(W)}$$

$$\text{Relative Risk Aversion } RRA = W \times ARA$$

We then analyze the demand for one risky asset. We show that:

- the amount invested in the asset increases with wealth if ARA is decreasing with wealth
- the fraction invested in the asset increases with wealth if RRA is decreasing with wealth

We then apply this analysis using the most commonly used utility functions:

Quadratic, exponential, log, power

### References

DD Chap 3 (Making Choices in Risky Situations)

DD Chap 4 (Measuring Risk and Risk Aversion)

DD Chap 5 (Risk Aversion and Investment Decisions, Part 1)

## Day 2 – Act 2 Understanding the stochastic discount factor

We show that the stochastic discount factor is equal to the stochastic marginal rate of

$$\text{substitution: } m(s) = \beta \frac{u'(c_1(s))}{u'(c_0)}$$

We then use the model to review the equity premium (Mehra Prescott) and the risk-free puzzle (Weil). We also introduce Hansen-Jagannathan bounds.

### References

DD Chap 8 (Arrow-Debreu Pricing – Part 1) Not very useful for my purpose – Focused on Pareto Optimality – shows that  $m=MRS$

PP LN 8 (Consumption-Savings, Portfolio Choice and Asset Pricing)

## Day 3 – Act 1 CAPM according to Mossin

Following Mossin, we derive the CAPM as a general equilibrium model based on quadratic utility.

### References

Mossin Chap 4 (?)

## Day 3 – Act 2 CAPM and efficient frontier mathematics

We present the mathematics leading to the calculation of the efficient frontier and we derive a CAPM formula if no riskless asset exist.

### References

DD Chapter 6: (Risk Aversion and Investment Decisions, Part II: Modern Portfolio Theory) I will not cover this chapter as I suppose you have studied this material before

DD Chapter 7 (CAPM)

## Day 4 – Act 1 APT

We introduce the Arbitrage Pricing Theory. Starting from a factor model of returns, we will derive a multibeta version of the CAPM.

### References

DD Chap 13 (APT)

## Day 4 – Act 2 Consumption Capital Asset Pricing Model

We now wish to understand the connection (if any) between the general model ( $p=E(mx)$ ) and the CAPM.

### References

DD Chapter 9 (CCAPM)

## Day 5 – Act 1 Multiperiod models

We will have a brief introduction to multiperiod models (this is a highly technical topic). We will show that options are useful to complete market and we will illustrate dynamic completeness using binomial. We will conclude by showing why state prices can be extracted from option prices.

### References

DD Chapter 11 (The Martingale Measure: Part I)

## Day 5 – Act 2 Recent research

We will conclude this course with a short review of some recent papers that are based on the theory covered previously.

## References

### Books

To prepare this course, I have used several books. Each of them has advantages and drawbacks.

### **Bossaerts, P. and B. Ødegaard, *Lectures on Corporate Finance*, World Scientific, 2001**

An unusual introduction to elementary concepts of corporate finance. A short book (only 231 pages) with a strong emphasis on basic principles of modern finance. The only example (to my knowledge) of the use of state price at an introductory level. Even the publisher is unusual.

### **Campbell, J., A. Lo and C. MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press, 1997**

This is the indispensable reference for empirical application of finance. It includes nice summaries of the various theories, discussion of econometric techniques and many empirical results.

### **Cochrane, J., *Asset Pricing*, Revised edition, Princeton University Press, 2005**

This is a marvellous book which is used in many PhD programs. I discovered this book two or three years ago and I became immediately addicted to it. Cochrane starts from basic economic principles to show the connection between the various asset pricing models. The style is direct and witty. Moreover, being also an econometrician, Cochrane devotes a substantial fraction of the book to econometric techniques (he advocates strongly GMM).

**Copeland, T., F. Weston and K. Shastri, *Financial Theory and Corporate Policy*, 4<sup>th</sup> ed., Pearson 2005**

This is a revised edition of a fairly old textbook (I far as I remember, the first edition came out in the early 1980s) with a focus on corporate finance. It is more advanced than Brealey Myers or Ross Westerfield Jaffee. It includes one chapter on the state preference theory dating from the first edition. There are many references to empirical studies.

**Danthine, J-P. and J. Donaldson, J., *Intermediate Financial Theory*, 2d ed. Elsevier, 2005**

This book is the closest to what I was looking for. It covers the modern approaches to asset pricing. The level of math is adequate and some references are made to empirical studies. It is written by economists which implies that more space is devoted to concepts such as Pareto optimality and general equilibrium than I would do given my utility function.

**Demange, G. and J-C. Rochet, *Méthodes mathématiques de la finance*, Economica, 1992**

For those of you who like mathematics, this is the book to read. The mathematical treatment is rigorous (this is where I discovered Hilbert spaces) and proofs are elegant. The book is written in the style typical of French mathematicians (some people love it).

**Duffie, D. *Dynamic Asset Pricing Theory*, 3d ed. Princeton University Press, 2001**

Probably one of the best books if you have a good mathematical background (although, the author claims that “for mathematical preparation, little beyond undergraduate analysis and linear algebra is assumed”). Many references to the literature.

**Huang, C. and R. Litzenberger, *Foundations for Financial Economics*, North Holland, 1988**

This used to be the reference for introductory PhD courses in the late 1980's. Not fun reading but still a good reference.

**Lengwiler, Y., *Microfoundations of Financial Economics*, Princeton University Press, 2004**

A very nice book for any one interested in the relation between financial economics and macroeconomics. Comparable, in many respects, to Danthine Donaldson but does not cover the CAPM (this is the reason why I didn't choose it as the main reference for this course).

**LeRoy, S. and J. Werner, *Principles of Financial Economics*, Cambridge University Press, 2001**

The backcover announces that this text is ideally suited for beginning Ph.D. graduate students (dixit S.Ross). But the only comment on Amazon.com does not encourage using it:

Reviewer: **A reader** from London United Kingdom

Can Steve Ross, Darrell Duffie and Ed Prescott be wrong about the same thing? One would most likely assume not. With this book, however, one might wonder... In my humble opinion the authors of *Principles of Financial Economics* do not fill the gap they claim to bridge. The text is largely unreadable from a linear algebra point of view. Any undergrad econometrics textbook is more rigorous

in its use of notation. Derivations do not live up to the rigour proclaimed. At times proofs rely on circular arguments.

LeRoy and Werner have made a clear effort to make the notions accessible but, at the end, the material remains too abstract for my taste. It helped me, however, to clarify somewhat some obscure notions about the pricing kernel and the expectation kernel.

### **Mossin, J. *Theory of Financial Markets*, Prentice Hall, 1973**

This a book from the early days of finance. Interesting as a reference to understand the state of the art in the early 1970's. Very elegant and still worth reading.

### **Ross, S., *Neoclassical Finance*, Princeton University Press, 2005**

A short book (99 pages) based on the Princeton University Lectures in Finance that Ross gave in the spring 2001. A very elegant and personal presentation of neoclassical financial theory. Too dense to be used as a textbook but definitely worth reading.

## **Articles**

- Campbell, J., Asset Pricing at the Millenium, *Journal of Finance*, 55, 4 (August 2000) 1515-1567  
The definite survey of asset pricing published in 2000. A must read for all doctoral students.
- Cochrane, J., New facts in finance, *Economic Perspectives XXIII* (3) Third quarter 1999 (Federal Reserve Bank of Chicago)  
“This is a review essay of the transition from unpredictable returns and CAPM to predictable returns and multifactor models.” Provocative and fun reading.
- Cochrane, J. *Financial Markets and the Real Economy*, Working paper, GSB, University of Chicago, May 2005 – available at John Cochrane’s home page  
“This review will introduce a volume by the same title in the Edward Elgar series "The International Library of Critical Writings in Financial Economics" edited by Richard Roll. Everything you wanted to know, but didn’t have time to read, about equity premium, consumption-based models, investment-based models, general equilibrium in asset pricing, labor income and idiosyncratic risk.”
- Dybvig, P. and S. Ross, Arbitrage, State Prices and Portfolio Theory, Working paper May 2003 to appear in the *Handbook of the Economics of Finance* – available at Dybvig’s home page <http://dybfin.wustl.edu/>  
“gives an introduction to advanced concepts in investments at a level that is appropriate for advanced undergraduates or beginning doctoral students in finance. The focus is on the economics; the presentation uses single-period models that are less challenging quantitatively than continuous-time models. The paper is to appear as a chapter in the *Handbook of the Economics of Finance* being edited by George Constantinides and René Stulz”
- Schwert, G. William William, "Anomalies and Market Efficiency" (October 2002). Simon School of Business Working Paper No. FR 02-13. <http://ssrn.com/abstract=338080>  
“The evidence in this paper shows that the size effect, the value effect, the weekend effect, and the dividend yield effect seem to have weakened or disappeared after the papers that highlighted them were published. At about the same time, practitioners began investment vehicles that implemented the strategies implied by some of these academic papers.” An antidote to Cochrane’s “New facts in finance”. Maybe old finance is OK.