Factor Investing

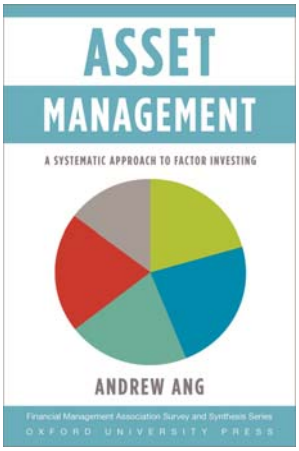
Andrew Ang

Columbia Business School

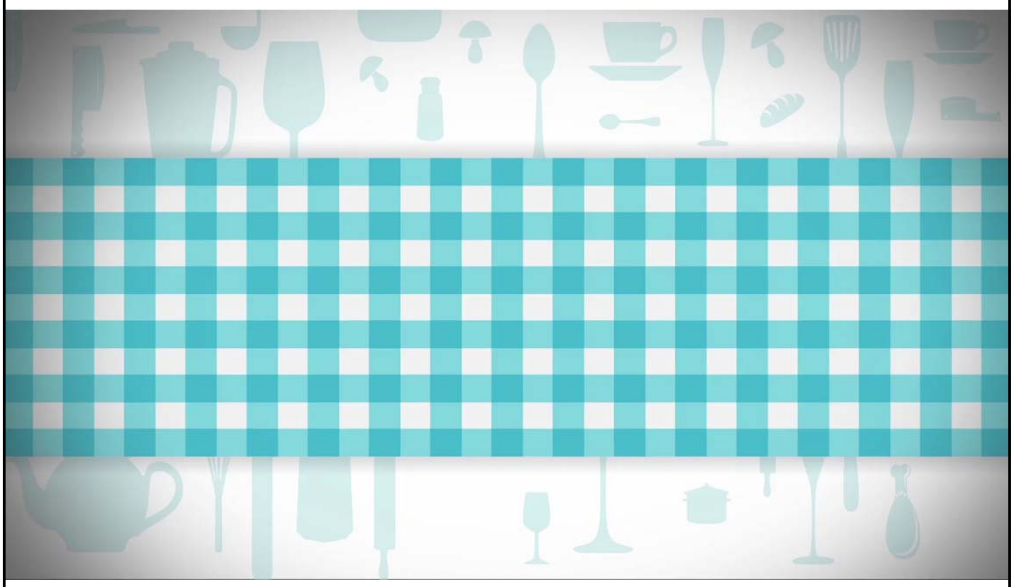
SQA November 2014

Today's Talk

- From Chapters 5, 7, and 14 of
  Asset Management: A Systematic Approach to Factor Investing

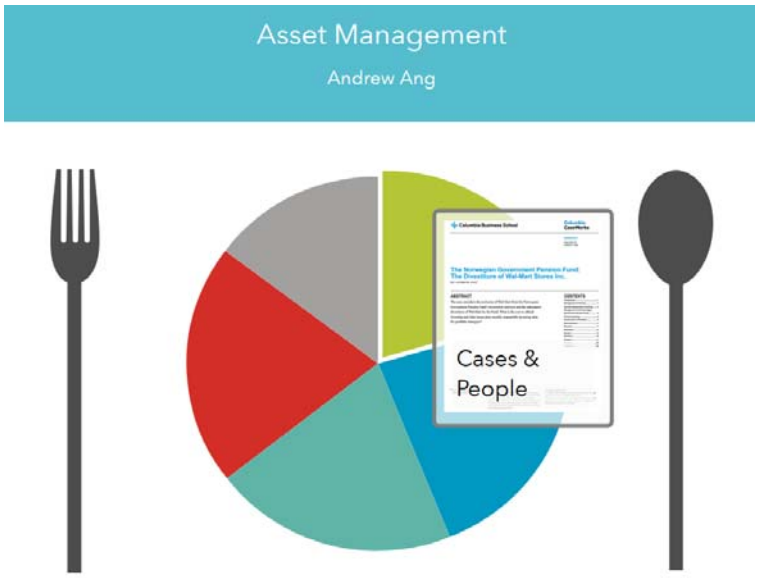


What's the Book About?



3

www.factorinvestingbook.com



4

Investment Factors

Simple Investment Factors

- Equities
- Bonds

- Cheap index management delivers these *long-only* factors at essentially zero cost in very large size
- Based on market capitalization weights—represent the aggregate *average* investor

Factors and Canada

Factor Investing a la CPPIB

- Factor investing considers the factor premiums behind the assets; it looks through asset class "labels" to the risk factors beneath
- The simple CAPM is a statement about a factor benchmark
  - Consider a stock with a beta of 1.3

$$E(r_i - r_f) = \alpha + 1.3E(r_m - r_f)$$

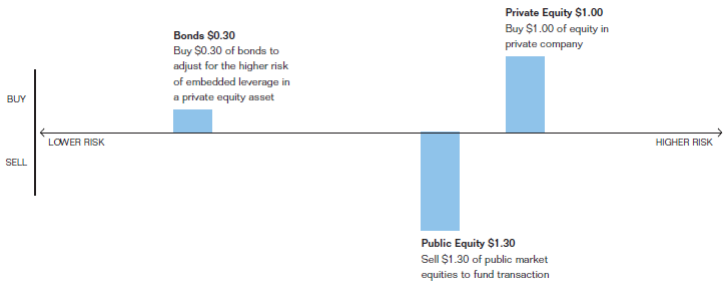
$$\underbrace{E(r_i)}_{\$1} = \alpha + \underbrace{[-0.3r_f + 1.3E(r_m)]}_{\$1}$$

  - Factor benchmark is a short position of $0.30 in risk-free assets (bonds) and a leveraged position of $1.30 in the market portfolio (equities)

Factor Investing a la CPPIB

- CPPIB looks through each asset class to underlying systematic factors (in a "*reference portfolio*")
- Private equity is not an asset class: private equity has characteristics in common with fixed income and equities

EXAMPLE: FUNDING A PRIVATE EQUITY TRANSACTION USING THE TOTAL PORTFOLIO APPROACH



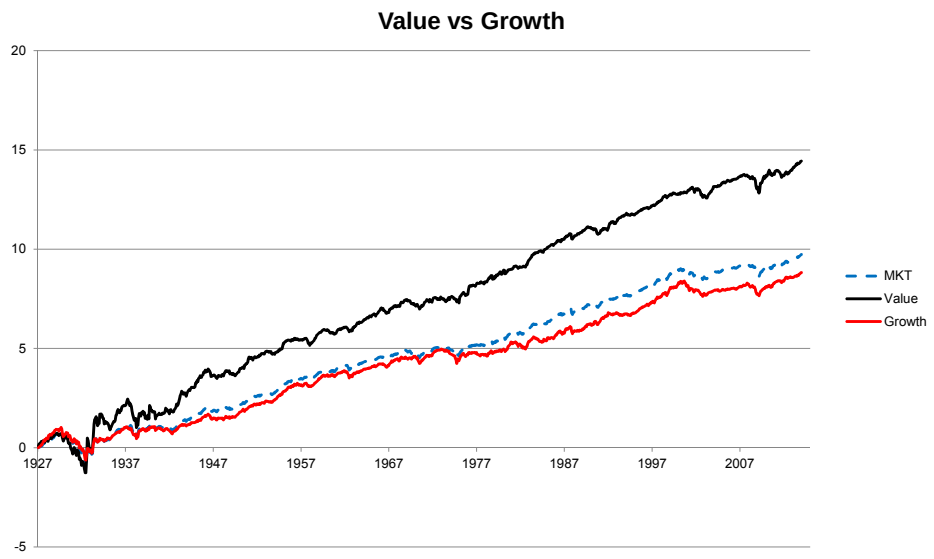
Source: CPPIB

Dynamic Factors

Dynamic Factors

- Theory and long investing experience have identified classes of assets that have consistently higher (or lower) average returns than the market portfolio
- Dynamic factors take long position in securities with similar characteristics, which tend to comove with each other, and offsetting short positions in securities with the opposite characteristics
- The market portfolio, by definition, has no dynamic factor exposure
- The average investor, who holds the market, does not practice dynamic factor investing!

Value vs Growth



Dynamic Factors

- Dynamic factors are investment strategies that systematically take positions away from market capitalization weights
- Factor risk premiums are earned through bearing risk which other investors wish to avoid
- Investing in dynamic factor strategies requires skills, and is costly
- Each factor premium is *the reward for bearing risk in a different set of bad times*

Value: Rational Theories

- New definitions of “bad times”:
  - Investment growth
  - Labor income
  - Other types of consumption, like non-durable or luxury consumption, consumption of housing, or “long-run” consumption risk
- Changing betas: value firm betas increase during risky times
- Investment or Q theory: Value firms are risky because during bad times
  - They are burdened with more unproductive capital (they cannot disinvest as easily as growth firms because they hold stodgy PP&E).
  - They want to cut back on capital, face higher adjustment costs
  - Growth firms can better deal with a downturn by deferring investment

Value: Behavioral Theories

- Most behavioral explanations of value center around over-reaction/over-extrapolation
  - Investors over-extrapolate past growth rates into the future.
  - Growth firms have had high past growth rates. Prices of these firms are bid up too high reflecting excessive optimism.
  - When growth does not materialize, prices fall so returns are low relative to value firms
- Crucial assumption: naïve investors over-extrapolate and prices reflect the over-reaction. Contrarian (value) investors outperform by taking the opposite side.
  - Why don't more value investors enter the market and bid up the prices of value stocks removing the value premium?

Dynamic Factor Portfolios

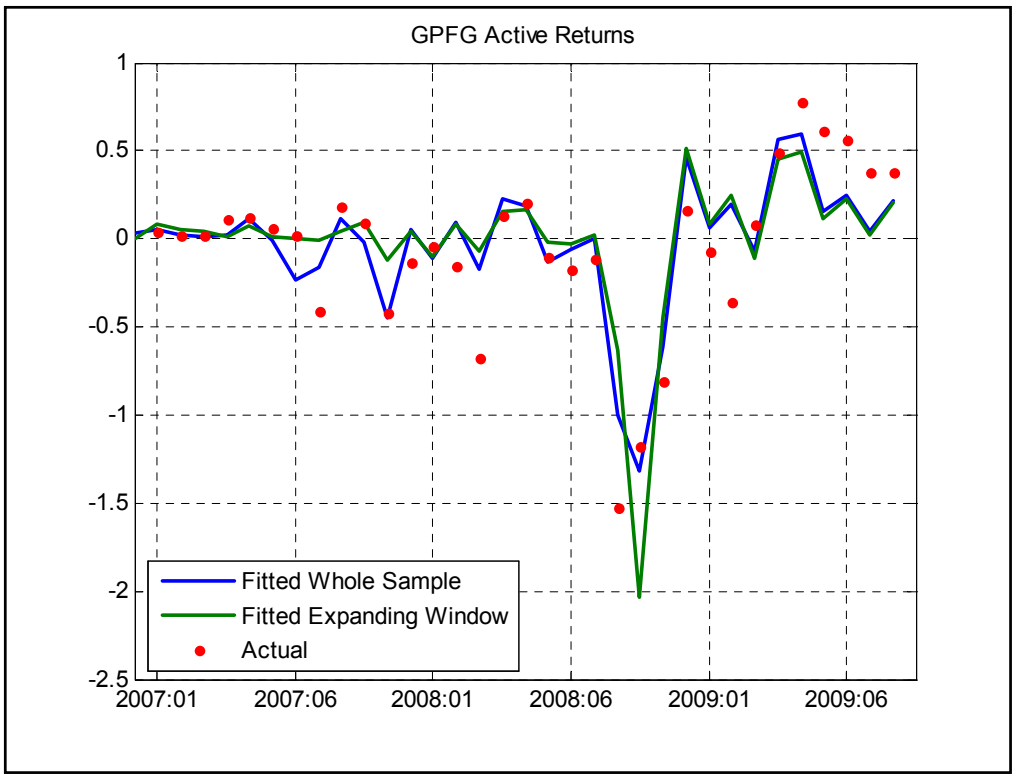
<u>Dynamic factors go beyond asset classes</u>

- Value
  - Fixed Income: "Riding the yield curve" or "Roll-down" related to duration
  - Foreign Exchange: "Carry"
  - Equities: "Value/Growth"
  - Commodities: "Roll" related to normalization/backwardation
- Momentum
  - Equities, Fixed Income, Foreign Exchange: "Momentum"
  - Commodities: "CTA"
  - Also called "Trend"

Factors and Norway

NBIM

Norges Bank Investment Management



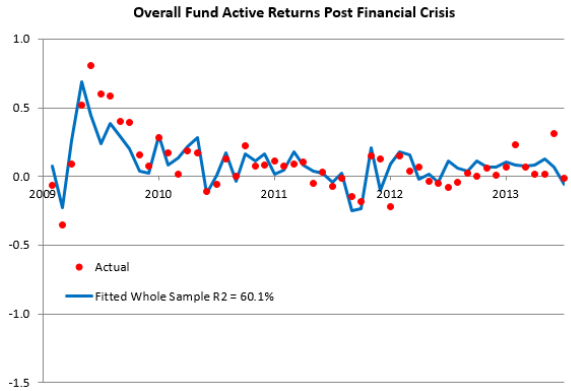
Factors Dominate in Large Portfolios

- In very large portfolios it is very hard to find “alpha” that is not related to factors
  - Many mispricing opportunities are small in scale
  - Manager decisions, both internal and external, tend to be correlated
  - Firm- (or strategy-) specific bets become swamped at the portfolio level
- Thousands of correlated individual bets become large bets on factors
  - Reaching for yield by buying 1000 relatively illiquid bonds is not 1000 separate investments: it is one bet on an *ILLIQUIDITY* factor
  - Overweighting 2000 value-oriented stocks and underweighting 2000 growth stocks is not 2000 separate long-short investments: it is one bet on a *VALUE/GROWTH* factor

19

Norway and Factors

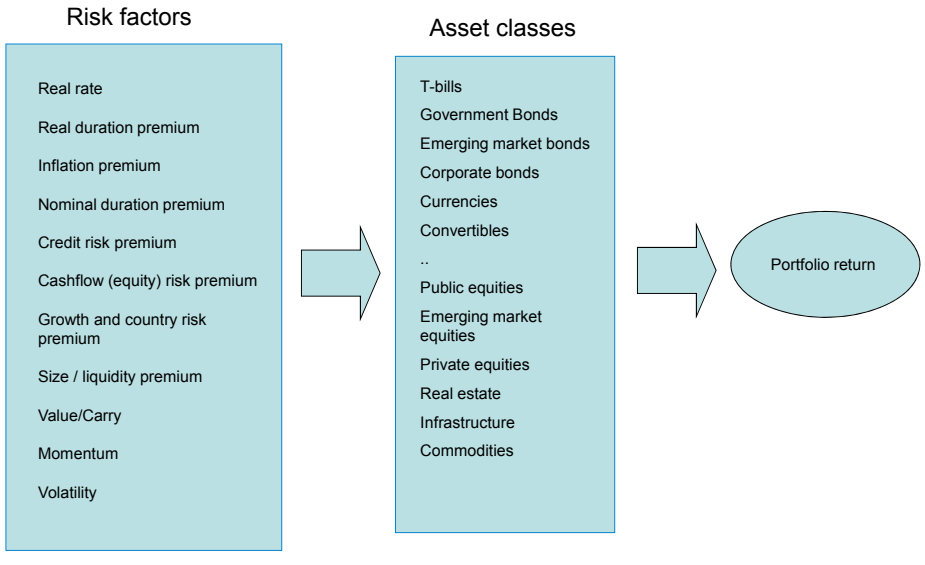
- Updating performance to 2013, 60% of the Fund’s active returns were explained by systematic factors post the financial crisis
- Norway now harvests factor premiums through an Operational Reference Portfolio



20

Factor Investing

Factor Investing: Factors => Assets



Factor Investing: Factor Exposure

- Who holds the market portfolio?

  The average investor

  The market embodies the average effect

- If you are different from average (e.g. you have a longer horizon than the typical investor), you will optimally *NOT* hold market weights
- Which tilts you should hold relative to the market are determined by your desired holdings of factor risk, which depend on investor-specific characteristics

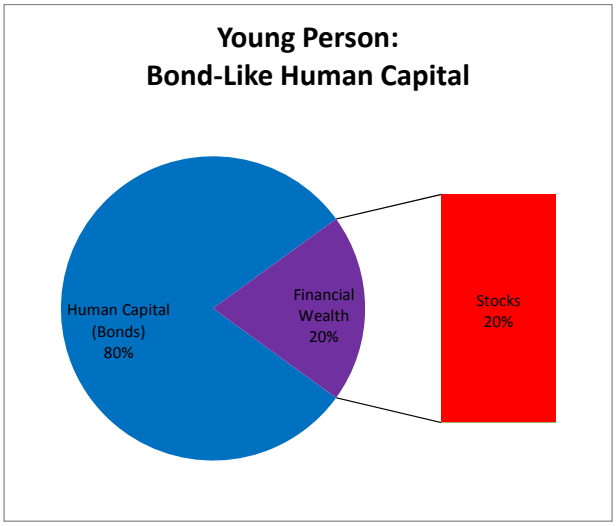
Factors and Investing over the Life Cycle

Are You a Stock or a Bond?

- Human capital has factor exposure, too!
- Whether you are a stock or a bond determines whether you should decrease or increase risky asset exposure as you approach retirement
- Conventional advice—indeed, the whole target date funds industry—advocates you should shift into safe assets as you retire

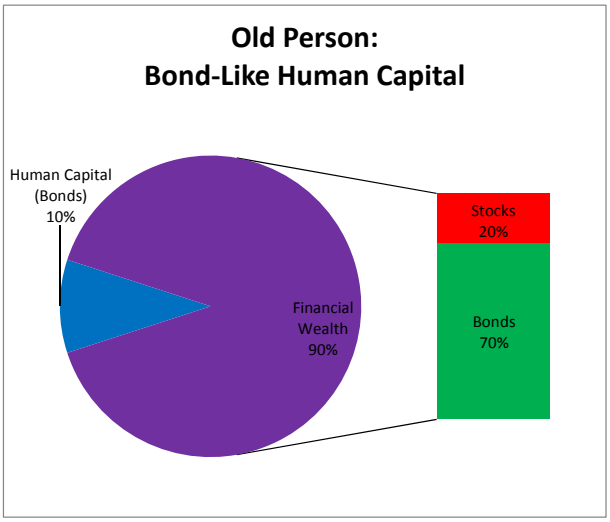
Bond-Like Human Capital

- Suppose a person targets 20% risky assets over her whole life



Bond-Like Human Capital

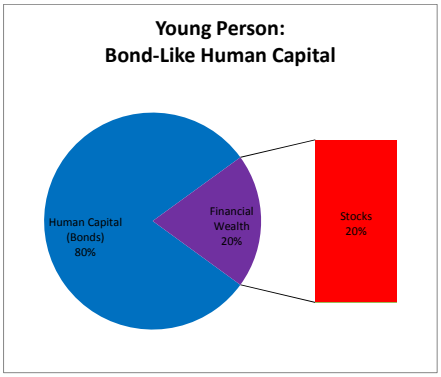
- Suppose a person targets 20% risky assets over her whole life

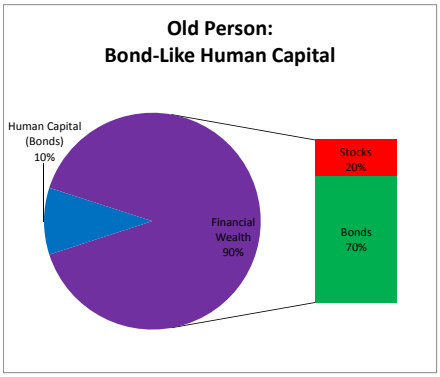


27

Bond-Like Human Capital

- Suppose a person targets 20% risky assets over her whole life. With bond-like human capital, you hold *fewer* risky assets as you age.

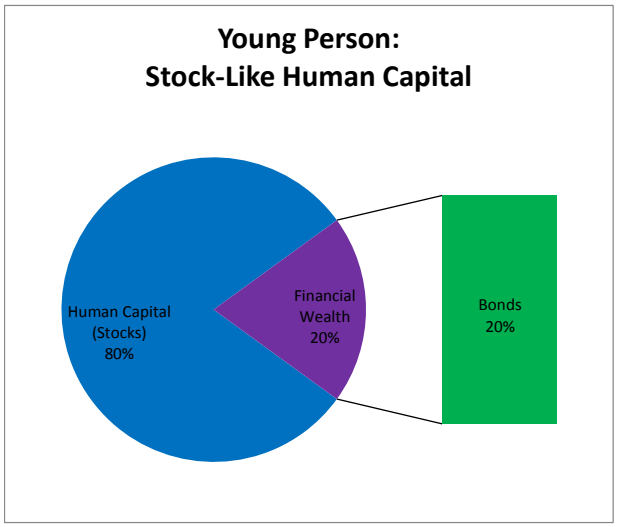




28

Stock-Like Human Capital

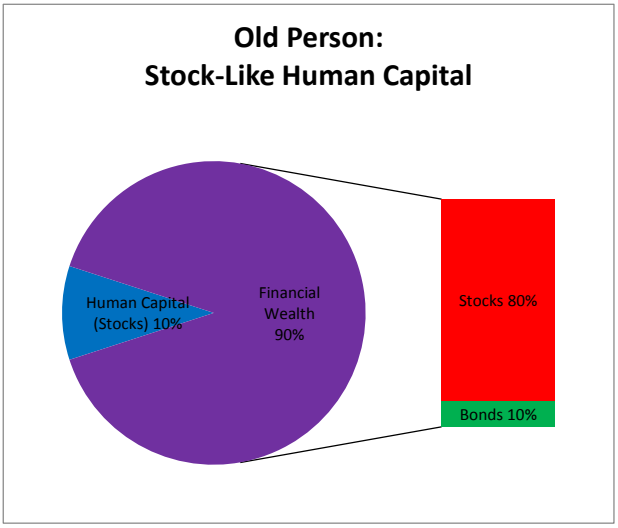
- Suppose a person targets 80% risky assets over his whole life



29

Stock-Like Human Capital

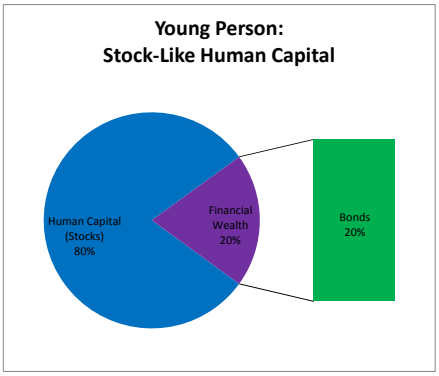
- Suppose a person targets 80% risky assets over his whole life

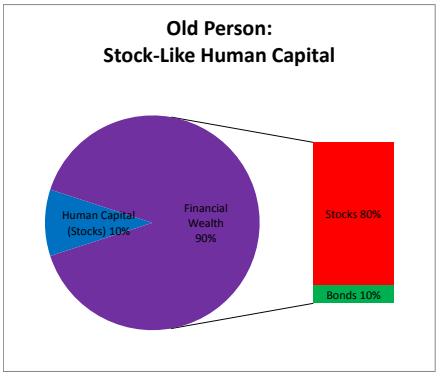


30

Stock-Like Human Capital

- Suppose a person targets 80% risky assets over his whole life. With stock-like human capital, you hold *more* risky assets as you age.





Human Capital Factor Exposure

- All else equal, the life-cycle theory predicts

  Bond-like labor income => Reduce equities as you age

  Stock-like labor income => Increase equities as you age

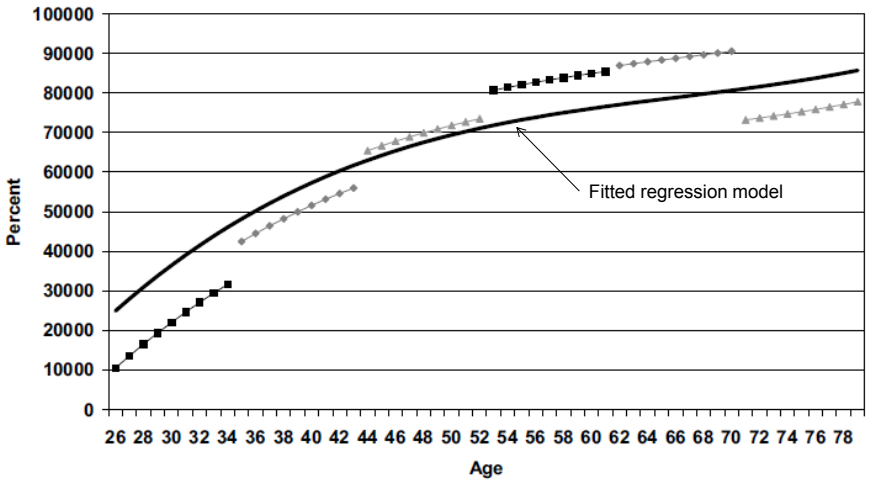
- The fact that labor income is smooth (for most people) does not mean human capital (NPV of labor income) is not risky—dividends are smooth but stock prices (NPV of dividends) are volatile

- Are you a stock or a bond?

What do People Actually Do?

- A large fraction of households do not hold any equity (non-participation)
- Older working households hold higher fractions of equity than younger working households (household equity shares increase with age), and even at retirement the fraction of equity held is very high
- Rich households hold more equity than poor households

Figure 6. Home Equity for Two-Person Households
Smoothed Data from SIPP - Selected Cohorts

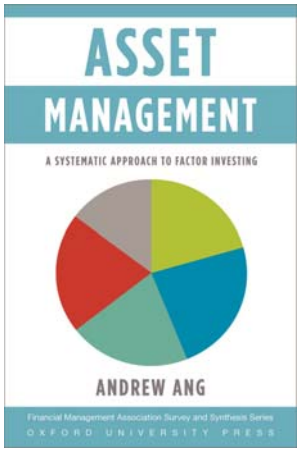


Venti and Wise (2002)

Summary

Summary

- Asset management isn't really about the management of assets. It is all about factors.



Appendix

Selected Reviews

This splendid book lays out the important lessons that a new generation of finance research has learned about markets and investing, in a thoughtful and accessible way. Ang focuses on real issues for real players, and distills practical lessons about investment strategies and the investment process.

John Cochrane

Every professional asset manager should read Ang's *Asset Management*, easily the most thoughtfully written, accessible, and carefully researched treatment of the topic. Each chapter is an expertly guided tour.

Darrell Duffie

It is no surprise that many of us have been using the unfinished chapters of Andrew Ang's *Asset Management* for teaching. For over 10 years, there has been glaring lacuna when it comes to textbooks for the teaching of investment finance. Andrew's book fills this void and is destined to become the standard text in investments at top graduate schools. It will also be a must-read for practitioners of investment finance.

Campbell Harvey

Biography

Andrew Ang

Ann F. Kaplan Professor of Business

Columbia Business School

Professor Ang is a financial economist whose work centers on understanding the nature of risk and return in asset prices. His work spans municipal and government bond markets, equities, investment management and portfolio allocation, and alternative investments. Professor Ang is a Research Associate of the National Bureau of Economic Research and has served as associate editor for several leading journals. He has consulted for several investment institutions, most regularly the Norwegian sovereign wealth fund.