

Discussion of:

Competing Theories of Financial Anomalies

*by Alon Brav and J.B. Heaton*

Conference on Asset Prices and the Stock Market

Federal Reserve Bank of Atlanta

September 15, 2000

*Discussant:*

Kent Daniel

Kellogg School, Northwestern University and NBER

# Motivation

- Strict rational expectations models do not fit the data well.
- Two alternative “competing” models appear to fit the data better:
  1. **Behavioral** theories, based on the idea that investors process available information in a suboptimal way.
  2. **Rational Structural Uncertainty (RSU)** theories, based on the idea that investors do not have the information about the economic environment that is supposed in tests of rational expectations models.
- This paper’s contribution:
  1. Shows that it is difficult to distinguish between the two competing models – this is equivalent to saying there is low statistical power
  2. Links this “low-power” argument to the “limits of arbitrage” argument (Shleifer and Vishny 1997).
  3. Discusses the differing policy implications of the two theories.

# Rejection of Pure-Rational Expectations Models

- Pure-Rational Expectations (RE) models require extreme preferences to explain the returns of momentum based strategies.
- Using a pricing kernel approach: (Hansen and Richard (1987)):

$$E_t[\tilde{m}_{t+1}\tilde{R}_{t+1}^e|\mathcal{F}_t] = 0$$

- Hansen and Jagannathan (1991) show that, based on this:

$$\frac{\sigma_m}{E[m]} = -\frac{1}{\rho} \frac{E[R^e]}{\sigma_R}$$

- Thus, in this framework, a high Sharpe ratio implies a high variability in marginal utility across states.
- This problem is even more severe if the correlation between the asset/portfolio return and marginal utility is low.
- Over 1972-97 period, a combination of momentum and book-to-market strategies yields a monthly Sharpe-Ratio of 0.37
  - Market SR is  $\approx 0.12$  over this period.
  - CAPM  $\beta$  of strategy is -0.32.
  - Moreover this strategy is does not appear to be highly correlated with other business-cycle related variables.

# Problems with the Pure-Rational Expectations Approach

- Consider the following Gibbons, Ross and Shanken (1989)-like regression, testing the CAPM:

$$\tilde{r}_{\text{HML},t} = \alpha_{\text{HML}} + \beta_{\text{HML}} \tilde{r}_{\text{m},t} + \tilde{\epsilon}_{\text{HML},t}$$

- Fama and French (1993) use a similar regression to reject the hypothesis that the CAPM explains the book to market effect.
- Intuitively, the pure RE CAPM hypothesizes that all risk premia arise from covariation with the market factors.
- This significance of the  $\hat{\alpha}_{\text{HML}}$  in this regression shows that the zero-investment portfolio with returns described by:

$$\tilde{r}_{\text{p},t} = \tilde{r}_{\text{HML},t} - \beta_{\text{HML}} \tilde{r}_{\text{m},t}$$

Has a significantly positive return and zero covariation with the market. Hence, this result allows rejection of the CAPM.

- It also means that a RE investor in this economy could have earned a higher Sharpe ratio with this portfolio than he could have with the market alone (consistent with the intuitive interpretation).
- However, this doesn't mean that we, as econometricians, could have *ex-ante*, constructed a portfolio with a higher Sharpe ratio than the market.
  - $\alpha_{\text{HML}}$  and  $\beta_{\text{HML}}$  are known to the RE investor, but not to the econometrician.
- Investors are more like econometricians than RE

## Testing an RSU Model

- Essentially, in testing models in this way, we are implicitly assuming that investors know a great deal about the underlying structure of the model. It is harder to reject a CAPM-like model with learning, where it takes investors time to learn the mean returns and covariances of each of the assets.
- To reject this modified-CAPM, they would have to show that investors could have learned about this anomaly and consistently exploited it.
  - We could reject the RSU hypothesis by showing that investors, using only *ex ante* information, could have exploited these anomalies.
- Using only *ex-ante* information, could they have constructed portfolios with Sharpe-Ratios higher than what was available from the market alone?

# Can Anomalies be Explained by RSU Alone?

- A number of papers have explored whether U.S. investors could have learned about and exploited various anomalies:
  - Kandel and Stambaugh (1996), Barberis (2000), Daniel and Titman (1999).
- Daniel and Titman (1999) show that a purely adaptive strategy, earned large and significant returns
  - $\bar{r}_{\text{annual}} = 7.61\%$ ,  $\hat{\beta} = -0.099$ .
  - Portfolio weights were based on prior 10-year return of size, book-to-market, and momentum sorted portfolios.
  - 1974-1997 test period.
- Also, another set of papers has shown that size, book to market, momentum effects are present in international markets:
  - Hawawini and Keim (1995), Fama and French (1998), Rouwenhorst (1998)
- Also, at least for the book-to-market effect, the effect is also present outside of the original time period in which it was discovered (Davis (1994), Davis, Fama and French (2000))
  - Note that these papers also show that the correlation between returns to such strategies are not highly correlated across markets.
- Authors should address whether RSU models could be consistent with this range of evidence.
  - Is there statistical power with this much data?

# Structural Uncertainty and the Limits of Arbitrage

- The authors suggest a strong link between the structural uncertainty and limits of arbitrage.
  - There is considerable casual empirical support for this idea.
  - Decline of the size and book-to-market effects subsequent to their “popularization.”
- However, the strength and consistency of the anomlies appear to be too strong and consistent (in the time-series and cross-section) to result from RSU.
- Once investors “discover” these anomalies they attempt to exploit them. However, they don’t learn about them in a ”rational” way.
- It may be the case that investors use *ad-hoc* learning.
  - This ad-hoc learning may very well be the root-cause of many behavioral anomalies, as the authors suggest in the paper.

- An investor who believed that he was the only one doing this sort of analysis would strongly tilt his portfolio towards the strategies that performed well in the past. However, an investor who believed that inefficiencies are almost immediately corrected by other active investors might choose not to tilt at all towards the better performing strategies.

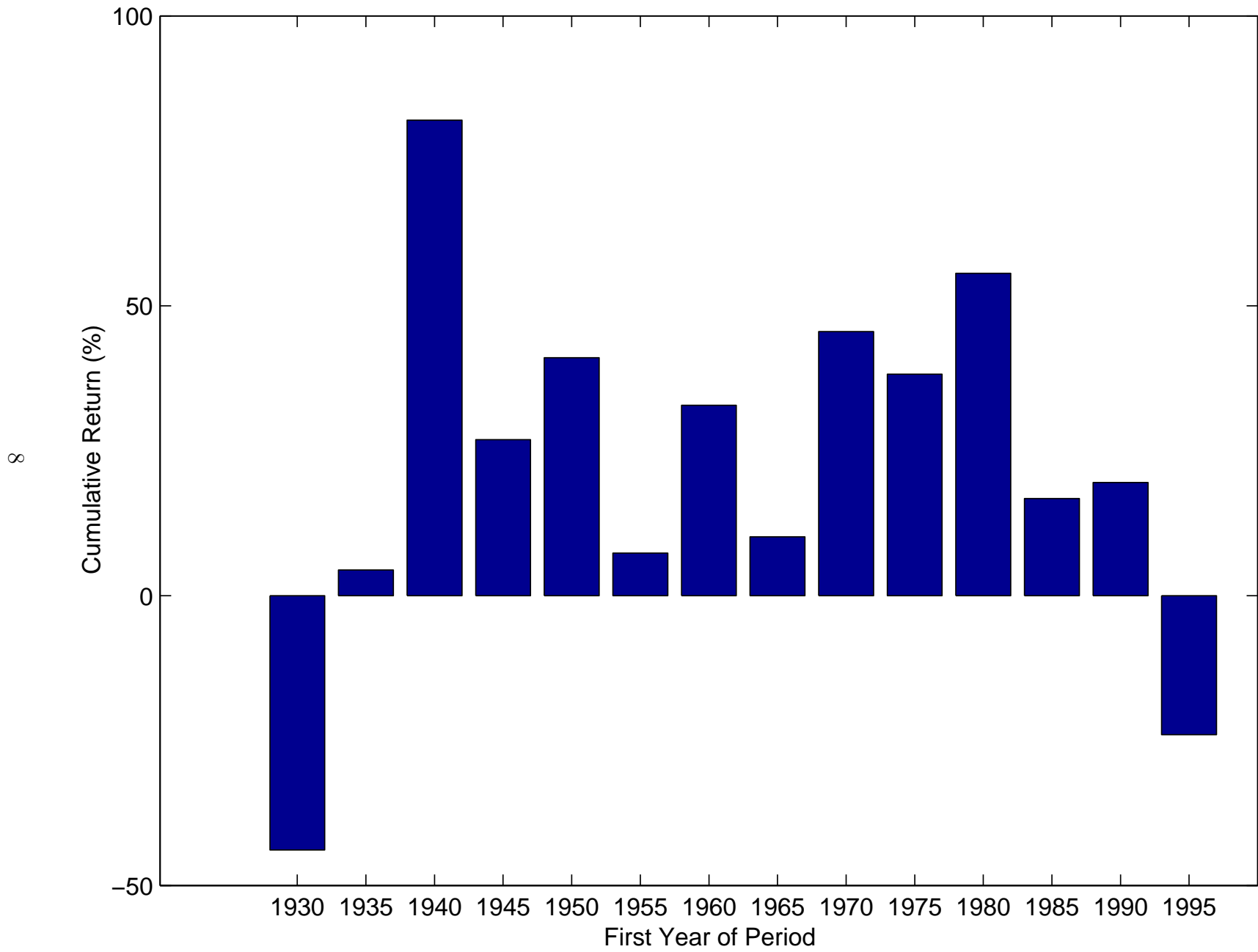
- In a recent article in the *Journal of Portfolio Management*, Merton Miller (1999) stated:

If you find some mechanical rule that seems to earn above-normal returns – and with thousands of researchers spinning through the mountains of tapes of past data, anomalies, like the currently fashionable ‘momentum effects,’ are bound to keep turning up – and imitators will enter and compete away those above-normal returns exactly as in any other setting in economics. Above-normal profits, wherever they are found, inevitably carry with them the seeds of their own decay. (p. 99)

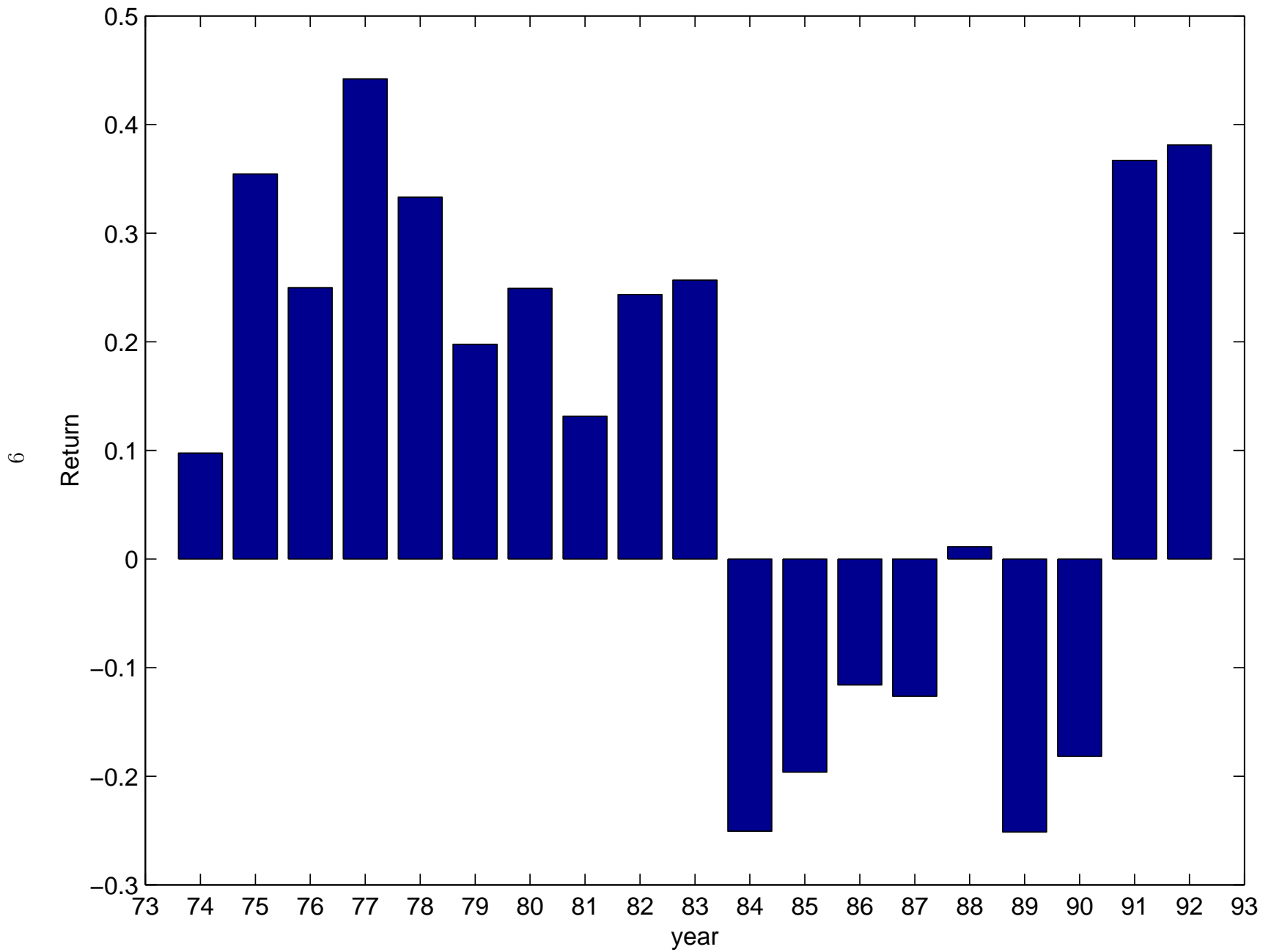
- Ironically, if most rational investors believe that the market is very efficient, they will not exploit the strategies and the pricing anomaly is likely to persist. Alternatively, if the rational investors underestimate the number and aggressiveness of other rational investors, they may as a group tilt too much towards these strategies causing the anomaly to be reversed.



Cumulative Five Year returns -- HML Portfolio



CRSP Annual Decile 2 – Decile 10 Returns



## References

- Barberis, Nicholas [2000] “Investing for the Long Run when Returns are Predictable.” *Journal of Finance* 55(2), pp. 225 – 264
- Daniel, Kent D., and Sheridan Titman [1999] “Market Efficiency in an Irrational World.” *Financial Analysts’ Journal* 55(6), pp. 28–40
- Davis, James, Eugene F. Fama, and Kenneth R. French [2000] “Characteristics, Covariances, and Average Returns: 1929-1997.” *Journal of Finance* 55(1), pp. 389–406
- Davis, James L. [1994] “The Cross-Section of Realized Stock Returns: The Pre-COMPUSTAT Evidence.” *Journal of Finance* 50, pp. 1579–1593
- Fama, Eugene F., and Kenneth R. French [1993] “Common risk factors in the returns on stocks and bonds.” *Journal of Financial Economics* 33, pp. 3–56
- [1998] “Value Versus Growth: The International Evidence.” *Journal of Finance* 53(6), pp. 1975–1999
- Gibbons, Michael R., Stephen A. Ross, and Jay Shanken [1989] “A Test of the Efficiency of a Given Portfolio.” *Econometrica* 57(5), pp. 1121–1152
- Hansen, Lars, and Scott F. Richard [1987] “The Role of Conditioning Information in Deducing Testable Restrictions Implied by Dynamic Asset Pricing Models.” *Econometrica* 55, pp. 587–613
- Hansen, Lars P., and Ravi Jagannathan [1991] “Implications of Security Market Data for Models of Dynamic Economies.” *Journal of Political Economy* 99(2), pp. 225–262
- Hawawini, Gabriel, and Donald B. Keim [1995] “On the Predictability of Common Stock Returns: World-Wide Evidence.” In *Finance, Handbooks in Operations Research and Management Science and Management Science*, ed. Robert A. Jarrow, Vojislav Maksimovic, and William T. Ziemba (Amsterdam: North Holland) chapter 17, pp. 497–544
- Kandel, Shmuel, and Robert F. Stambaugh [1996] “On the Predictability of Stock Returns: An Asset-Allocation Perspective.” *Journal of Finance* 53(2), pp. 385–424
- Miller, Merton H [1999] “A History of Finance.” *Journal of Portfolio Management* 25(4), pp. 95–101
- Rouwenhorst, K. Geert [1998] “International Momentum Strategies.” *Journal of Finance* 53(1), pp. 267–284
- Shleifer, Andrei, and Robert Vishny [1997] “The Limits to Arbitrage.” *Journal of Finance* 52(1), pp. 35–55