Lecture Notes

Hou, Mo, Xue, and Zhang (Management Science, forthcoming): The Economics of Security Analysis

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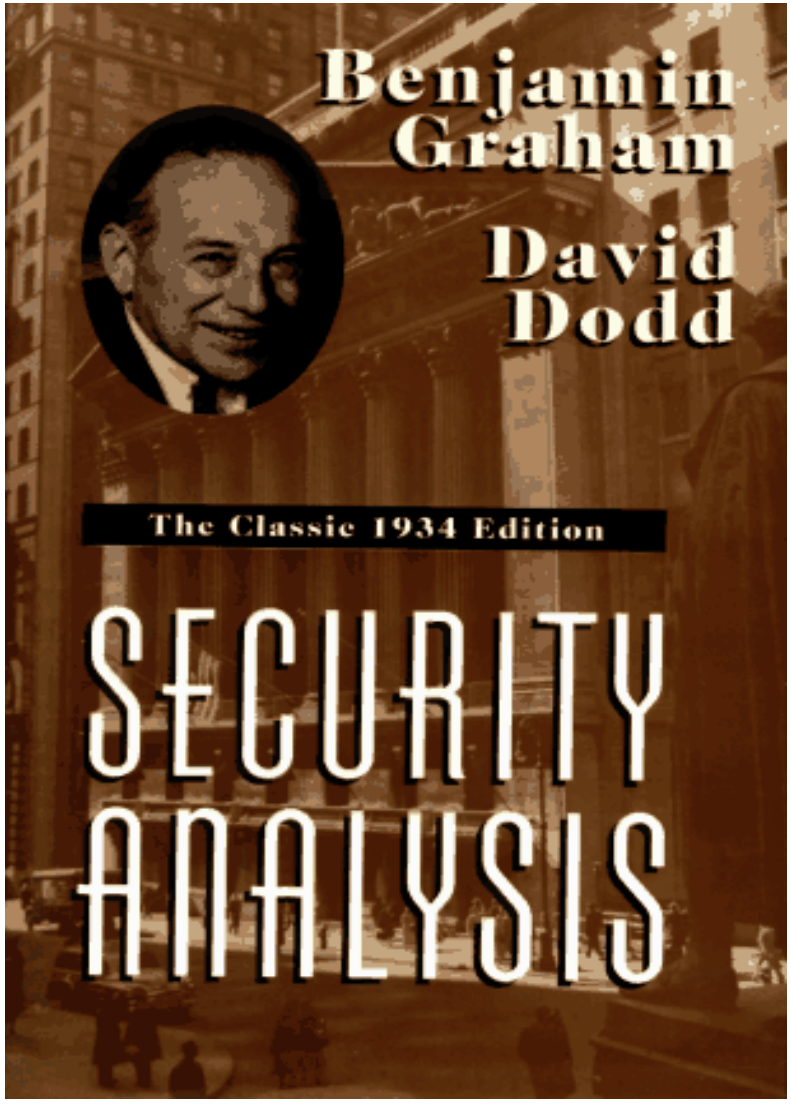
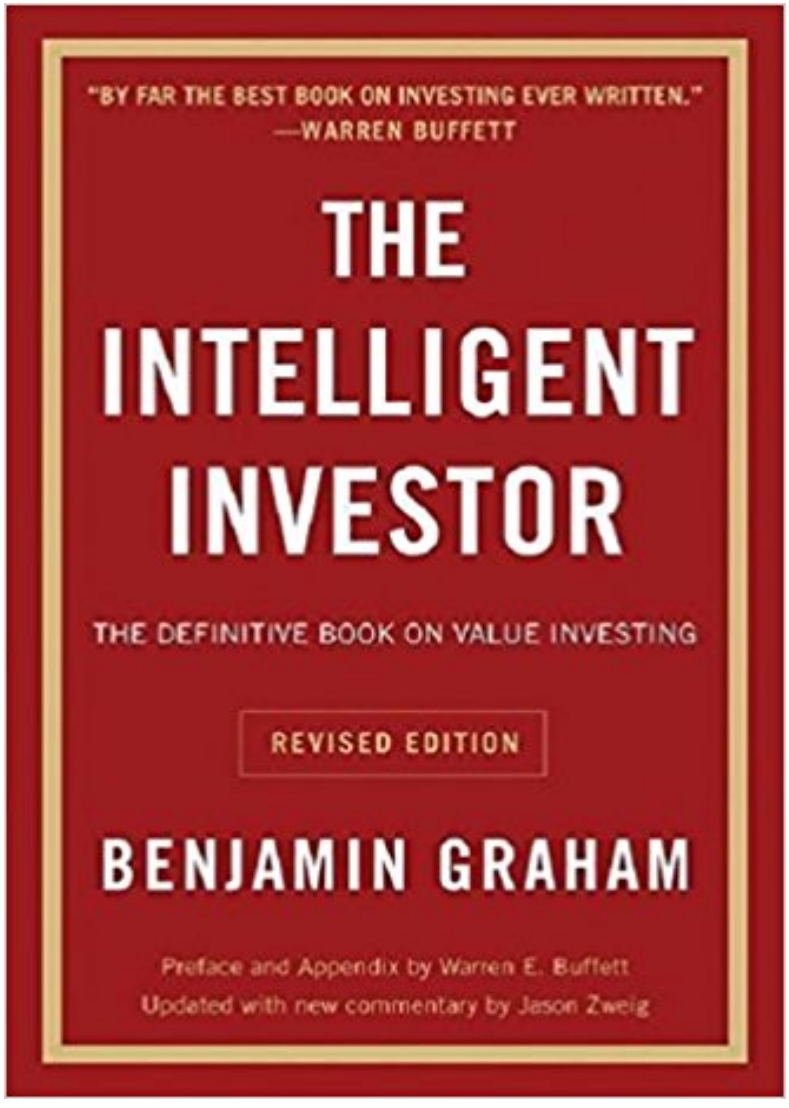
The investment CAPM, in which expected returns vary with investment, profitability, and expected growth cross-sectionally, provides an equilibrium foundation for Graham and Dodd (1934)

Outline

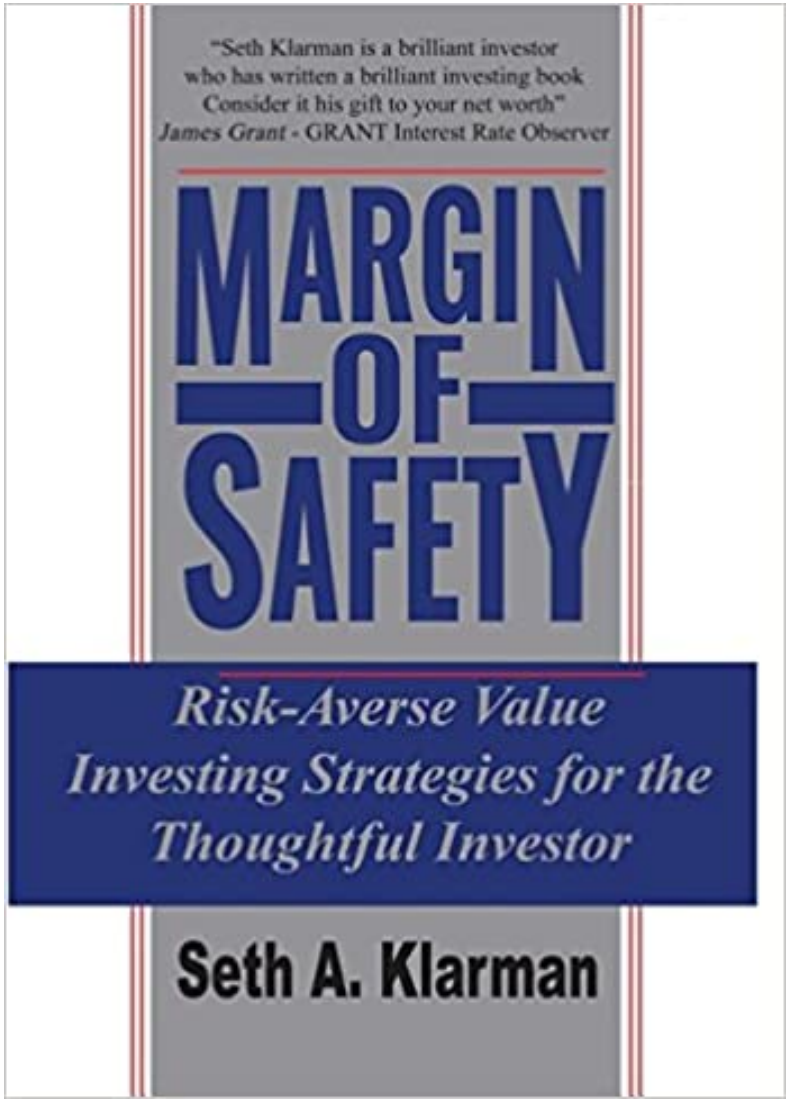
Outline

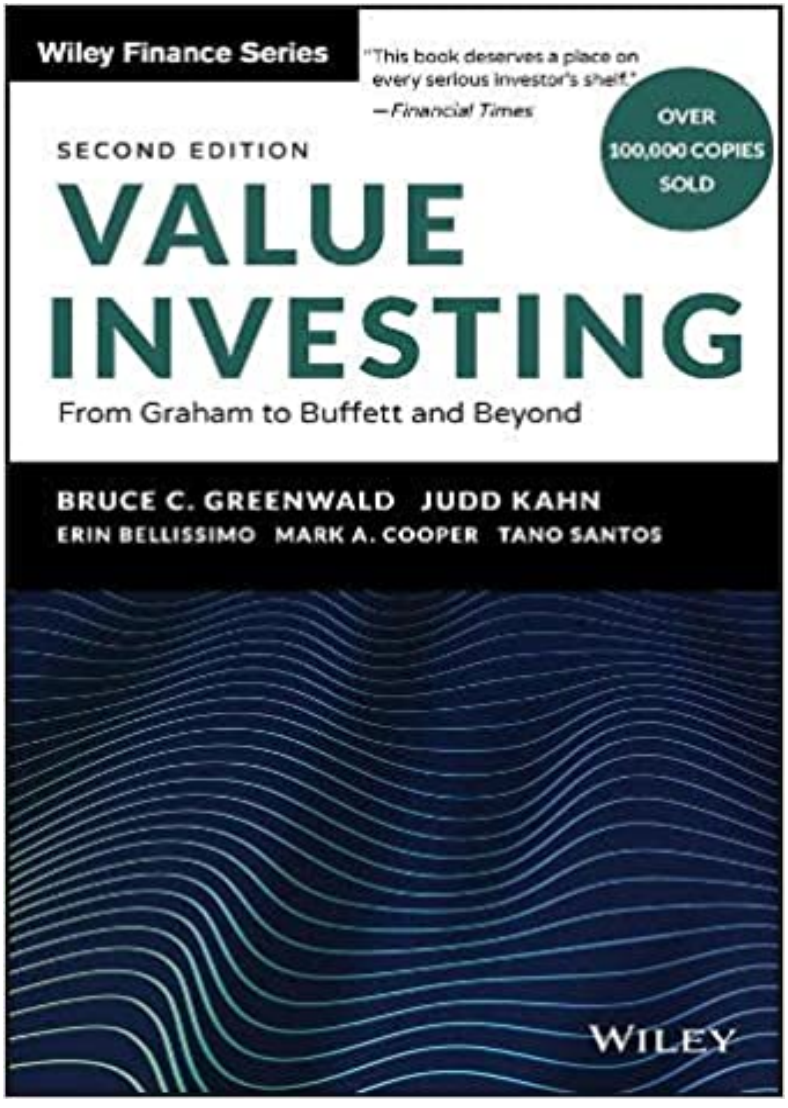

Benjamin Graham
David Dodd
The Classic 1934 Edition
SECURITY ANALYSIS


"BY FAR THE BEST BOOK ON INVESTING EVER WRITTEN."
—WARREN BUFFETT
THE INTELLIGENT INVESTOR
THE DEFINITIVE BOOK ON VALUE INVESTING
REVISED EDITION
BENJAMIN GRAHAM
Preface and Appendix by Warren E. Buffett
Updated with new commentary by Jason Zweig

Motivation

Security analysis, modern works





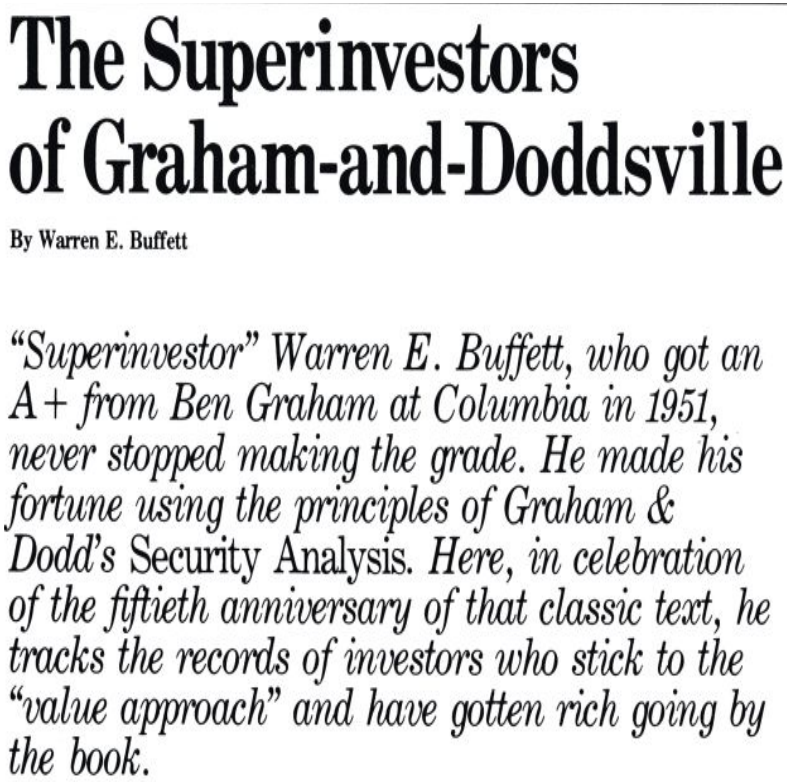
Invest in undervalued securities selling well below the intrinsic value

- The value justifiable by the firm's earnings, assets, and other accounting information
- Distinct from the market value subject to artificial manipulation and psychological distortion

Maintain margin of safety, the intrinsic-market value distance

"[T]he market is not a weighting machine, on which the value of each issue is recorded by an exact and impersonal mechanism, in accordance with its specific qualities. Rather should we say that the market is a voting machine, whereon countless individuals register choices which are the product partly of reason and partly of emotion (p. 27, original emphasis)."

"One of your partners, named Mr. Market, is very obliging indeed. Every day he tells you what he thinks your interest is worth and furthermore offers either to buy you out or to sell you an additional interest on that basis. Sometimes his idea of value appears plausible and justified by business developments and prospects as you know them. Often, on the other hand, Mr. Market lets his enthusiasm or his fears run away from him, and the value he proposes seems to you a little short of silly (p. 204–205)."



The Superinvestors of Graham-and-Doddsville

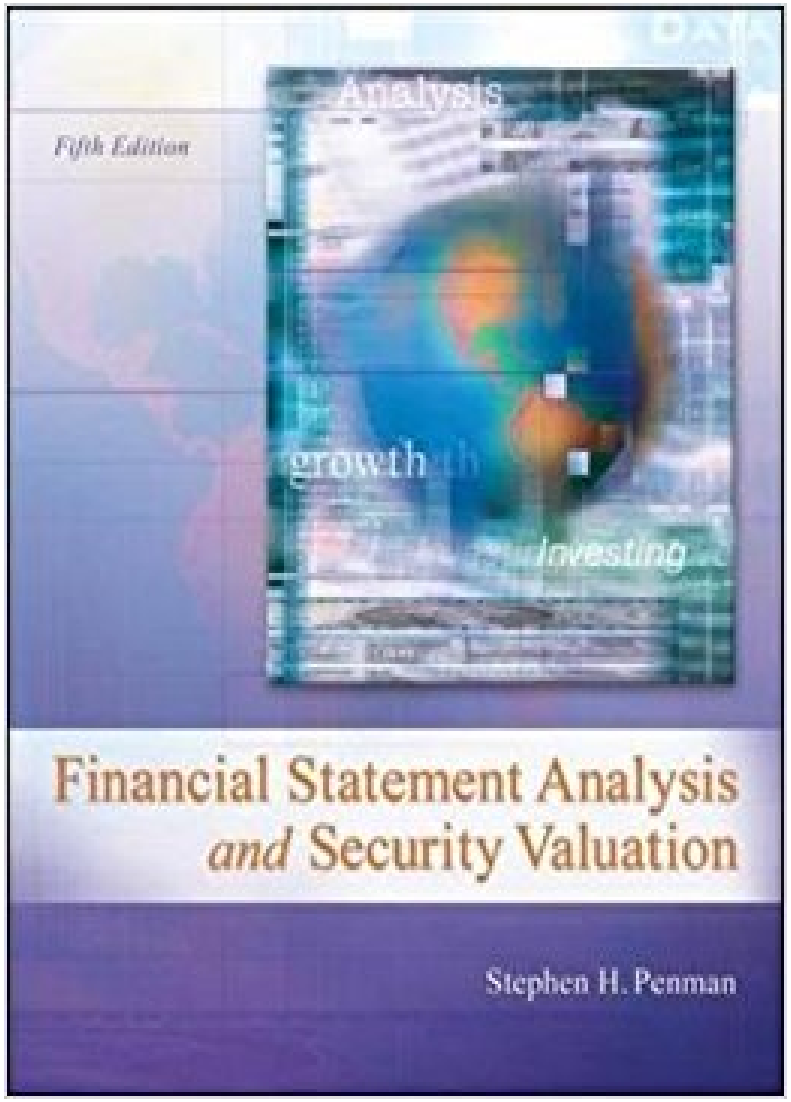
By Warren E. Buffett

"Superinvestor" Warren E. Buffett, who got an A+ from Ben Graham at Columbia in 1951, never stopped making the grade. He made his fortune using the principles of Graham & Dodd's Security Analysis. *Here, in celebration of the fiftieth anniversary of that classic text, he tracks the records of investors who stick to the "value approach" and have gotten rich going by the book.*

"Our Graham & Dodd investors, needless to say, do not discuss beta, the capital asset pricing model or covariance in returns among securities. These are not subjects of any interest to them. In fact, most of them would have difficulty defining those terms (Buffett 1984, p. 7)"

Motivation

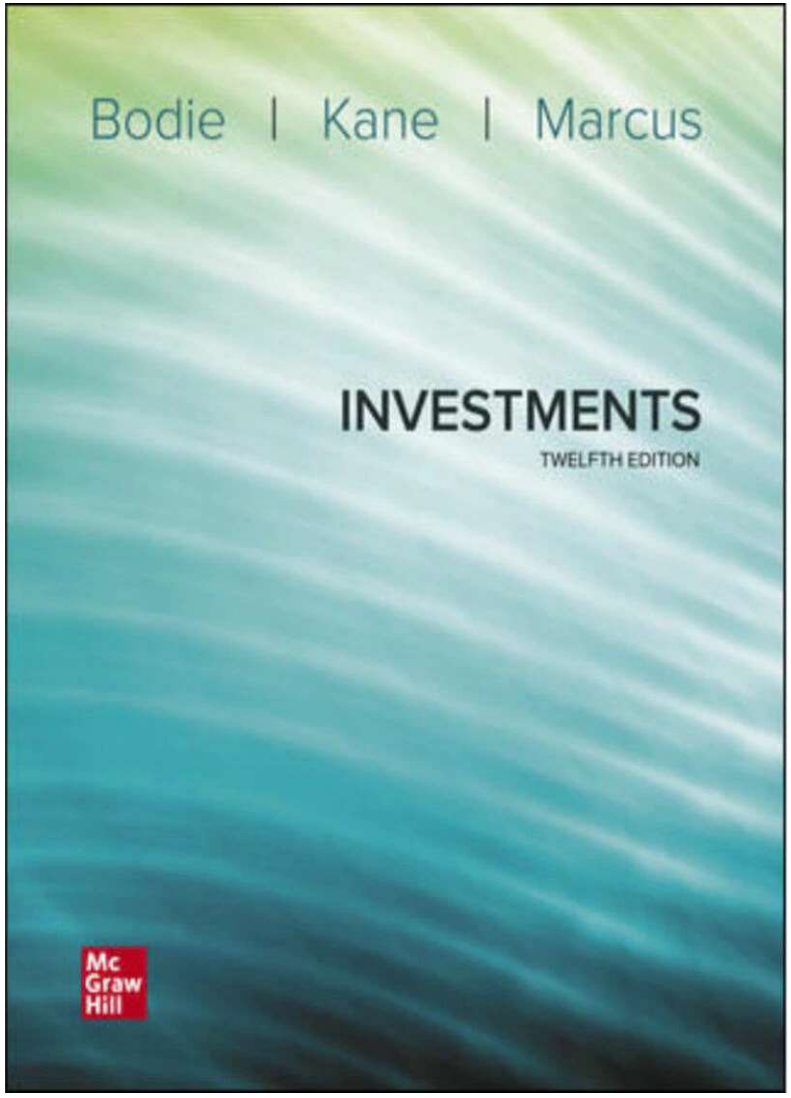
Academic accounting: Penman (2013, p. 210, original emphasis)



"Passive investors accept market prices as fair value. Fundamental investors, in contrast, are active investors. They see that price is what you pay, value is what you get. They understand that the primary risk in investing is the risk of paying too much (or selling for too little). The fundamentalist actively challenges the market price: Is it indeed a fair price?"

Motivation

Academic finance: Bodie, Kane, and Marcus (2021, p. 339, our emphasis)



"[T]he efficient market hypothesis predicts that most fundamental analysis also is doomed to failure. If the analyst relies on publicly available earnings and industry information, his or her evaluation of the firm's prospects is not likely to be significantly more accurate than those of rival analysts"

Outline

Two parallel interpretations of any predictability:

$$\overbrace{r_{jt+1}}^{\textbf{Realized returns}} = \underbrace{E_t[r_{jt+1}]}_{\textbf{Expected returns}} + \overbrace{\epsilon_{jt+1}}^{\textbf{Abnormal returns}}$$

Time-varying and cross-sectionally varying expected returns (EMH) versus predictable abnormal returns (behavioral finance)

Expected returns as functions of accounting information

The marginal investor (e.g., a representative household) maximizes:

$$U(C_t) + \rho E_t[U(C_{t+1})]$$

subject to:

$$\begin{aligned} C_t + \sum_i P_{it} S_{it+1} &= \sum_i (P_{it} + D_{it}) S_{it} \\ C_{t+1} &= \sum_i (P_{it+1} + D_{it+1}) S_{it+1} \end{aligned}$$

The first principle of consumption:

$$E_t[M_{t+1} r^S_{it+1}] = 1 \quad \Rightarrow \quad \overbrace{E_t[r^S_{it+1}] - r_{ft} = \beta^M_{it} \lambda_{Mt}}^{\textbf{The Consumption CAPM}}$$

An individual firm i maximizes:

$$P_{it} + D_{it} \equiv \max_{\{I_{it}\}} \Pi_{it} A_{it} - I_{it} - \frac{a}{2}\left(\frac{I_{it}}{A_{it}}\right)^2 A_{it} + E_t\left[M_{t+1}\Pi_{it+1}A_{it+1}\right]$$

The first principle of investment:

$$\frac{P_{it+1} + D_{it+1}}{P_{it}} \equiv \underbrace{R_{it+1} = \frac{\Pi_{it+1}}{1 + a(I_{it}/A_{it})}}_{\textbf{The Investment CAPM}}$$

A restatement of the Net Present Value (NPV) rule

Equilibrium

Asset prices are equilibrated by the supply and demand of risky assets

The demand and supply theories of value deliver identical expected returns in general equilibrium:

$$R_{ft} + \beta_{it}^{M} \lambda_{Mt} = E_t[R_{it+1}] = \frac{E_t[\Pi_{it+1}]}{1 + a(I_{it}/A_{it})}$$

Causation? Covariances, expected returns, and characteristics are all simultaneously determined in equilibrium

The investment CAPM in a multiperiod world:

$$R_{it+1} \approx \frac{\Pi_{it+1} + (1-\delta)\left[1 + a\left(I_{it+1}/A_{it+1}\right)\right]}{1 + a\left(I_{it}/A_{it}\right)}$$

Cross-sectionally varying expected returns, depending on investment, expected profitability, and expected growth

The q-factor model and the q^5 model:

$$\begin{aligned} E[R_i - R_f] &= \beta^i_{\text{MKT}}\, E[\text{MKT}] + \beta^i_{\text{Me}}\, E[R_{\text{Me}}] \\ &\quad + \beta^i_{\text{I/A}}\, E[R_{\text{I/A}}] + \beta^i_{\text{Roe}}\, E[R_{\text{Roe}}] + \beta^i_{\text{Eg}}\, E[R_{\text{Eg}}] \end{aligned}$$

"A new conception was given central importance—that of trend of earnings. The past was important only in so far as it showed the direction in which the future could be expected to move. A continuous increase in profits proved that the company was on the upgrade and promised still better results in the future than had been accomplished to date" (p. 353, original emphasis)

"The concept of earnings power has a definite and important place in investment theory. It combines a statement of actual earnings, shown over a period of years, with a reasonable expectation that these will be approximated in the future, unless extraordinary conditions supervene" (p. 506, original emphasis)

"Assuming a fair degree of confidence on the part of the investor that the company will expand in the future, what price is he justified in paying for this attractive element? Obviously, if he can get a good future for nothing, i.e., if the price reflects only the past record, he is making a sound investment. But this is not the case, of course, if the market itself is counting on future growth" (p. 366–367, original emphasis)

"[O]nce the investor pays a substantial amount for the growth factor, he is inevitably assuming certain kinds of risk; viz., that the growth will be less than he anticipates, that over the long pull he will have paid too much for what he gets, that for a considerable period the market will value the stock less optimistically than he does" (p. 367, original emphasis)

The investment CAPM, in which expected returns vary with investment, profitability, and expected growth cross-sectionally, provides an equilibrium foundation for Graham and Dodd (1934)

- Graham and Dodd implicitly assume a constant discount rate, but we model cross-sectionally varying expected returns
- The consumption CAPM downplays (dismisses?), but we validate security analysis on equilibrium grounds

Outline

In the data, the q^5 model largely explains:

- Abarbanell and Bushee (1998)
- Frankel and Lee (1998)
- Greenblatt (2005, 2010): "Magic formula"
- Asness, Frazzini, and Pedersen (2019): Quality minus junk
- Bartram and Grinblatt (2018): Agnostic analysis
- Operating cash flow-to-market
- Penman and Zhu (2014, 2020): Expected-return strategies

TABLE 1
Definitions of Fundamental Signals and Observed Empirical Relations Between Signals and Current Stock Returns and Future Earnings

Signal	*Measurement*[a]	*Observed Relation with Current Stock Returns*[b]	*Observed Relation with One-Year-Ahead Earnings*	*Observed Relation with Long-Term Earnings Growth*
Inventory (INV)[c]	Δ Sales (12)[d] − Δ Inventory (78 or 3)	+	+	
Accounts Receivable (AR)	Δ Sales − Δ Accounts Receivable (2)		−	
Capital Expenditures (CAPX)	Δ Firm CAPX (30) − Δ Industry CAPX[e]		−	−
Gross Margin (GM)	Δ Gross Margin (12–41) − Δ Sales	+	+	
Selling and Administrative Expenses (S&A)	Δ Sales − Δ S&A (189)	+		
Effective Tax Rate (ETR)	$\left[\mathrm{ETR}_t - \left(\frac{1}{3}\sum_{\tau=1}^{3}\mathrm{ETR}_{t-\tau}\right)\right] \times \mathrm{CHGEPS}_t^f$ where $\mathrm{ETR}_t = \frac{\mathrm{TaxExpense}(16)_t}{\mathrm{EBT}(170+65)_t}$	+	+	+
Earnings Quality (EQ)	1 for LIFO, 0 for FIFO or other (59)			+
Audit Qualification (AQ)	1 for Unqualified, 0 for Qualified or other (149)			
Labor Force (LF)	$\left(\frac{\mathrm{Sales}_t}{\#\mathrm{Employees}(29)_t} - \frac{\mathrm{Sales}_{t-1}}{\#\mathrm{Employees}_{t-1}}\right) \Big/ \frac{\mathrm{Sales}_{t-1}}{\#\mathrm{Employees}_{t-1}}$		+	+

[a] The Δ operator represents a percentage change in the variable from its average over the past two years; e.g. Δ Sales = $[\mathrm{Sales}_t - \mathrm{E}(\mathrm{Sales}_t)]/\mathrm{E}(\mathrm{Sales}_t)$, where $\mathrm{E}(\mathrm{Sales}_t) = (\mathrm{Sales}_{t-1} + \mathrm{Sales}_{t-2})/2$. The variables are defined such that their *expected* relation with current stock returns and future earnings is *positive,* contrary to the definition of the signals used in Lev and Thiagarajan (1993) and Abarbanell and Bushee (1997), who define the signals to have negative relations.

Quantitative Strategies

Abarbanell and Bushee (1998): Composite score, 1/1967–12/2020

	L	2	3	4	H	H−L
			$\overline{R}$			
All	0.50	0.56	0.66	0.65	0.67	0.17
Micro	0.75	0.91	0.88	1.04	0.91	0.16
Small	0.67	0.80	0.87	0.92	0.89	0.22
Big	0.49	0.55	0.65	0.63	0.64	0.15
			α_{q^5} ($p_{\text{GRS}} = 0.09$)			
All	−0.02	0.02	0.03	0.02	0.11	0.13
Micro	0.08	0.17	0.13	0.26	0.19	0.11
Small	−0.04	0.04	−0.01	0.06	0.12	0.16
Big	0.00	0.03	0.04	0.02	0.12	0.11
	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	
All	−0.01	0.00	−0.15	0.16	0.01	
Micro	−0.02	0.09	−0.05	0.03	0.04	
Small	−0.07	0.06	−0.13	0.07	0.12	
Big	−0.01	0.00	−0.16	0.17	0.01	

	L	2	3	4	H	H−L
			$t_{\overline{R}}$			
All	2.43	3.12	3.81	3.86	3.42	1.92
Micro	2.44	3.26	3.17	3.80	3.03	2.06
Small	2.55	3.36	3.71	3.93	3.65	2.98
Big	2.45	3.06	3.79	3.81	3.33	1.60
			t_{q^5}			
All	−0.30	0.43	0.69	0.31	1.51	1.27
Micro	0.75	1.80	1.65	3.08	2.50	1.20
Small	−0.65	0.72	−0.13	0.92	1.92	1.93
Big	0.05	0.51	0.79	0.40	1.47	1.03
	t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}	
All	−0.30	0.06	−2.18	2.51	0.18	
Micro	−0.72	1.63	−0.67	0.59	0.68	
Small	−3.09	2.24	−2.50	1.59	2.29	
Big	−0.19	0.11	−2.18	2.58	0.06	

Lev and Thiagarajan (1993): Selected signals from analysts' written pronouncements are value relevant (significantly associated with contemporaneous stock returns)

Abarbanell and Bushee (1997): Their value relevance is due to associations with subsequent earnings changes

Abarbanell and Bushee (1998): The signals forecast returns as investors underreact to earnings news

The investment CAPM: Signals relate to the expected return via expected profitability (and expected growth)

Quantitative Strategies

Frankel and Lee (1998): Intrinsic-to-market value, 1/1967–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.51	0.59	0.57	0.74	0.88	0.36	2.41	3.55	3.24	4.27	4.60	2.38
Micro	0.76	0.94	0.87	0.93	1.03	0.27	2.50	3.48	3.45	3.68	3.77	1.99
Small	0.65	0.84	0.89	0.86	0.97	0.33	2.36	3.52	4.05	3.98	3.90	2.16
Big	0.52	0.58	0.55	0.72	0.82	0.29	2.45	3.54	3.15	4.20	4.37	1.90
	α_{q^5} ($p_{\text{GRS}} = 0.08$)						t_{q^5}					
All	0.01	−0.14	−0.17	−0.03	0.16	0.15	0.08	−2.09	−2.13	−0.34	1.65	1.05
Micro	0.03	0.21	0.07	0.14	0.23	0.20	0.28	2.02	0.88	1.44	2.37	1.64
Small	−0.08	0.00	0.02	0.01	0.11	0.19	−0.89	−0.03	0.25	0.12	1.12	1.35
Big	0.03	−0.14	−0.18	−0.03	0.14	0.11	0.41	−2.07	−2.12	−0.38	1.41	0.71
	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}		t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}	
All	−0.08	0.20	0.70	−0.16	0.06		−1.75	2.42	6.15	−1.39	0.53	
Micro	−0.03	−0.16	0.54	0.06	−0.11		−0.68	−2.00	4.95	0.56	−0.94	
Small	0.00	−0.17	0.73	−0.06	−0.04		0.04	−1.22	5.37	−0.46	−0.30	
Big	−0.08	0.14	0.72	−0.15	0.04		−1.59	1.57	5.96	−1.23	0.35	

The intrinsic value based on a 2-period residual income model:

$$V_t^h = B_t + \frac{(E_t[\text{Roe}_{t+1}] - r)}{(1+r)} B_t + \frac{(E_t[\text{Roe}_{t+2}] - r)}{(1+r)r} B_{t+1},$$

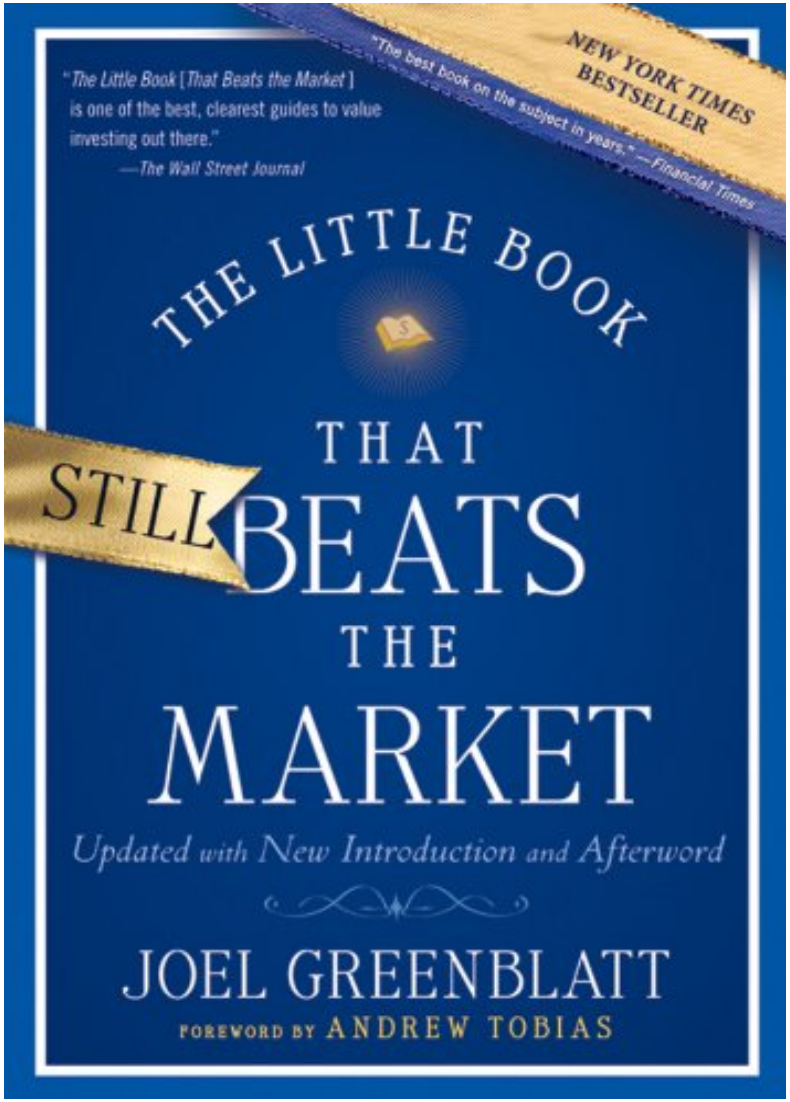
V_t^h: The intrinsic value; B_t: The book equity; $E_t[\text{Roe}_{t+1}]$ and $E_t[\text{Roe}_{t+2}]$: The expected return on equity

V_t^h/P_t can deviate from 1, without mispricing, because of errors in cash flow forecasts and in discount rates

V_t^h/P_t (with a constant discount rate of 12%) mostly as a nonlinear function of investment, profitability, and expected growth

Quantitative Strategies

Greenblatt's (2005, 2010) "Magic formula:" Buy good companies (ones that have high returns on capital) at bargain prices (prices that give investors high earnings yields)



Quantitative Strategies

Greenblatt (2005, 2010): "Magic formula," 1/1967–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.44	0.55	0.53	0.63	0.90	0.46	1.84	3.11	2.90	3.57	5.03	3.16
Micro	0.62	0.77	0.86	0.98	0.97	0.35	1.81	2.75	2.97	3.53	3.71	2.05
Small	0.55	0.80	0.79	0.89	0.95	0.40	1.84	3.30	3.26	3.60	3.98	2.49
Big	0.47	0.54	0.52	0.61	0.88	0.41	2.03	3.11	2.86	3.50	5.01	2.70
	α_{q^5} ($p_{\text{GRS}} = 0.87$)						t_{q^5}					
All	0.10	0.04	−0.01	−0.03	0.07	−0.03	1.01	0.66	−0.22	−0.48	1.05	−0.24
Micro	0.07	0.06	0.12	0.16	0.14	0.06	0.60	0.64	1.46	1.71	1.58	0.46
Small	0.04	0.04	0.06	0.03	0.08	0.04	0.46	0.51	0.86	0.38	1.03	0.29
Big	0.19	0.06	−0.01	−0.03	0.06	−0.13	1.77	0.83	−0.14	−0.50	0.88	−0.98

	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}
All	−0.11	0.07	0.08	0.42	0.37	−3.12	1.12	0.95	5.21	3.90
Micro	−0.09	−0.25	0.41	0.67	−0.09	−2.04	−2.06	3.22	6.22	−0.91
Small	−0.11	−0.09	0.47	0.59	−0.01	−2.21	−0.69	3.92	5.30	−0.08
Big	−0.10	0.18	0.06	0.42	0.40	−2.61	2.83	0.68	4.85	3.88

Quality: Characteristics investors are willing to pay a high price for

- Profitability: Gross profitability, return on equity, return on assets, cash flow-to-assets, gross margin, and negative accruals
- Growth: The 5-year growth in residual per-share profitability measures, excluding accruals
- Safety: The Frazzini-Pedersen (2014) beta, leverage, O-score, Z-score, and the volatility of return on equity

Quantitative Strategies

Asness, Frazzini, and Pedersen (2019): Quality, 1/1967–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.45	0.52	0.51	0.60	0.71	0.25	1.80	2.67	2.87	3.35	3.81	1.74
Micro	0.41	0.85	0.93	0.97	0.96	0.55	1.13	2.86	3.26	3.50	3.64	3.61
Small	0.59	0.78	0.83	0.82	0.96	0.37	1.93	3.21	3.32	3.34	3.90	2.88
Big	0.48	0.49	0.49	0.59	0.69	0.22	2.01	2.58	2.77	3.30	3.76	1.51
	α_{q^5} ($p_{\text{GRS}} = 0.00$)						t_{q^5}					
All	0.01	−0.01	−0.04	0.06	0.11	0.10	0.18	−0.10	−0.69	1.13	2.09	0.97
Micro	0.03	0.26	0.22	0.32	0.29	0.27	0.15	2.17	2.20	2.84	2.52	2.02
Small	0.13	0.11	0.08	0.14	0.21	0.08	1.68	1.57	1.23	2.13	2.72	0.77
Big	0.07	0.00	−0.04	0.05	0.11	0.04	0.69	−0.05	−0.68	1.03	2.00	0.38

	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}
All	−0.15	−0.36	−0.59	0.43	0.40	−4.99	−8.83	−8.86	7.06	5.73
Micro	−0.17	−0.21	0.03	0.63	0.14	−5.75	−4.07	0.33	8.00	1.76
Small	−0.17	−0.12	−0.10	0.56	0.21	−4.95	−1.33	−1.24	7.03	2.84
Big	−0.13	−0.22	−0.65	0.40	0.40	−3.76	−5.25	−8.72	5.91	5.06

At the beginning of each month, cross-sectionally regress the beginning-of-the-month market equity on a long list of 25 most recently available quarterly accounting variables

A stock's intrinsic value, V, each month, as the fitted component of the month's cross-sectional regression

The agnostic fundamental measure is $(V - P)/P$

Quantitative Strategies

Bartram and Grinblatt (2018): Agnostic analysis, 1/1977–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.69	0.65	0.85	0.91	1.05	0.36	2.82	3.58	4.38	3.93	3.76	1.70
Micro	0.37	0.57	0.93	0.89	1.18	0.81	0.92	1.57	2.85	3.00	3.68	3.71
Small	0.70	0.93	0.88	1.02	1.12	0.42	2.11	3.29	3.30	3.83	3.73	2.09
Big	0.70	0.65	0.85	0.91	1.06	0.36	2.91	3.63	4.49	4.00	3.82	1.59
	α_{q^5} ($p_{\text{GRS}} = 0.00$)						t_{q^5}					
All	0.05	−0.03	0.14	0.25	0.39	0.34	0.52	−0.43	1.85	1.91	2.84	1.60
Micro	0.06	−0.04	0.05	0.01	0.47	0.42	0.19	−0.14	0.28	0.08	2.85	1.62
Small	0.09	0.12	0.00	0.21	0.36	0.27	0.85	1.23	0.05	1.88	2.62	1.33
Big	0.08	−0.02	0.16	0.30	0.44	0.36	0.76	−0.31	2.01	2.03	2.71	1.56
	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}		t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}	
All	0.07	0.34	0.80	−0.18	−0.30		0.96	1.61	4.08	−1.00	−1.85	
Micro	0.01	−0.19	0.59	0.43	0.06		0.09	−1.94	3.23	1.97	0.33	
Small	0.03	−0.33	1.00	0.16	−0.19		0.47	−1.87	5.75	0.80	−1.15	
Big	0.11	0.12	0.73	−0.22	−0.25		1.52	0.61	3.91	−1.20	−1.36	

Operating cash flow: Total revenue minus cost of goods sold minus selling, general, and administrative expenses plus research and development expenditures minus change in accounts receivable minus change in inventory minus change in prepaid expenses plus change in deferred revenue plus change in trade accounts payable and plus change in accrued expenses (Ball et al. 2016)

1967–2020: The high-minus-low OCF/M decile earns 10.64% per annum versus 3.46% for the high-minus-low B/M decile

OCF/M is a better measure for value than B/M, probably because OCF better captures intangibles than book equity (Penman 2009)

Operating cash flow-to-market as a better measure of value than book-to-market

Opinion

What Happened to Price-to-Book Ratio in Value Investing?

Assets that are developed internally don't appear on companies' books and cause businesses to appear more expensive than they truly are.

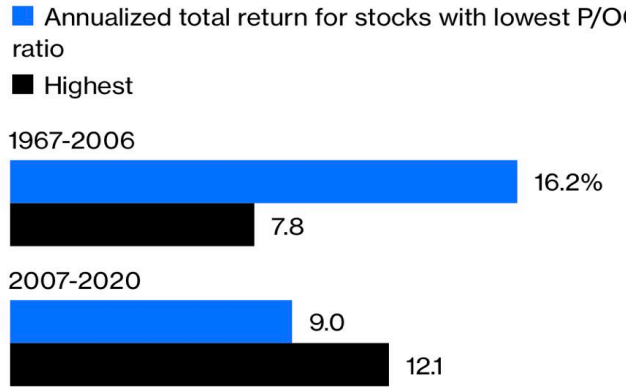
by Nir Kaissar

July 21, 2021 6:00 AM

Amazon's process for turning millions of online orders into next-day deliveries isn't reflected in its P/B ratio. *Photographer: Rachel Jessen/Bloomberg*

Measuring Up

Price-to-operating cash flow was a better measure of value than price-to-book both before and during value's recent stumble



Source: Kewei Hou, Haitao Mo, Chen Xue and Lu Zhang

BloombergOpinion

In Zhang's back tests, price-to-operating cash flow produced value portfolios that were more balanced across sectors, including technology, than those using P/B. As a result, while the cheapest stocks sorted by P/OCF still lagged growth stocks from 2007 to 2020, they held up

Quantitative Strategies

Operating cash flow-to-market, 1/1967–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.41	0.64	0.73	0.75	0.90	0.49	1.78	3.58	4.15	4.06	4.09	2.71
Micro	0.38	0.80	1.04	1.08	1.26	0.88	1.18	2.82	3.80	3.96	4.08	6.22
Small	0.40	0.90	0.96	1.04	1.01	0.61	1.38	3.68	3.95	4.18	3.65	3.75
Big	0.45	0.63	0.70	0.71	0.83	0.37	1.99	3.56	4.08	3.93	3.83	1.99
	α_{q^5} ($p_{\text{GRS}} = 0.00$)						t_{q^5}					
All	0.08	−0.01	−0.06	−0.06	0.15	0.06	1.07	−0.22	−0.97	−0.83	1.35	0.46
Micro	−0.14	0.08	0.25	0.27	0.37	0.51	−1.25	0.92	2.91	3.22	3.40	3.72
Small	−0.06	0.01	0.08	0.06	0.06	0.12	−0.78	0.14	1.08	0.75	0.51	0.85
Big	0.16	0.00	−0.07	−0.08	0.12	−0.03	1.92	0.01	−1.10	−1.03	0.99	−0.22
	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}		t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}	
All	0.01	0.28	1.11	−0.40	0.21		0.25	4.25	11.63	−4.19	1.68	
Micro	0.03	−0.01	0.79	0.09	0.06		0.76	−0.17	7.85	0.80	0.50	
Small	0.06	−0.01	1.10	−0.03	0.13		1.20	−0.12	9.44	−0.22	1.03	
Big	0.01	0.25	1.14	−0.41	0.20		0.22	3.44	10.17	−3.76	1.49	

The 1-period-ahead expected return:

$$E_t[r_{it+1}] = \frac{E_t[Y_{it+1}]}{P_{it}} + E_t\left[\frac{(P_{it+1} - B_{it+1}) - (P_{it} - B_{it})}{P_{it}}\right]$$

Relate $E_t[(P_{it+1} - B_{it+1}) - (P_{it} - B_{it})]$ to expected earnings growth

The investment CAPM more "fundamental" than the Penman-Zhu model, which still has the market equity in its formulation

Expected-return proxy from projecting future returns on 8 variables that are a priori connected to future earnings growth

E/P, B/M, accruals, investment, growth in net operating assets, ROA, net external financing, and net share issues

At the end of June of year t, in the prior 10-year rolling window, perform annual CX regressions of returns cumulated from July of the previous year to June of the subsequent year

Combine the average slopes from the 10-year rolling window with the 8 variables for the fiscal year ending in calendar year $t-1$

Quantitative Strategies

Penman and Zhu (2020): Expected-return strategies, 7/1982–12/2020

	L	2	3	4	H	H−L	L	2	3	4	H	H−L
	$\overline{R}$						$t_{\overline{R}}$					
All	0.54	0.77	0.89	0.89	1.08	0.54	2.06	3.75	4.51	4.74	5.04	3.93
Micro	0.46	1.01	1.05	1.04	1.18	0.72	1.24	3.09	3.40	3.43	3.98	4.42
Small	0.61	1.05	1.03	1.05	0.90	0.28	1.90	3.73	3.98	4.22	3.32	1.96
Big	0.57	0.76	0.89	0.88	1.07	0.50	2.26	3.76	4.54	4.73	5.06	3.50
	α_{q^5} ($p_{\text{GRS}} = 0.00$)						t_{q^5}					
All	−0.05	−0.02	0.05	−0.02	0.19	0.23	−0.74	−0.30	0.59	−0.36	2.24	2.16
Micro	−0.15	0.30	0.26	0.26	0.44	0.59	−1.36	2.93	2.62	1.98	3.18	3.74
Small	−0.07	0.11	0.14	0.16	−0.04	0.03	−0.89	1.15	1.84	2.15	−0.47	0.25
Big	−0.01	−0.02	0.05	−0.03	0.19	0.21	−0.21	−0.31	0.57	−0.46	2.03	1.69

	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	t_{Mkt}	t_{Me}	$t_{\text{I/A}}$	t_{Roe}	t_{Eg}
All	−0.05	−0.21	0.61	−0.14	0.39	−1.45	−4.60	6.97	−2.29	5.36
Micro	−0.11	−0.25	0.46	0.33	−0.04	−2.66	−3.53	3.89	3.69	−0.37
Small	−0.08	−0.21	0.70	0.15	0.13	−1.83	−3.21	8.32	1.56	1.52
Big	−0.05	−0.16	0.60	−0.20	0.41	−1.35	−3.04	5.81	−2.84	5.07

Outline

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PRESIDENTIAL SCHOLAR

Fundamental Analysis Redux

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ABSTRACT: In their classic text *Security Analysis,* Graham and Dodd (1934) warn investors against sole reliance on a few quantitative factors in investment decisions. Instead, they recommend that investment decisions be based on a comprehensive fundamental analysis of the underlying securities. While their views held sway for many decades, recent years have witnessed a sharp reversal. Scholars of finance often overlook fundamental analysis, and their influence has led to a surge of investment products relying solely on a few quantitative factors. These products often have names that appeal to fundamental analysis, such as "value" and "quality." I argue that Graham and Dodd's (1934) recommendations continue to have merit. I show how popular quantitative approaches to investing overlook important information and select stocks with distorted accounting numbers rather than temporary mispricing. I conclude that informative financial reporting and comprehensive fundamental analysis are essential for the efficient functioning of capital markets.

Active Funds

Top 20 active equity funds in CRSP based on full-life information ratio (IR)

#	Fund Name	Start	End	TNA	α	t_α	IR
1	Pacific Capital Funds: Small Cap Fund	12/99	6/10	195	0.92	3.16	0.30
2	Monetta Trust: Monetta Core Growth Fund	7/07	12/20	69	0.33	3.13	0.29
3	Fidelity Select Portfolios: Medical Technology and Devices Portfolio	6/98	12/20	1,802	0.83	4.45	0.27
4	BlackRock Funds: BlackRock Health Sciences Opportunities Portfolio	1/01	12/20	2,770	0.69	3.88	0.26
5	Pioneer Series Trust X: Pioneer Fundamental Growth Fund	1/07	12/20	2,566	0.30	3.16	0.26
6	Advisors' Inner Circle Fund: CIBC Atlas Disciplined Equity Fund	1/07	10/20	559	0.17	3.09	0.25
7	Fidelity Select Portfolios: IT Services Portfolio	5/08	12/20	1,415	0.55	2.70	0.25
8	Templeton Growth Fund	1/67	11/90	580	0.66	3.87	0.25
9	Parnassus Income Funds: Parnassus Core Equity Fund	12/97	12/20	5,557	0.35	3.68	0.25
10	Vanguard Specialized Funds: Vanguard Health Care Fund	12/85	4/08	8,866	0.62	3.47	0.24

Active Funds

Top 20 active equity funds in CRSP based on full-life information ratio (IR)

#	Fund Name	Start	End	TNA	α	t_α	IR
11	Columbia Funds Series Trust I: Columbia Strategic Investor Fund	7/01	7/12	663	0.31	2.34	0.24
12	Delaware Group Equity Funds IV: Delaware Healthcare Fund	12/07	12/20	374	0.67	2.88	0.24
13	Sit Mutual Funds, Inc: Sit Dividend Growth Fund	6/04	12/20	482	0.17	2.99	0.23
14	American Century Mutual Funds, Inc: Sustainable Equity Fund	6/05	12/20	369	0.15	2.79	0.23
15	Westport Funds: Westport Fund	12/98	8/16	223	0.49	3.49	0.23
16	Hartford Mutual Funds, Inc: Hartford MidCap Fund	12/98	10/20	4,423	0.44	3.23	0.23
17	Advisors' Inner Circle Fund: Edgewood Growth Fund	1/07	10/20	5,520	0.46	2.30	0.23
18	Ivy Funds: Ivy Global Natural Resources Fund	1/98	4/08	1,498	1.29	2.41	0.23
19	CRM Mutual Fund Trust: CRM Mid Cap Value Fund	12/99	12/20	1,719	0.50	2.70	0.23
20	Principal Funds, Inc: MidCap Fund	12/01	12/20	5,810	0.34	3.22	0.22

Active Funds

Explaining the performance of aggregate active fund portfolios

Funds	$\overline{R}$	α	α_q	α_{q^5}	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	R^2
Explaining gross fund returns										
All, ew	0.62	0.03	−0.01	0.04	0.97	0.22	−0.06	0.09	−0.09	97%
	3.17	0.66	−0.38	1.29	114.20	12.97	−2.91	3.55	−4.12	
All, vw	0.56	−0.03	−0.04	0.00	0.98	0.10	−0.09	0.08	−0.06	98%
	2.91	−0.79	−1.16	0.11	110.89	6.11	−4.75	3.38	−3.24	
Explaining net fund returns										
All, ew	0.54	−0.06	−0.10	−0.04	0.97	0.22	−0.06	0.09	−0.08	97%
	2.73	−1.29	−2.81	−1.30	114.98	12.98	−2.95	3.53	−4.09	
All, vw	0.49	−0.10	−0.11	−0.07	0.98	0.10	−0.09	0.08	−0.06	98%
	2.55	−2.91	−3.34	−2.11	111.14	6.13	−4.80	3.37	−3.23	

Sharpe's (1991) arithmetic of active management

Active Funds

Explaining the performance of top-20 active fund portfolios

Funds	$\overline{R}$	α	α_q	α_{q^5}	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	R^2
Explaining gross fund returns										
Top-20, ew	1.08	0.62	0.54	0.44	0.80	0.15	0.09	−0.05	0.16	76%
	6.25	6.53	5.54	4.46	21.40	3.63	1.41	−0.90	3.07	
Top-20, vw	1.01	0.58	0.43	0.30	0.78	0.12	0.15	0.01	0.21	70%
	5.89	5.63	3.73	2.45	20.17	3.03	1.82	0.22	3.28	
Explaining net fund returns										
Top-20, ew	1.00	0.54	0.46	0.36	0.80	0.14	0.09	−0.05	0.16	76%
	5.80	5.73	4.74	3.65	21.42	3.64	1.42	−0.88	3.08	
Top-20, vw	0.95	0.52	0.37	0.23	0.78	0.12	0.15	0.02	0.21	70%
	5.51	5.01	3.19	1.92	20.17	3.03	1.83	0.23	3.28	

Magnitude reduction (%): 59.3, 68.9, 64, and 75.8 relative to $\overline{R}$; 29, 48.3, 33.3, and 55.8 relative to α, respectively

The aggregate fund portfolios have significantly negative investment and expected growth factor loadings

The top-20 fund portfolios have significantly positive expected growth and positive (albeit insignificant) investment factor loadings

Top funds outperform via holding high expected growth, low investment stocks at the expense of other funds who hold the opposite sides of the trades in equilibrium

The q-factor and q^5 regressions

	$\overline{R}$	α	β_{Mkt}	β_{Me}	$\beta_{\text{I/A}}$	β_{Roe}	β_{Eg}	R^2
2/68–12/20	1.41	0.59	0.77	−0.04	0.59	0.38		19%
	4.98	2.34	8.89	−0.24	3.82	3.31		
		0.74	0.74	−0.06	0.64	0.46	−0.23	19%
		2.66	8.58	−0.35	4.06	3.40	−1.30	
11/76–3/17	1.51	0.47	0.87	−0.14	0.73	0.48		27%
	4.81	1.72	10.29	−1.00	4.37	4.41		
		0.65	0.85	−0.16	0.78	0.58	−0.29	28%
		2.07	9.72	−1.16	4.55	4.47	−1.44	

The AQR 6-factor regressions

	α	β_{Mkt}	β_{SMB}	β_{HML}	β_{UMD}	β_{BAB}	β_{QMJ}	R^2
2/68–12/20	0.58	0.79	−0.12	0.33	−0.01	0.24	0.30	20%
	2.07	8.99	−0.79	2.50	−0.12	2.51	2.13	
11/76–3/17	0.45	0.93	−0.18	0.40	−0.05	0.27	0.39	29%
	1.67	10.67	−1.45	3.20	−0.91	2.98	2.79	

Outline

Testing the investment CAPM requires auxiliary assumptions on measuring investment, profitability, and expected growth

Investment as asset growth, not accounting for expensed investments (that forecast returns with a positive slope)

The impact of accounting conservatism on risks

Conservative accounting yields a negative (tangible) investment-return relation, as in our investment factor

Intangible investments incorporated into the q^5 model via the expected growth factor, which uses OCF as a key instrument

OCF includes R&D expenses (probably the most reliably measured intangible investments at the firm level) but excludes SG&A

Tangible and intangible investments should not be summed up

The investment CAPM provides an equilibrium foundation for Graham and Dodd (1934)

While challenging the mispricing paradigm, we completely agree with Sloan (2019) that active, discretionary management is indispensable for well-functioning capital markets

The investment CAPM is fighting on three fronts:

- Consumptionism: Asset pricing is all about the pricing kernel
- Behavioral finance: Investors make systematic mistakes
- Empiricism: Observed factors are all we can learn

A Kantian transcendental argument: What must the financial world be like for asset pricing anomalies to be possible?

A Copernican revolution in finance: Corporations, not investors, are the causal powers of asset prices, especially of their own stocks