Equity Valuation Without DCF

Thummim Cho, Christopher Polk, and Robert Rogers

Korea University, LSE, and LSE

University of Cambridge Judge Business School

April 28, 2026

Equity Valuation Without DCF

Thummim Cho, Christopher Polk, and Robert Rogers

Korea University, LSE, and LSE

University of Cambridge Judge Business School

April 28, 2026

Equity Valuation Without DCF

Thummim Cho, Christopher Polk, and Robert Rogers

Korea University, LSE, and Chicago Booth

University of Cambridge Judge Business School

April 28, 2026

Motivation

What Is A Stock's Fundamental Value?

- Value based solely on its stream of future cash flows: $V_0 = E_0 \sum_{t=1}^{\infty} \widetilde{M}_{0\to t} D_t$
- Ultimate question for buy-and-hold investors
  - To them, abnormal returns a sideshow; want to know if the price is right (Cohen, Polk, & Vuolteenaho 2009)
- Important perspective for understanding firm behavior
  - Drives real investment (Baker et al. 2003; Polk & Sapienza 2009), M&A (Shleifer & Vishney 2003), issuance/repurchase (Baker & Wurgler 2002)
- "When did our field stop being 'asset pricing' and become 'asset expected returning?'" (Cochrane 2011 AFA Presidential Address)

How Do We Estimate A Stock's Fundamental Value?

1. Multiples

$$\hat{V}_0^{Multiple} = \overline{P/B} \times B_0$$

- Problem: low multiple may reflect low future profits &/or high risk (Cohen, Polk, and Vuolteenaho; 2003, 2009) rather than underpricing

How Do We Estimate A Stock's Fundamental Value?

1. Multiples

$$\hat{V}_0^{Multiple} = \overline{P/B} \times B_0$$

- Problem: low multiple may reflect low future profits &/or high risk (Cohen, Polk, and Vuolteenaho; 2003, 2009) rather than underpricing

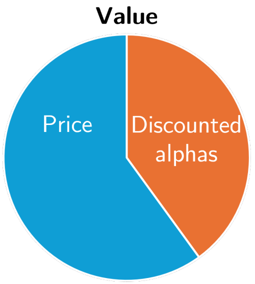
2. Discounted cash flow (DCF)

$$\hat{V}_0^{DCF} = \frac{E_0[D_1]}{1+r_1} + \frac{E_0[D_2]}{(1+r_2)^2} + \ldots$$

- Problem: inputs noisy, with room for discretion
- Estimating $E_0[D]$ challenging, especially for high-duration firms
- Estimating r "distressingly imprecise" (Fama & French 1997)

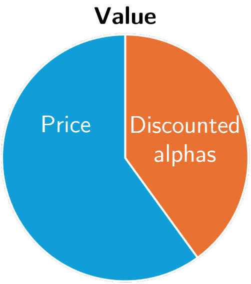
We Propose A New Approach: *Discounted Alphas*

$\hat{V}_0 = P_0 + \text{discounted alphas}$



We Propose A New Approach: *Discounted Alphas*

$\hat{V}_0 = P_0 +$ discounted alphas



Idea: forecast alphas, and "correct the price"

- Not a model but a mathematical identity
- No need to estimate V from scratch
  - Smaller amounts & shorter horizons (αs: 0–8 yrs; **CF**s: 30+ yrs)
  - **estimated quantity small** $\Rightarrow$ $Var(\widehat{V}_0 - V_0) \downarrow$
- Leverages insights from asset-pricing
  - Estimate α then time discount $\rightarrow$ **DCF r_i encodes risk & time discount**
  - Imposes correct pricing of R_f
  - Return predictability disciplines valuation

Equity Valuation In The Finance Literature

- Early work: Cohen, Polk, and Vuolteenaho (2009)
- Renewed interest in fundamental valuation and the mistakes therein: e.g., van Binsbergen and Op. (2019), Hommel et al. (2022), Decaire & Graham (2024), Decaire et al. (2024), Bordalo et al. (2019, 2024, 2025), Delao and Myers. (2021), Delao et al. (2024), Ben-David & Chinco (2024), Gormsen & Huber (2023, 2024)

- DCF approach: Ohlson (1995), Frankel & Lee (1998), Dechow et al. (1999), Lee et al. (1999), Gerakos & Linnainmaa (2018), Golubov & Konstantinidi (2019), Lee et al. (2021), Goncalves & Leonard (2023)
- Composite signals/agnostic regression/PCA: Stambaugh & Yuan (2017), Asness et al. (2019), Bartram & Grinblatt (2018, 2021), van Binsbergen et al. (2023)
  - **Competing methods miss much variation our new technique uncovers**

- Cho and Polk (2024): Derived the discounted alphas identity and used it to estimate the *average time-series* mispricing of characteristic-sorted *portfolios*
  - **In contrast, we provide *real-time* estimates of *stock-level* value**

Implementation

The Discounted Alphas Identity: Intuitive Derivation

- The "abnormal payoff" from holding a stock each period is:

$$P_{i,t}\alpha_{i,t}$$

where $\alpha_{i,t}$ is the alpha earned between t and $t+1$.

- Thus, the NPV from buying and holding the stock is:

$$V_{i,t} - P_{i,t} = \sum_{\tau=0}^{\infty} E_t \left[\widetilde{M}_{t\to t+\tau+1} P_{i,t+\tau} \alpha_{i,t+\tau} \right]$$

The Discounted Alphas Identity: Intuitive Derivation

- The "abnormal payoff" from holding a stock each period is:

$$P_{i,t}\alpha_{i,t}$$

  where $\alpha_{i,t}$ is the alpha earned between t and $t+1$.

- Thus, the NPV from buying and holding the stock is:

$$V_{i,t} - P_{i,t} = \sum_{\tau=0}^{\infty} E_t\left[\widetilde{M}_{t\to t+\tau+1} P_{i,t+\tau}\alpha_{i,t+\tau}\right]$$

- **Two aspects of DA reduce estimator variance, relative to DCF**
  - "Corrects the price"
  - Imposes valid population-level restrictions

Advantage 1: "Corrects The Price"

$$\underbrace{V}_{\text{large}} = \underbrace{P}_{\text{large}} + \underbrace{\text{discounted alphas}}_{\text{small}}$$

- Correction term should be relatively small to model-implied value, V
- Since price is observed, all uncertainty in V comes only from the correction
- Unless alphas are estimated with disproportionately more noise than cashflows, DA should have **lower estimator variance, relative to DCF**
- Our calibrations confirm DA standard errors roughly 10x smaller than those of DCF

Advantage 2: Imposes Valid Population-level Restrictions

$$\textbf{DA:} \quad V_t^{DA} = 1 + \frac{\alpha_t}{1 + R_{f,t}}$$

$$\textbf{DCF:} \quad V_t^{DCF} = E_t\left[\widetilde{M}_{t+1}(1 + R_{t+1})\right] = \left(E_t\left[\widetilde{M}_{t+1}(1 + R_{f,t})\right] - 1\right) + V_t^{DA}$$

- Consider a simple two-period asset with price 1; DCF and DA simplify as above
- DA imposes correct pricing of $R_{f,t}$ (or another base asset) under $\widetilde{M}$

$$E_t[\widetilde{M}_{t+1}(1 + R_{f,t})] = 1$$

- In contrast, DCF inherits estimation error from both the DA term & pricing $R_{f,t}$
- Thus, DA should have **lower estimator variance, relative to DCF**
- This advantage becomes *more* important in the multi-period case
  - DA imposes these restrictions at every future date and in every state

The Discounted Alphas Identity: One-period Law Of Motion

- The "abnormal payoff" from holding a stock each period is:

$$P_{i,t}\alpha_{i,t}$$

where $\alpha_{i,t}$ is the alpha earned between t and $t+1$.

- Thus, the NPV from buying and holding the stock is:

$$V_{i,t} - P_{i,t} = \sum_{\tau=0}^{\infty} E_t \left[\widetilde{M}_{t\to t+\tau+1} P_{i,t+\tau}\alpha_{i,t+\tau} \right]$$

The Discounted Alphas Identity: One-period Law Of Motion

- The "abnormal payoff" from holding a stock each period is:

$$P_{i,t}\alpha_{i,t}$$

where $\alpha_{i,t}$ is the alpha earned between t and $t+1$.

- Thus, the NPV from buying and holding the stock is:

$$V_{i,t} - P_{i,t} = \sum_{\tau=0}^{\infty} E_t\left[\widetilde{M}_{t\to t+\tau+1} P_{i,t+\tau}\alpha_{i,t+\tau}\right]$$

- **Scale by $P_{i,t}$ and express as a one-period law of motion:**

$$\begin{aligned} \frac{V_{i,t}}{P_{i,t}} - 1 &= \frac{\alpha_{i,t}}{1+R_{f,t}} + E_t\left[\widetilde{M}_{t+1}\frac{P_{i,t+1}}{P_{i,t}}\left(\frac{V_{i,t+1}}{P_{i,t+1}} - 1\right)\right] \\ \text{underpricing}_t &= \text{alpha}_t + \text{discount} \times \text{underpricing}_{t+1} \end{aligned}$$

Estimate The Linear Model Of Value That Best Fits The Identity

- Rewrite underpricing as $\gamma_V \times z_t$ plus a projection error

- Identity becomes:

$$\frac{\alpha_t}{1+R_{f,t}} = \gamma_V E_t\left[z_t - \widetilde{M}_{t+1}\frac{P_{t+1}}{P_t}z_{t+1}\right] + u_t$$

- Linear regression of *alphas* on expected discounted *changes in characteristics*
  - Measures the flow of alpha per unit of decay in those characteristics

Two-step Estimator Of γ_V And Value

Step 1: Alpha, capital gain, and characteristic regressions

- Estimate linear processes: for $x \in \{R^e, G^e, z\}$:

$$x_{i,t+1} = a_{x,i,t} + \beta_{x,i,t} f_{t+1} + \epsilon_{x,i,t+1}$$

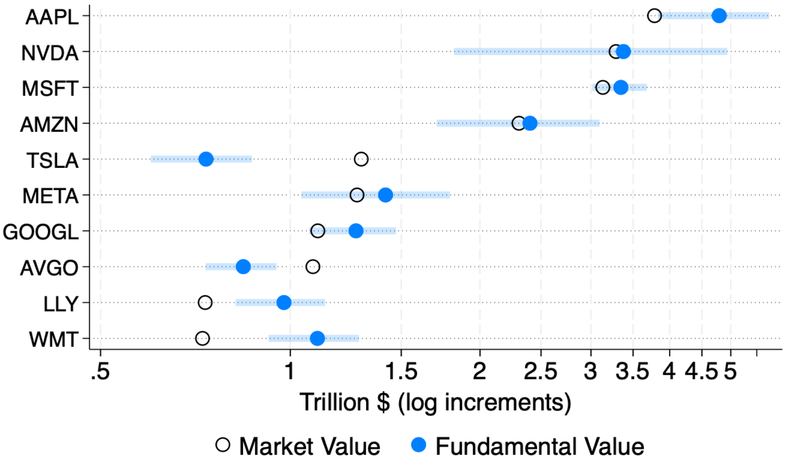
$$a_{x,i,t} = \gamma_x z_{i,t}, \quad \beta'_{x,i,t} = \Gamma_x z_{i,t}$$

  where f are the factors driving $\widetilde{M}$
- These processes imply an approximate value for $E_t \left(z_{i,t} - \text{discount} \times z_{i,t+1} \right)$
  - See paper for details

Step 2: Value regression

- Regress $\alpha_{i,t}$ on $E_t \left(z_{i,t} - \text{discount} \times z_{i,t+1} \right)$ to find $\hat{\gamma}_V$.
- $\widehat{V}_{i,T} = (1 + \hat{\gamma}_V z_{i,T}) P_{i,T}$

Output Example: Price And CAPM Value On December 31, 2024



Of course, fundamental value estimates model-specific (e.g., CAPM vs FF3)

Implementation Details

- Asset pricing models ($\widetilde{M}$): presentation will focus on the CAPM, but we also study results based on FF3, FF5, or risk-neutral benchmarks
- Characteristics (z): cross-sectional ranks of book-to-market, profitability, rolling market beta, liquidity, investment, net issuance, return (momentum)
- Overlapping annual observations in value-weight regressions
- In-sample and rolling-window out-of-sample estimates, 1953–2024
- Standard errors bootstrapped by year and firm

Comparing The Return And Price-level Perspectives

One-month CAPM Alpha

1. Momentum, profitability, B/M, ...
2. Large historical alphas)
3. Decaying over past two decades
4. Focus on dynamic traders

Comparing The Return And Price-level Perspectives

	One-month CAPM Alpha		**CAPM Value-Price**
1	Momentum, profitability, B/M, ...	$\rightarrow$	Beta, profitability, B/M, ...
2	Large historical alphas	$\rightarrow$	Prices "almost efficient" (Black (1986))
3	Decaying over past two decades	$\rightarrow$	Increasing persistence over that time
4	Focus on dynamic traders	$\rightarrow$	Buy-and-hold investors' holdings

Core Results

γ_V: Incremental Predictors Of Stock Underpricing (CAPM, Full-sample)

Panel A. Monthly Alpha (γ_α^{1m}, %)

$$\alpha_t = \gamma_\alpha^{1m} z_{i,t} + \epsilon_{i,t}$$

BM	0.17
Prof	0.20
Beta	-0.16
Inv	-0.03
NetIss	-0.10
Size	-0.03
Ret	0.25
LagRet	-0.01

Panel B. Underpricing (γ_V, %)

$$\frac{V_{i,t}}{P_{i,t}} - 1 = \gamma_V z_{i,t} + u_{i,t}$$

BM	7.0
Prof	12.7
Beta	-13.5
Inv	-1.8
NetIss	-2.9
Size	-0.1
Ret	-0.1
LagRet	-1.1

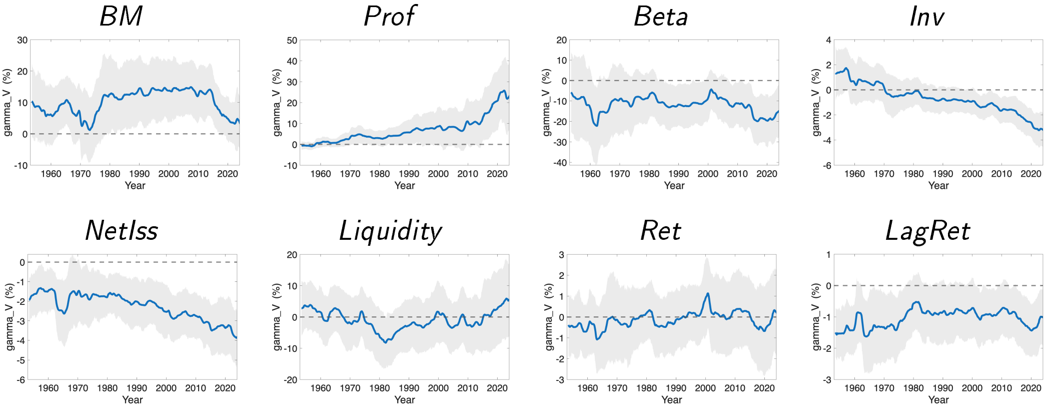
Characteristics predict *underpricing* differently from the way they predict *alphas*

Varying The Benchmark Model: Full-sample Estimates

	CAPM γ_V		Three-factor γ_V		Five-factor γ_V	
Characteristic	(1)	(2)	(3)	(4)	(5)	(6)
BM	7.01	9.36	-5.18	-3.60	1.46	1.40
	(1.72)	(2.17)	(2.36)	(1.66)	(0.52)	(0.53)
Prof	12.71	12.82	19.43	19.71	19.60	19.69
	(2.95)	(2.89)	(5.04)	(5.03)	(4.58)	(4.55)
Beta	-13.48	-14.23	-8.94	-9.51	1.99	2.17
	(2.70)	(2.74)	(1.88)	(1.94)	(0.37)	(0.40)
Inv	-1.81	-2.04	-1.94	-2.17	-0.67	-0.67
	(3.63)	(3.89)	(3.72)	(3.99)	(1.42)	(1.32)
NetIss	-2.88	-3.10	-1.97	-2.16	-0.50	-0.49
	(5.02)	(4.96)	(4.00)	(4.03)	(0.97)	(0.94)
Liq	-0.09	-0.48	-1.13	-1.42	-5.09	-5.09
	(0.02)	(0.11)	(0.44)	(0.54)	(2.60)	(2.53)
Ret	-0.08	0.93	0.56	1.44	3.15	3.03
	(0.11)	(1.64)	(0.73)	(2.43)	(3.27)	(3.50)
LagRet	-1.05		-0.93		0.07	
	(2.86)		(2.44)		(0.15)	

Estimates change, as they should, when we vary $\widetilde{M}$

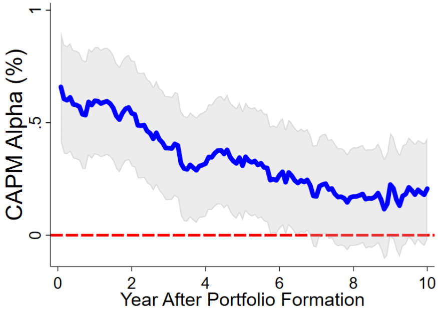
Moving-window Estimates Of γ_V (CAPM, Real-time)



Estimates vary meaningfully over time

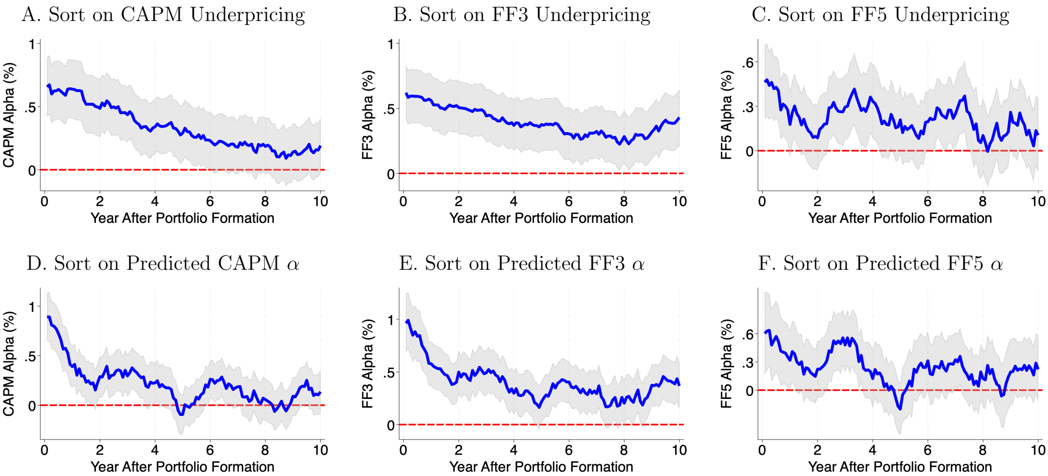
Validation: Out-of-sample $\frac{V}{P}$ Predicts Persistent Future Alphas

Post-formation αs from $\frac{V}{P}$-sorted portfolios



- Also significantly predicts:
  - Five-year CAR
  - Cho and Polk's (2024) $\frac{V}{P}$ measure
- Detects mispricing along the Russell 1000/2000 border
- Sorts on "risk-neutral" $\frac{V}{P}$ generate large variation in long-horizon discount rates; the implied $\frac{V}{B}$ ratio strongly predicts cash-flow growth

Validation: Sorts On Alpha Vs. Sorts On V/P



More persistent differences in alphas from V/P sorts

Validation: Cumulative Abnormal Returns

Panel A. Ex-Post Five-year Cumulative Abnormal Returns (CAR)

Ex-ante Sorting Variable	CAPM CAR	FF3 CAR	FF5 CAR
CAPM Underpricing	**27.39 (4.43)**	22.31 (3.51)	9.56 (1.41)
FF3 Underpricing	20.76 (3.68)	**26.84 (4.82)**	17.53 (2.97)
FF5 Underpricing	4.35 (0.49)	13.15 (2.52)	**16.13 (3.07)**

Large *model-specific* differences in five-year CARs

Validation: Valuation Return Consistency

The identity-implied *valuation residual* should be mean zero and orthogonal to $\widetilde{M}_{t+1}$:

$$\eta^V_{i,t+1} = \underbrace{R^e_{i,t+1}}_{\text{Excess Return}} + \underbrace{\frac{\widehat{V}_{i,t+1} - P_{i,t+1} - (1 + R_{f,t})(\widehat{V}_{i,t} - P_{i,t})}{P_{i,t}}}_{\Delta \text{ Underpricing}} \quad (1)$$

$$E_t\left[\widetilde{M}_{t+1}\,\eta^V_{i,t+1}\right] = 0 \quad (2)$$

	Intercept Coefficient [p-value]				
	Long	Short	Long-Short		
	X^L	X^S	Excess return	Δ Underpricing	X^{LS}
CAPM	1.93 [0.147]	0.06 [0.955]	7.91 [0.000]	-6.04 [0.000]	1.87 [0.390]
FF3	1.69 [0.206]	-1.14 [0.270]	7.44 [0.000]	-4.61 [0.000]	2.83 [0.191]
FF5	-0.50 [0.517]	-0.50 [0.517]	5.63 [0.006]	-5.96 [0.000]	-0.33 [0.909]

Excess returns line up well with changes in model-implied valuations

Cho-Polk's (2024) Ex-post Mispricing Estimator $\hat{\delta}$

Calendar-time expression for δ:

$$\delta \;=\; E\left[\delta_t^{CT}\right], \qquad \delta_t^{CT} = -\sum_{j=1}^{\infty} M_{t-j,t}\,\frac{P_{(t-j),t-1}}{P_{(t-j),t-j}}\,R^e_{(t-j),t}$$

Method of moments estimator:

$$\hat{\delta} = \frac{1}{T}\sum_{t=1}^{T}\tilde{\delta}_t \quad \text{where} \quad \tilde{\delta}_t = \underbrace{-\sum_{j=1}^{J} M_{t-j,t}\,\frac{P_{(t-j),t-1}}{P_{(t-j),t-j}}\,R^e_{(t-j),t}}_{\text{time } t \text{ observation for } \delta}$$

- $J = 180$ months (15 yrs) with returns measured in excess of the market
- $M_{t-j,t} = \exp\left(b_0 j - b_1 \sum_{s=0}^{j-1} \log\left(1 + R^{mkt}_{t-s}\right)\right)$, choosing (b_0, b_1) to set market portfolio's in-sample α and δ zero

Validation: Cho-Polk Portfolio Underpricing

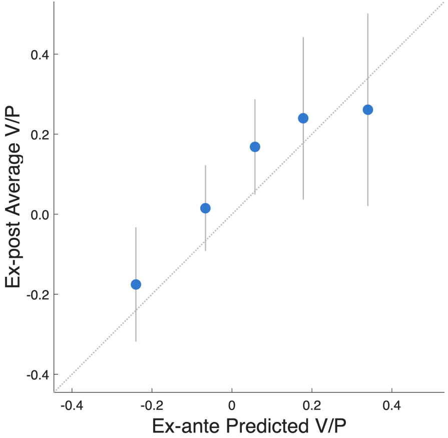
Panel C. Cho-Polk Portfolio Underpricing

	Portfolio Underpricing Based on Ex-Post Returns						
Ex-ante Sorting Variable	Low	2	3	4	High	Hi-Lo	ΔHi-Lo
CAPM Underpricing	-17.55	1.52	16.82	23.98	26.11	43.67	-14.35
[p-value]	[0.016]	[0.781]	[0.006]	[0.021]	[0.034]	[0.017]	[0.434]
FF3 Underpricing	-31.91	-11.92	6.42	20.73	23.91	55.83	-6.15
[p-value]	[0.012]	[0.032]	[0.274]	[0.003]	[0.017]	[0.011]	[0.779]

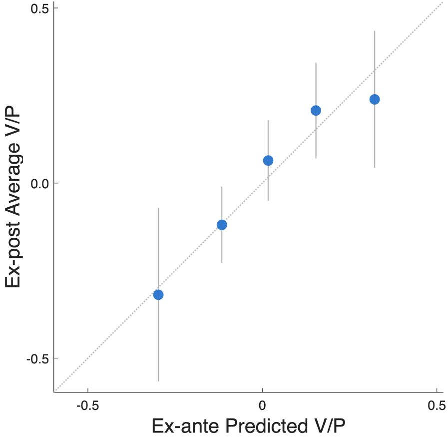
Our real-time measure generates significant spread in Cho-Polk $\hat{\delta}$
Moreover, our predicted spread lines up well with this realized spread

Validation: Cho-Polk Portfolio Underpricing

Panel A. CAPM Fundamental Value



Panel B. FF3 Fundamental Value



Thus, discounted alpha informative in both an ordinal and a cardinal sense

Validation: Russell 1000/2000 Index Effect

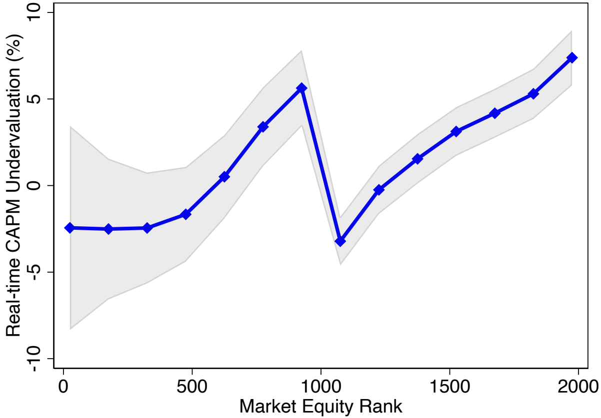
Stocks at the bottom (top) of the Russell 1000 (2000) receive disproportionately less (more) capital because of benchmark concerns (Chang et al., 2015)

	Dependent Variable: CAPM Underpricing			
Bottom of Russell 1000	7.81 (3.48)		7.83 (3.49)	8.59 (6.18)
Top of Russell 2000		-13.25 (11.44)	-13.26 (11.43)	
Russell 1000	-2.89 (1.26)		-0.32 (0.17)	
Russell 2000		7.24 (3.23)	7.03 (5.81)	
Sample	All	All	All	1000/2000 Border

We detect this demand-driven, non-fundamental component of stock prices

Validation: Russell 1000/2000 Index Effect

Stocks at the bottom (top) of the Russell 1000 (2000) receive disproportionately less (more) capital because of benchmark concerns (Chang et al., 2015)



We detect this demand-driven, non-fundamental component of stock prices

Cho and Polk's (2024) Mispricing Signal

- Vuolteenaho (2002): CAPM-implied value of a stock is approximately the spread between future expected profitability and future CAPM risk premia
- Thus, if expected future profitability high despite a low beta and a cheap price (high book-to-market), the stock's likely to be **underpriced**

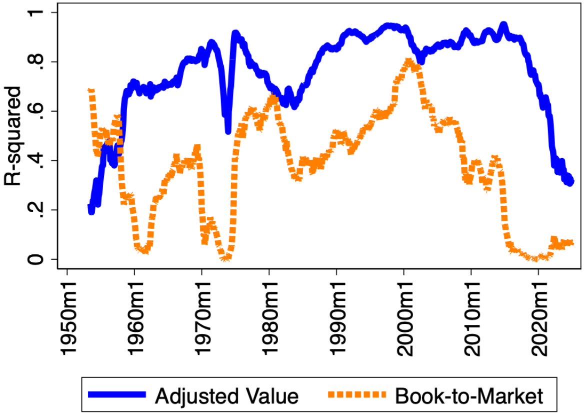
$$\textbf{Adjusted Value} = z\,(\text{B/M}) + z\,(\text{Prof}) - z\,(\text{Beta})$$

Adjusted Value: Cho-Polk's Mispricing Signal

J	δ_{Low}	δ_2	δ_3	δ_4	δ_{High}	δ_{H-L}
1mo	0.29	-0.00	-0.17	-0.23	-0.46	-0.75
("return")	(5.46)	(-0.01)	(-3.43)	(-4.01)	(-6.11)	(-6.88)
1yr	3.24	0.10	-1.96	-3.04	-5.02	-8.26
	(4.39)	(0.16)	(-3.01)	(-3.51)	(-5.24)	(-5.75)
3yrs	7.08	0.76	-4.91	-8.06	-12.28	-19.37
	(3.54)	(0.44)	(-2.24)	(-3.35)	(-4.34)	(-4.69)
5yrs	9.34	2.45	-6.90	-12.17	-18.92	-28.26
	(3.59)	(1.05)	(-2.03)	(-3.66)	(-3.57)	(-4.15)
10yrs	14.72	0.44	-9.04	-20.74	-26.88	-41.60
	(3.79)	(0.13)	(-2.07)	(-3.49)	(-3.05)	(-3.63)
15yrs	18.45	2.32	-13.15	-29.92	-33.41	-51.86
("price")	(3.33)	(0.47)	(-2.80)	(-2.46)	(-2.69)	(-3.14)

Cho and Polk's measure predicts large, significant CAPM mispricing...

Comparing BM And Adjusted Value To Discounted Alphas



...but still misses a lot of the variation in our real-time signal; BM even more

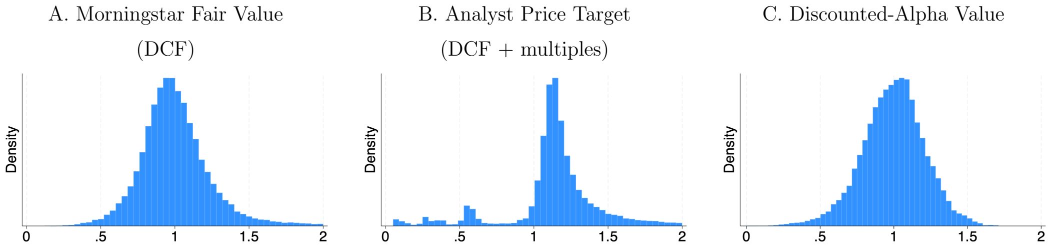
DCF Comparison

Analyst DCF Estimates

- Morningstar employs roughly 150 equity analysts to produce DCF-based, CAPM-implied fundamental values for every firm
  - Use detailed cash-flow projections, staged fade-to-perpetuity assumptions, and explicit discounting at the CAPM-implied weighted average cost of capital to arrive at a fair value

- Sell-side analyst targets typically combine DCF with relative valuation based on price multiples

Comparison To Practitioners' DCF: Distributions



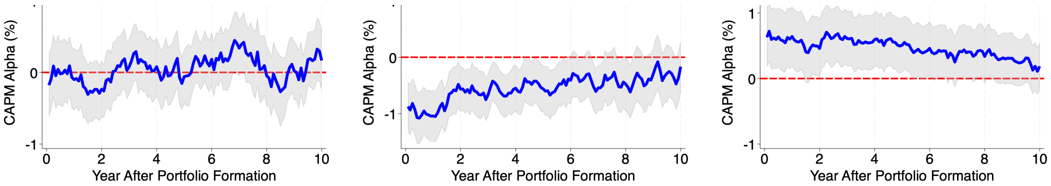
- Both discounted-alpha and Morningstar have reasonably centered distributions, with mispricing values greater than +/-50% extremely rare
- Sell-side one-year price targets are right-skewed, with a median (mean) implied return of about 15% (20%) and are often far away from the current price

Comparison To Practitioners' DCF: Post-formation Alphas

A. Morningstar Fair Value (DCF)

B. Analyst Price Target (DCF + multiples)

C. Discounted-Alpha Value



While discounted-alpha value predicts strong, persistent ex-post alphas,

- **Morningstar DCF**: fails to identify underpriced stocks
- **Analyst targets**: systematically optimistic $\rightarrow$ predict *overpricing*

Comparison To An Analogous DCF Implementation

We develop an alternative "book-based" approach and estimate it using the exact same steps as in DA

$$E_t[\widetilde{M}_{t+1}\ EP_{i,t+1}] = \nu^b_{i,t} - E_t\left[\widetilde{M}_{t+1}\frac{B_{i,t+1}}{B_{i,t}}\ \nu^b_{i,t+1}\right]$$

where ν is the value-to-book ratio and EP is the excess payout ratio

- The results clearly show DA's advantages relative to DCF as the latter
  - forecasts larger payouts that decay more slowly
  - has much larger standard errors, and
  - does not significantly predict mispricing out-of-sample

Comparison To Academic DCF And Other Valuation Metrics

	FE/ME (GL)		Mispricing Factors (SY)		Quality (AFP)		Price Wedge (vBBOT)	
BM	11.65	(2.05)	9.86	(2.53)	9.00	(2.18)	9.02	(2.13)
Prof	10.39	(1.57)	12.00	(2.48)	13.72	(2.35)	10.59	(2.19)
Beta	-15.69	(2.37)	-11.92	(2.42)	-11.83	(2.49)	-19.91	(4.18)
⋮	⋮		⋮		⋮			
FE/ME	7.96	(3.31)						
Mgmt			3.10	(4.29)				
Perf			4.00	(3.34)				
Quality					2.43	(2.61)		
Price Wedge							-6.56	(2.51)
Sample period	1973–2018		1953–2024		1957–2024		1974–2017	

- DCF-based FE/ME (Goncalves and Leonard (2023)) and price wedge (van Binsbergen et al. (2023)) as well as other mispricing signals add useful incremental information
- But they leave out important information in characteristics about CAPM-implied value

Application 1

Long-Term Buy-and-Hold Investors

1: Long-term Buy-and-Hold Investors

- Our measures of price-level mispricing should be extremely relevant to buy-and-hold investors
  - The typical Private Equity Fund has an investment horizon close to 10 years
  - Acolytes of the buy-and-hold approach of Graham and Dodd (1934) – Berkshire Hathaway (Warren Buffett), Tiger Management (Julian Robertson), Capital Group, and Dodge & Cox – should buy the most underpriced stocks
- Some evidence that Buffett (Frazzini et al. 2018) and PE funds (Stafford 2022) tilt towards well-known quant characterististics.
  - However, as we have shown, the way in which those characteristics are combined matters when it comes to measuring price-level distortions

1: Private Equity Buyouts And IPOs

	Dependent Variable: CAPM Underpricing					
PE buyout	10.71	12.32			12.28	12.52
	(3.56)	(5.27)			(5.26)	(5.00)
PE IPO			-15.03	-18.33	-18.33	-17.06
			(19.69)	(26.41)	(26.41)	(17.68)
Delisting						-1.28
						(1.56)
IPO						-0.24
						(0.29)
Sample	Delisting stocks	All	IPO stocks	All	All	All

PE funds buy low and sell high

1: Fundamental Managers' Portfolio Weights

- LHS: Estimated CAPM underpricing (V/P).

Buffett	14.19		12.15	7.94		6.88
	(4.94)		(4.22)	(2.11)		(1.83)
Fundamental		3.56	2.87		5.66	4.75
		(5.11)	(4.19)		(4.66)	(4.46)
Weight	EW	EW	EW	VW	VW	VW

Fundamental managers buy cheap stocks relative to the CAPM...

1: Fundamental Managers' Portfolio Weights

- LHS: Estimated CAPM alpha.

Buffett	5.62		3.80	1.71		1.28
	(3.31)		(2.39)	(0.88)		(0.66)
Fundamental		2.76	2.56		2.08	1.94
		(3.33)	(3.06)		(3.03)	(2.90)
Weight	EW	EW	EW	VW	VW	VW

..that do not immediately generate significant CAPM alpha

Application 2

Market Efficiency

2: Measuring Market Efficiency

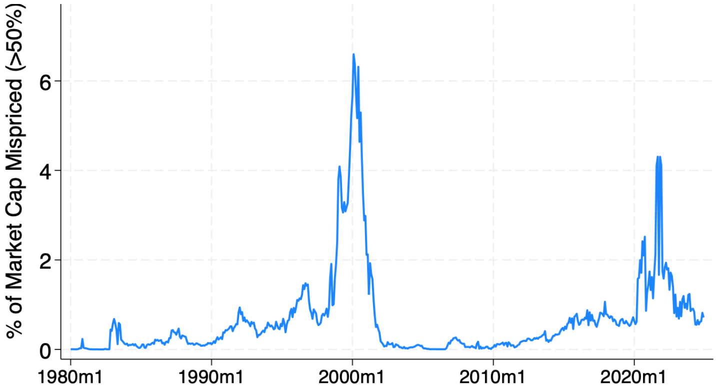
- Valuation spreads are often used to measure the magnitude of cross-sectional opportunities (Cohen, Polk, and Vuolteenaho 2003; Asness 2024)
- But valuation spreads are driven to a large degree by differences in profitability (Cohen, Polk, and Vuolteenaho; 2003), investment (Cho, Kremans, Lee, and Polk; 2024), and systematic risk (Cohen, Polk, and Vuolteenaho; 2009).
- In contrast, our V/P spreads, by construction, are not driven by that variation

2: How Efficient Are Stock Prices? Black's Intuition

Black (1986, "Noise"):

"We might define an efficient market as one in which price is ***within a factor of 2 of value****.... By this definition, I think* ***almost all markets are efficient*** *almost all of the time. 'Almost all' means at least 90%."*

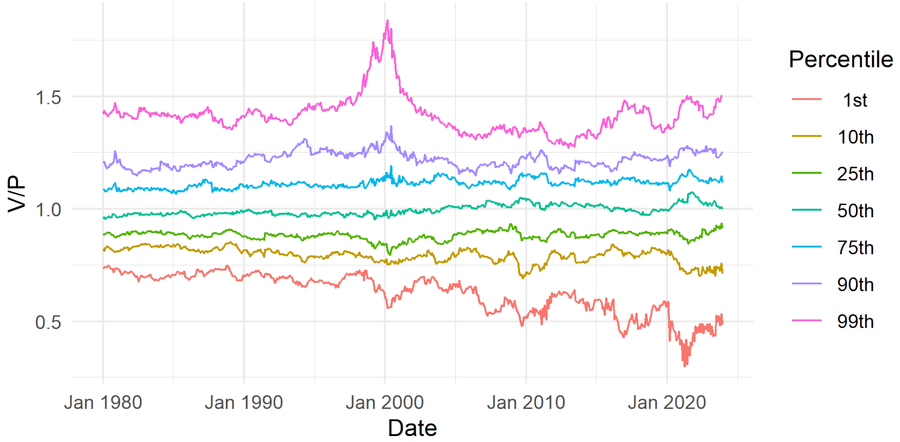
Stocks with > 50% CAPM mispricing



Our measure confirms Black's intuition

2: Have Stock Prices Become More Efficient?

Value-weight quantiles of out-of-sample V/P, 1980–2023



Not really, at least relative to the CAPM

2: Two Components Of Market Efficiency

- Decline in alpha (Chordia et al. 2014; McLean & Pontiff 2016; Cho 2020).
- Does this imply increased market efficiency (and our $\frac{V}{P}$ results misleading)?
- Not necessarily — mispricing can become more persistent:

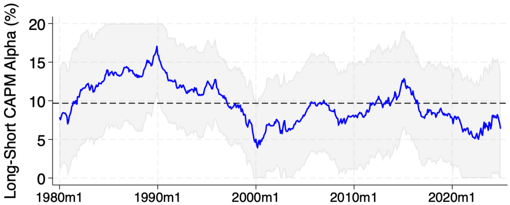
$$\begin{aligned} \text{underpricing}_t &= \text{alpha}_t + \text{discount} \times \text{underpricing}_{t+1} \\ \implies 1 &= \underbrace{\frac{\text{alpha}_t}{\text{underpricing}_t}}_{\text{“Alpha Payout”}} + \underbrace{\text{discount} \times \frac{\text{underpricing}_{t+1}}{\text{underpricing}_t}}_{\text{“Mispricing Persistence”}} \end{aligned}$$

Out-of-sample test of estimated $\frac{V}{P}$:

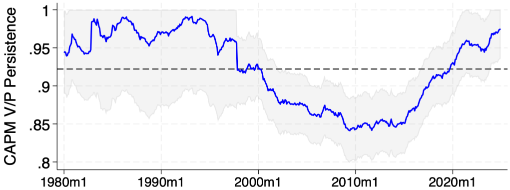
- Form a long-short porfolio sorted on out-of-sample $\frac{V}{P}$
- Measure alpha payout and mispricing persistence with rolling 10-year regressions
  - Possibility 1: Payout & persistence decline $\Rightarrow$ $\frac{V}{P}$ fails in recent sample
  - Possibility 2: Persistence increases $\Rightarrow$ cannot reject continued accuracy

2. Increased Mispricing Persistence Offsets Alpha Decline

CAPM Alphas on V/P Strategy



CAPM Mispricing (V/P) Persistence



Recent alpha decline does not necessarily imply greater price-level efficiency

Application 3

Analyst Expectations and Price Distortions

3: Analyst Expectations And Price Distortions

- Our results show that analyst price targets are systematically biased
- Might these biased expectations account for a meaningful share of the price-level distortions observed in the stock market?
  - Consistent with that view, stocks viewed favorably by analysts are overpriced relative to their fundamental cash-flow value
  - Relation present across specifications, including the five-factor model

3: Analyst Expectations And Price Distortions

$$\text{Model-implied Underpricing}_{i,t} = \gamma_V z_{i,t} + u_{i,t}$$

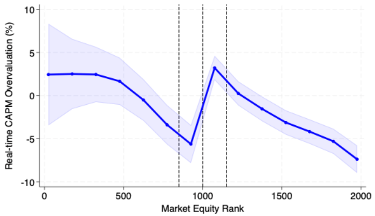
	Analyst Price Target			Baseline Specification		
Characteristic	CAPM	FF3	FF5	CAPM	FF3	FF5
BM	5.66	2.54	6.70	-1.03	-5.69	4.50
	(0.90)	(0.82)	(1.46)	(0.15)	(1.37)	(0.94)
Prof	21.49	23.15	19.71	31.30	35.11	22.95
	(3.13)	(4.10)	(2.80)	(3.16)	(4.54)	(2.55)
Beta	-5.97	-0.93	-4.23	-9.92	-4.94	-7.21
	(0.64)	(0.12)	(0.52)	(0.93)	(0.57)	(0.75)
⋮	⋮	⋮	⋮	⋮	⋮	⋮
LagRet	0.11	0.40	1.04	-0.08	0.16	1.18
	(0.15)	(0.73)	(1.83)	(0.11)	(0.26)	(1.90)
Price Target	-10.81	-11.33	-7.18			
	(4.28)	(4.70)	(3.35)			

Application 4

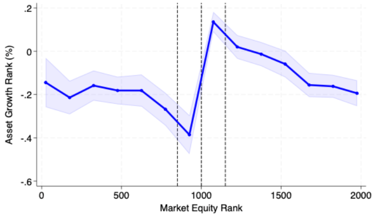
Real Effects

4: The Russell Kink: Overvaluation, Investment, And Issuance

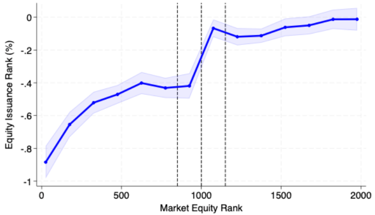
Overvaluation



Investment



Issuance

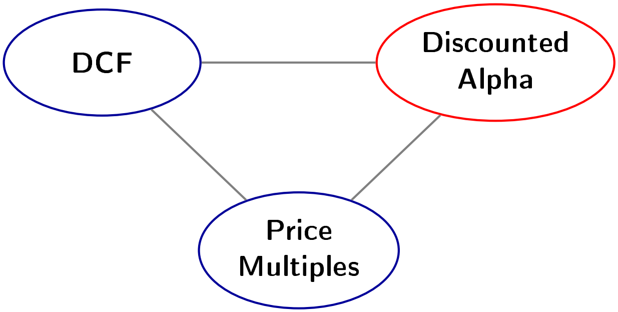


Mispricing, asset growth, and stock issuance all kink at the Russell cutoff

Conclusion

Conclusion

- **Discounted alpha**: A new framework for valuing individual stocks that exploits alpha research to value equities



- Many potential applications in academic research and industry