Stock Market Valuation: Explanations, Non-Explanations, and Some Open Questions

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Framework: PV identity under objective and subjective beliefs

- Campbell-Shiller PV identity under objective probabilities

$$p_t - d_t = \text{const.} + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

  - Objective = implied by actual law of motion, discoverable by econometrician ex-post with in-sample estimation

- Campbell-Shiller PV identity under subjective probabilities

$$p_t - d_t = \text{const.} + \widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

  - Subjective = can deviate from objective due to parameter uncertainty and learning, fading memory, behavioral biases, etc.

Outline: Focus on three broad questions

1. No excess volatility? Cash flow dark matter explanations
   - Atkeson, Heathcote, and Perri (AHP)
2. Interpretation of valuation ratio variance decompositions
   - De La O, Han, and Myers (DHM)
   - AHP
3. How do analysts use observed market prices in constructing forecasts?
   - Bordalo et al. (BGLS)
   - Ben-David and Chinco (BC)

Additional details in write-up:

Definition of excess volatility

- Objective PV identity, rearranged:

$$p_t = \text{const.} + \underbrace{d_t + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}}_{\text{changes in } p_t \text{ permanent}} - \underbrace{\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}}_{\text{changes in } p_t \text{ transitory}}$$

  - Change in permanent component: No reversal
  - Change in transitory component: Subsequent reversal

- Definition: Stock prices are excessively volatile if

$$\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right) > 0$$

40+ years of research on return predictability and excess volatility

Do Stock Prices Move Too Much to be
Justified by Subsequent Changes in Dividends?

By ROBERT J. SHILLER*

The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors

John Y. Campbell
Princeton University

Robert J. Shiller
Yale University

DIVIDEND YIELDS AND EXPECTED STOCK RETURNS*

Eugene F. FAMA and Kenneth R. FRENCH
University of Chicago, Chicago, IL 60637, USA

Received August 1987, final version received March 1988

But once every few years, a cash flow dark matter story...

Vol. CVIII May 1993 Issue 2

WHY DOES THE STOCK MARKET FLUCTUATE?*

ROBERT B. BARSKY AND J. BRADFORD DE LONG

RICHARD T. ELY LECTURE

Struggling to Understand the Stock Market

By ROBERT E. HALL*

ECONOMIC REVIEW November 2004 Vol. 45, No. 4

THE 1929 STOCK MARKET: IRVING FISHER WAS RIGHT*

BY ELLEN R. MCGRATTAN AND EDWARD C. PRESCOTT[1]

There is No Excess Volatility Puzzle*

Andrew Atkeson Jonathan Heathcote Fabrizio Perri
UCLA Federal Reserve Bank of Minneapolis

AHP: Setup

- AHP define, for CRSP value-weighted index

$$\frac{D_t}{C_t} = \frac{\text{Dividends per share}}{\text{Aggregate PCE}}$$

and

$$\frac{P_t}{C_t} = \frac{\text{Price per share}}{\text{Aggregate PCE}}$$

- Annual data

AHP's key point: Stock market valuation reflects variation in long-run expected D/C

- D/C has persistent variation

$$\frac{D_{t+1}}{C_{t+1}} - X_t = \psi \left(\frac{D_t}{C_t} - X_t \right) + \sigma_D \varepsilon_{D,t+1}$$

  around random-walk endpoint

$$X_{t+1} = X_t + \sigma_X \varepsilon_{X,t+1}$$

- In a constant expected return model, this implies

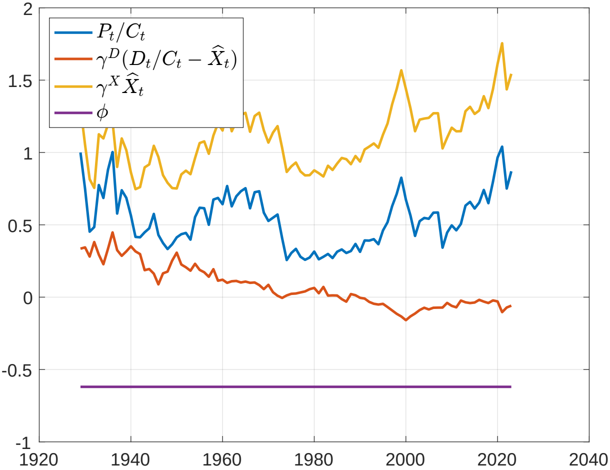
$$\frac{P_t}{C_t} = \gamma_D \left(\frac{D_t}{C_t} - X_t \right) + \gamma_X X_t + \phi$$

- AHP extract X_t as

$$\widehat{X}_t = \frac{1}{\gamma^X - \gamma^D} \left(\frac{P_t}{C_t} - \gamma^D \frac{D_t}{C_t} - \phi \right)$$

  which yields $\widehat{X}_t = X_t$.

AHP's story: P/C varies largely because of permanent shifts in D/C captured by $\widehat{X}_t$



but does the extracted $\widehat{X}_t$ really capture shifts in expected future D/C?

Main piece of evidence reported in the paper meant to support notion that $\widehat{X}_t$ captures expected future D/C

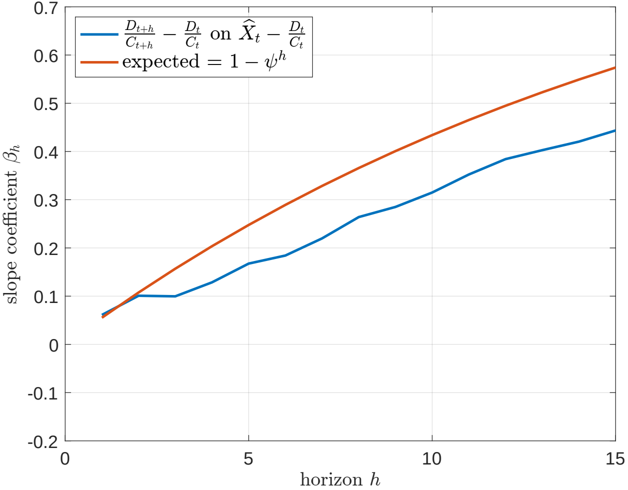
- AHP suggest that the β coefficient in regression

$$\frac{D_{t+h}}{C_{t+h}} - \frac{D_t}{C_t} = a + \beta\left(\widehat{X}_t - \frac{D_t}{C_t}\right) + e_{t+h}$$

  captures predictability of D/C with extracted $\widehat{X}_t$.

- Model implication: $\beta \to 1$ for large h

Main piece of evidence reported in the paper meant to support notion that $\widehat{X}_t$ captures expected future D/C



But, is it current D/C or $\widehat{X}_t$ that forecasts future D/C?

- AHP suggest that the β coefficient in regression

$$\frac{D_{t+h}}{C_{t+h}} - \frac{D_t}{C_t} = a + \beta\left(\widehat{X}_t - \frac{D_t}{C_t}\right) + e_{t+h}$$

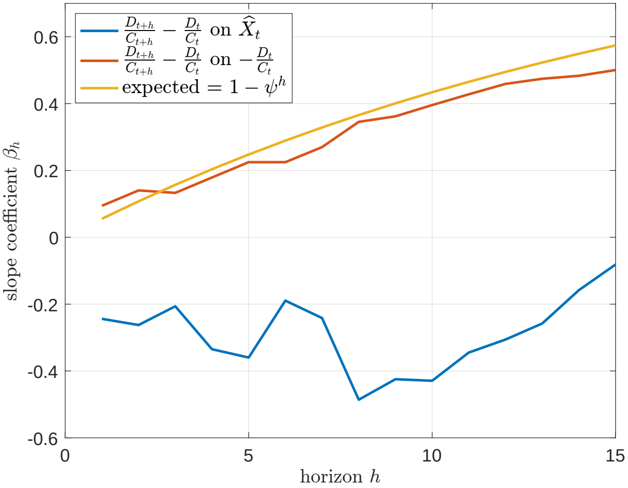
  captures predictability of D/C with extracted $\widehat{X}_t$.

- Is it D/C or $\widehat{X}_t$ that forecasts future D/C? Break up regression as

$$\frac{D_{t+h}}{C_{t+h}} - \frac{D_t}{C_t} = a + \beta_x \widehat{X}_t + \beta_{DC}\left(-\frac{D_t}{C_t}\right) + e_{t+h}$$

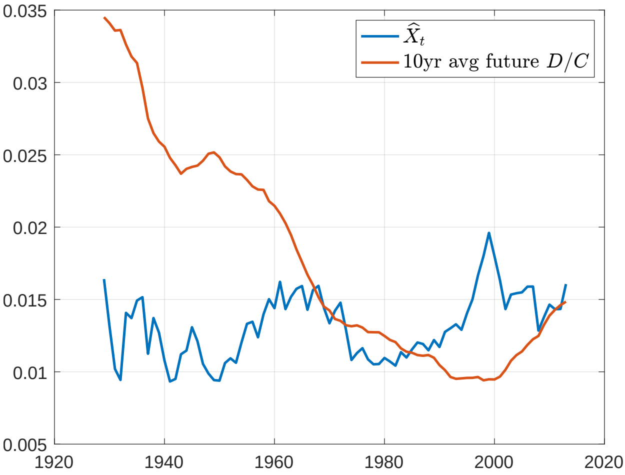
  and check: Is $\beta_x = \beta_{DC} = \beta =$ theory-implied value?

High $\widehat{X}_t$ does not forecast high future D/C!



$\widehat{X}_t$ even relates to future D/C in the wrong direction!

$\widehat{X}_t$ is unrelated to future long-run average D/C



Correlation = -0.2617

Alternative model consistent with $\widehat{X}_t$ not predicting D/C

- Highly persistent but stationary D/C with constant X

$$\frac{D_{t+1}}{C_{t+1}} - X = \psi\left(\frac{D_t}{C_t} - X\right) + \sigma_D \varepsilon_{D,t+1}$$

- And now valuation with time-varying expected returns ϕ_t

$$\frac{P_t}{C_t} = \gamma_D\left(\frac{D_t}{C_t} - X\right) + \gamma_X X + \phi_t$$

- Same calculation of $\widehat{X}_t$ as before

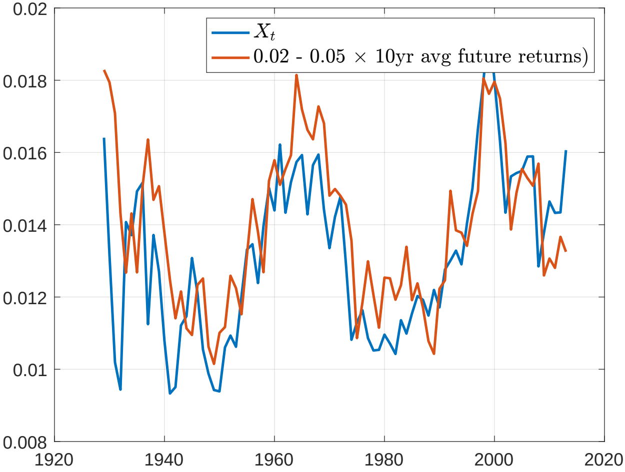
$$\widehat{X}_t = \frac{1}{\gamma^X - \gamma^D}\left(\frac{P_t}{C_t} - \gamma^D \frac{D_t}{C_t} - \phi\right)$$

now yields

$$\widehat{X}_t = X + \phi_t - \phi$$

i.e., in this alternative model $\widehat{X}_t$ perfectly isolates time-variation in expected returns!

Consistent with alternative model, and inconsistent with AHP's, $\widehat{X}_t$ is very strongly related to future returns



Correlation $= 0.70$

$\widehat{X}_t$ predicts future returns much better than P_t/D_t

	R_{t+1}	R_{t+2}	R_{t+3}	R_{t+4}	R_{t+5}
Panel A: Return prediction with P_t/D_t					
100× coeff.	-0.27	-0.24	-0.20	-0.17	-0.16
(t-stat.)	(-1.98)	(-1.69)	(-1.25)	(-1.23)	(-1.19)
R^2	0.03	0.02	0.01	0.01	0.00
Panel B: Return prediction with $\widehat{X}_t$					
coeff.	-33.20	-29.00	-19.66	-15.18	-16.04
(t-stat.)	(-3.86)	(-3.22)	(-2.26)	(-1.50)	(-1.68)
R^2	0.13	0.10	0.04	0.02	0.03

Log-linear version of alternative model with constant long-run mean of D/C

- Log dividend-consumption ratio dynamics, $d_t - c_t = \log(D_t/C_t)$,

$$d_{t+1} - c_{t+1} - x = \psi(d_t - c_t - x) + \sigma_d \varepsilon_{d,t+1}$$

and

$$\Delta c_{t+1} = g + \sigma_c \varepsilon_{c,t+1}$$

- Implies

$$\Delta d_{t+1} = -(1-\psi)(d_t - c_t - x) + g + \sigma_d \varepsilon_{d,t+1} + \sigma_c \varepsilon_{c,t+1}$$

and

$$\mathbb{E}_t \Delta d_{t+j} = -\psi^{j-1}(1-\psi)(d_t - c_t - x) + g$$

Isolating expected return variation

- Applying Campbell-Shiller PV identity

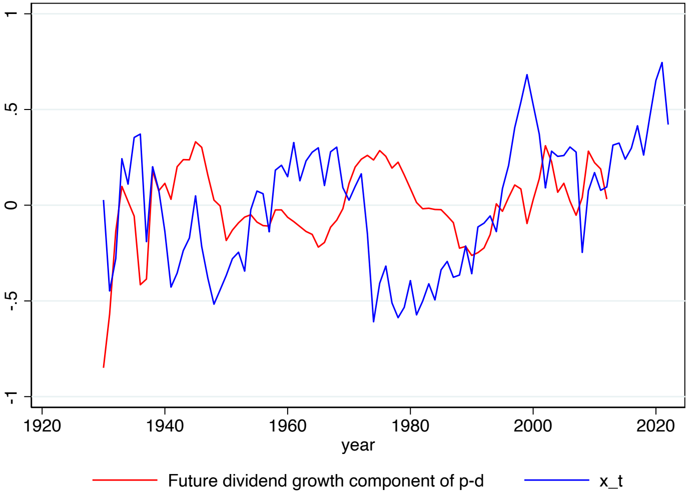
$$p_t - d_t = \text{const.} - \underbrace{\left(\frac{1-\psi}{1-\psi\rho}\right)(d_t - c_t)}_{\text{Expected dividend growth}} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- We can remove the expected dividend growth component and perfectly isolate time-variation in expected returns:

$$\begin{aligned} \hat{x}_t &= p_t - d_t + \left(\frac{1-\psi}{1-\psi\rho}\right)(d_t - c_t) \\ &= \text{const.} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j} \end{aligned}$$

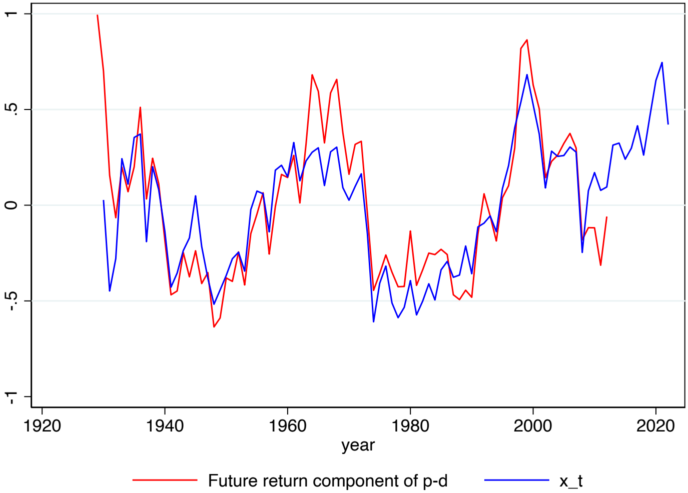
.

$\hat{x}_t$ and future dividend growth $\sum_{j=0}^{9} \rho^j \Delta d_{t+1+j}$



Correlation $= 0.00$

$\hat{x}_t$ and negative future returns $-\sum_{j=0}^{9} \rho^j r_{t+1+j}$



Correlation $= 0.86$

Predictive regression evidence (annual data)

	r_{t+1}	r_{t+2}	r_{t+3}	r_{t+4}	r_{t+5}
$p_t - d_t$	-0.083	-0.101	-0.064	-0.065	-0.075
(t-stat.)	(-1.92)	(-2.43)	(-1.48)	(-1.54)	(-1.78)
R^2	0.04	0.06	0.02	0.03	0.04
#Obs.	92	91	90	89	88

	r_{t+1}	r_{t+2}	r_{t+3}	r_{t+4}	r_{t+5}
$\hat{x}$	-0.192	-0.178	-0.095	-0.128	-0.131
(t-stat.)	(-3.27)	(-3.05)	(-1.54)	(-2.13)	(-2.16)
R^2	0.11	0.09	0.03	0.05	0.05
#Obs.	92	91	90	89	88

Why is $\hat{x}$ a better return predictor than $p_t - d_t$? Because $d_t - c_t$ predicts dividend growth

$$p_t - d_t = \text{const.} - \underbrace{\left(\frac{1-\psi}{1-\psi\rho}\right)(d_t - c_t)}_{\text{Expected dividend growth}} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

	Δd_{t+1}	Δd_{t+2}	Δd_{t+3}	Δd_{t+4}	Δd_{t+5}
$d_t - c_t$	-0.077	-0.069	-0.023	0.001	0.003
(t-stat.)	(-2.86)	(-2.58)	(-0.97)	(0.05)	(0.13)
R^2	0.08	0.07	0.01	0.00	0.00
#Obs.	92	91	90	89	88

- Why does $d_t - c_t$ predict Δd_{t+j}? Possibly: Entry of firms with low current dividends and high expected dividend growth

Bottom line on AHP: Aligning paper title with empirical evidence that $\widehat{X}_t$ predicts returns, not cash flows

STRONGER EVIDENCE OF THE

~~THERE IS NO~~ EXCESS VOLATILITY PUZZLE

Andrew Atkeson
Jonathan Heathcote
Fabrizio Perri

Working Paper 32481
http://www.nber.org/papers/w32481

Outline

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Additional details in write-up:

How should we measure excess volatility?

- Popular approach for assessing excess volatility: variance decompositions of valuation ratios $p_t - z_t$
  - E.g., $z_t = d_t$ (log dividends), $z_t = e_t$ (log earnings), $z_t = b_t$ (log book equity) , ...

- Motivation for focus on decomposition of $\mathrm{var}\,(p_t - z_t)$ rather than $\mathrm{var}\,(r_{t+1} - \mathbb{E}_t r_{t+1})$: How much does expected return variation matter for price levels?

- Conflicting messages depending on specification choices
  - PV identity based on P/E (DHM) vs. P/B (Cohen et al. 2003, 2009)
  - PV identity per-share (Campbell-Shiller) vs. in aggregate (Larrain and Yogo 2008)

- My take: Variance decompositions of valuation ratios not well suited for assessing excess volatility

Back to my definition of excess volatility

- Objective PV identity, rearranged:

$$p_t = \text{const.} + \underbrace{d_t + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}}_{\text{changes in } p_t \text{ permanent}} - \underbrace{\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}}_{\text{changes in } p_t \text{ transitory}}$$

- Fixing conditioning information, variance of the transitory component of stock prices

$$V_r = \operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j} \right) > 0$$

  is completely pinned down, does not depend on choice of z.

- Meaningful interpretation without further scaling or putting in relation to other variance
  - 1 S.D. move in transitory component (w/ c.f. fixed) of price is $\approx 100 \times \sqrt{V_r}$ percent

Variance decomposition of valuation ratios sensitive to choice of z

- Take CS PV identity and add $d_t - z_t$ on both sides

$$p_t - z_t = \text{const.} + d_t - z_t + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- Even with conditioning information fixed, the variance share

$$\frac{\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)}{\operatorname{var}\left(p_t - z_t\right)}$$

  is not invariant to z because denominator depends on $\operatorname{var}(d_t - z_t)$ and $\operatorname{cov}(d_t - z_t,$ other terms on RHS)

- Example: Pick noise variance in $z_t = d_t +$ noise to make variance share of expected returns arbitrarily small

Example: DHM

- Assume $d_t \approx \text{const.} + e_t$, so CS PV identity becomes

$$p_t - e_t = \text{const.} + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta e_{t+1+j} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- Add $e_t - b_t$ on both sides to get Cohen et al. (2003, 2009) PV identity

$$p_t - b_t = \text{const.} + \underbrace{e_t - b_t + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta e_{t+1+j}}_{\text{can be expressed as future log ROE}} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- DHM correctly point out that $e_t - b_t$ adds profitability variation that lowers the variance share of expected returns

- But there is an unambiguous answer to "price is right question": $\mathrm{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)$ is the same in both cases

Example: DHM

- From VAR estimated on panel of 5 value/growth buy-and-hold portfolios that includes both $p-e$ and $p-b$ as predictors:

	Covariance of $p-z$ with				
	$p-z$	$e-z$	$\mathbb{E}_t \sum \rho^j \Delta e$	$-\mathbb{E}_t \sum \rho^j r$	
	(1)	(2)	(3)	(4)	(4)/(1)
z = e	0.071	n/a	0.017	0.055	0.775
z = b	0.196	0.093	0.020	0.088	0.449

- Irrespective of z, $\mathrm{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)^{\frac{1}{2}} = 0.209$ tells us that 1 S.D. move in transitory component of price is about 20.9%.

Example: Larrain and Yogo (2008)

- With per-share net payout $Y_t > 0$, log of aggregate payout ratio $P_t Q_t / (Y_t Q_{t-1})$ has PV identity

$$p_t - y_t + \Delta q_t = \text{const.} + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j (\Delta y_{t+1+j} + \Delta q_{t+j}) - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- Here, typically

$$\frac{\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)}{\operatorname{var}(p_t - y_t + \Delta q_t)} < \frac{\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)}{\operatorname{var}(p_t - d_t)}$$

- But with the same conditioning information $\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)$ is the same for both version of PV identity!

- So per-share and aggregate PV identity yield the same answer about magnitude of transitory price component

Bottom line: Excess volatility assessment is invariant to choice of valuation ratio or form of PV identity

- Valuation ratio variance decompositions sensitive to choice of
  - Denominator variable
  - Aggregate or per-share formulation of PV identity

- But variance of transitory price component

$$\operatorname{var}\left(\mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}\right)$$

  only depends on set conditioning information, not on the valuation ratio used in PV identity.

- Seemingly disparate answers in the literature because of focus on valuation ratios

NB: Some valuation ratios can be better than others in isolating expected return variation

- If $\operatorname{cov}\left(d_t - z_t, \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}\right)$ sufficiently negative, then

  $$p_t - z_t = \text{const.} + d_t - z_t + \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

  then $p_t - z_t$ is a better signal of expected returns than $p_t - d_t$.

- Examples, as just discussed:
  - AHP: $z_t = d_t - \left(\frac{1-\psi}{1-\psi\rho}\right)(d_t - c_t)$
  - DHM: $z_t = e_t$ instead of $z_t = b_t$

Do short- or long-run cash flow growth expectations explain asset price movements?

- CS PV identity under subjective probabilities

$$p_t - d_t = \text{const.} + \widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

- Analysts earnings forecasts as cash flow expectations proxy
- Seemingly conflicting results in the literature
  - De La O and Myers (2021): Short-term growth expectations (STG) explain large share of variation in $p_t - e_t$
  - Nagel and Xu (2022), Bordalo et al. (2024): Long-term growth expectations (LTG) explain much of the valuation cycles and return predictability

Seemingly large role of STG in variance decomposition is an artifact of a noisy earnings measure

- Two $p_t - e_t$ ratios with different definitions of e_t
  - De La O and Myers (2021): before extraordinary items
  - DHM: before extraordinary items, special items, nonrec. taxes
- Share of $\text{var}\,(p_t - e_t)$ attributed to STG variation:

	$\frac{\text{cov}\,(p_t - e_t, \widetilde{\mathbb{E}}_t \Delta e_{t+1})}{\text{var}\,(p_t - e_t)}$
De La O and Myers (2021) definition	52%
DHM definition	16%

(CRSP vw. index, 1985 - 2023, annual, end of June prices and forecasts)

- Sharp fall in e_t and sharp rise in both $p_t - e_t$ and $\widetilde{\mathbb{E}}_t e_{t+1} - e_t$ during recessions unless special items are excluded

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Additional details in write-up:

Do analysts infer expected earnings growth from prices?

- Suppose analysts work with constant discount rate and back out $\widetilde{\mathbb{E}}_t \Delta d_{t+1+j}$ that fit $p_t - d_t$

$$p_t - d_t = \text{const.} + \widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}$$

- Concern: If investors price stocks with time-varying risk premia and constant $\mathbb{E}_t \Delta d_{t+1+j}$

$$p_t - d_t = \text{const.} - \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

then analysts' "cash-flow expectations" actually capture risk premia:

$$\widetilde{\mathbb{E}}_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} = \mathbb{E}_t \sum_{j=0}^{\infty} \rho^j r_{t+1+j}$$

BGLS facts: Suggestive, but not conclusive about inferred-from-prices story

- Changes in LTG explained by past earnings growth not just contemporaneous returns
  - If risk premia covary with past earnings growth: observationally equivalent
- LTG predicts returns controlling for valuation ratios
  - If STG varies predictably, this distorts $p_t - d_t$ as signal about expected returns, and LTG helps capture the risk premium component: observationally equivalent
- Return predictors predict analysts' forecast error
  - also true if analyst cash flow expectations contaminated by risk premia: observationally equivalent
- Probably a theorem: This question cannot be settled with data on valuation ratios, returns, analyst consensus forecasts, and earnings alone

How can one disentangle the stories?

- Exploit exogenous shocks to prices that are not cash flow news
  - Chaudhry (2024): Flow- & benchmark-induced price changes cause changes in analyst LTG expectations in cross-section
  - NB: is also consistent cash flow beliefs influenced by extrapolation from returns (e.g., Jin and Sui 2022)
- Examine analyst disagreement: Substantial disagreement about *LTG* difficult to reconcile with backed-out-from prices story
- Examine analyst disagreement about valuation inputs:
  - Decaire, Wittry, Sosyura (2024): for analysts that use DCF, substantial between-analyst variation in WACC, but WACC not negatively correlated with growth expectations

How can one disentangle the stories?

- Examine analysts' stock recommendations: If analysts simply backed out LTG from current price, difficult to explain why LTG correlated with view that current price is not right:

Panel A: Regressions of Recommendations on Valuation Estimates and Long-Term Growth Forecasts

Model	Intercept	V_{RI1}/P	V_{RI2}/P	V_{PEG}/P	LTG	Adj. R^2	#
1	3.861	−0.226				0.067	
	221.1***	−15.0‡					
2	3.741		−0.003			0.037	
	233.3***		−0.2				
3	3.515			0.424		0.152	
	108.3***			14.2***			
4	3.456				0.560	0.227	
	106.4***				18.3***		

Bradshaw (2004)

- Examine' price reactions to stock recommendations: If analysts simply backed out LTG from current price, difficult to explain why analyst stock recommendation announcements generate stronger price reaction when accompanied by LTG forecasts (Jung, Shane, and Yang 2012)

BC: Analyst target price forecasts based on mechanical trailing multiples valuation?

- Nothing necessarily wrong with multiplies valuation,

$$\hat{P}_t = \widetilde{\mathbb{E}}_t[E_{t+1}] \underbrace{\left(\frac{1}{r-g}\right)}_{multiple},$$

  if multiple reflects forward-looking assessment of $r - g$

- BC argue target price obtained mostly mechanically as

$$\hat{P}_t = \widetilde{\mathbb{E}}_t[E_{t+1}] \times \text{trailing } \frac{P}{E}$$

- However, if investors and analysts partly share same beliefs about LTG, there can be a high correlation between analyst's multiple and trailing realized multiple, even if analysts are forward-looking

Do these examples really show absence of forward-looking reasoning?

- (Chico's FAS) Multiple used > current multiple > trailing multiple, yet BC write: "There is nothing forward-looking about his choice of a 20× P/E ratio."

  Shares of CHS have traded at 14.3x for the last three years. Currently trading at 17.9x consensus FY2 P/E, we believe that CHS can see upside to the historical multiple given our expectation for at least accelerating mid-teens EPS growth, depressed margins, increased top- and bottom-line certainty owing to cost management in place, as well as generous use of the balance sheet. Our $20 price target applies roughly 20x to our 2016 EPS estimate of $0.98–a premium to our 15% 2015–2017E EPS CAGR owing to the above.

- (Coca Cola) An example with explicit forward-looking justification for sticking to recent realized multiple

  before considering becoming more positive. Our December 2020 price target of $59 is predicated on ~24x our 2021 estimate, broadly in line with the current multiple. While this is above the company's historical valuation, with rates moving lower and organic revenue growth still very strong, we see limited downside to the multiple in the coming months.

View that analysts mechanically use trailing P/E seems too simplistic

- Correlation of implied and trailing P/E far from perfect

Dep variable:	$\text{ImpliedPE}^{a}_{n,t}$			
	(1)	(2)	(3)	(4)
$\text{TrailingPE}_{n,t}$	0.58*** (0.01)	0.43*** (0.01)	0.58*** (0.01)	0.52*** (0.01)
Firm FE		Y		
Analyst FE			Y	
Month FE				Y
Adj. R^2	54.5%	67.7%	55.8%	61.5%
# Obs	1,646,279	1,646,207	1,646,279	1,646,077

Table 11. *Each column reports the results of a separate regression of the form*

- What magnitude of correlation proves it's mechanical reliance on trailing P/E rather beliefs about LTG partly shared with investors?

- More interesting: What explains the rest of the variation not explained by trailing P/E?

Hints from earlier literature: LTG matters

- PEG ratio-based target price

$$\hat{P}_{PEG,t} = \frac{\widetilde{\mathbb{E}}_t[E_{t+1}]}{LTG_t}$$

- $\hat{P}_{PEG,t}/P_t$ highly correlated with Target price$/P_t$:

TABLE 4
Pearson Correlation Matrix for Recommendations, Target Prices, and Pseudo-Target Prices
(n = 66)

	REC	TP/P	TP_{PE1}/P	TP_{PE2}/P	TP_{PEG1}/P	TP_{PEG2}/P
REC	—	0.33	–0.07^	–0.04^	0.39	0.38
TP/P		—	0.24^	0.33	0.50	0.56
TP_{PE1}/P			—	0.82	0.42	0.23
TP_{PE2}/P				—	0.41	0.45
TP_{PEG1}/P					—	0.86
TP_{PEG2}/P						—

Bradshaw (2002). TP_{PE1} and TP_{PE2} apply industry PE ratios to forward earnings. TP_{PEG1} and TP_{PEG2} are based on $\hat{P}_{PEG,t}$ with one- or two-year forward earnings.

Hints from earlier literature: LTG matters

- Forward E/target price - industry forward E/P correlates with earnings growth expectations:

Model	Pred. sign	1	2	3
Intercept	?	0.003	0.001	0.001
		(1.25)	(0.23)	(0.25)
LTG^{ind_adj}	$-$	-0.255^{***}		-0.191^{***}
		(-37.69)		(-32.32)
$G_2^{ind\_adj}$	$-$		-0.162^{***}	-0.144^{***}
			(-56.88)	(-54.31)
LEV^{ind_adj}	$+$			
n		39,428	39,428	39,428
Adj. R^2		12%	22%	29%

Yin, Peasnell, and Hunt (2018).

Summary

- Excess volatility puzzle is alive and well
- Variance decompositions of valuation ratios sensitive to specification. Focus on variance of transitory price component
- Long-term, not short-term, subjective cash flow growth expectations most relevant for explaining stock prices
- Open questions regarding influence of market prices on analysts' forecasts

Additional details in write-up: