

**Using earnings forecasts
to simultaneously estimate firm-specific
cost of equity and long-term growth**

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Purpose

- New implied COE measure
 - Higher accuracy
 - Lower bias
 - Implied COE – IRR equating market value to discounted future payoffs
 - Increasingly used in accounting and finance
 - Important to improve construct validity
- => More accurate, endogenously estimated, growth

Long-Term Growth

Simple ex.: Implied COE from Ohlson's (1995) RIM

$$MV_0 = BV_0 + \frac{E_0(RI_1)}{(r - g)}$$

- MV – market capitalization; BV – book value of equity; $E(RI)$ – analyst forecast
- + (-) error in growth (g) \Rightarrow upward (downward) bias in COE (r)

\Rightarrow Extant COE measures: $g = ?$



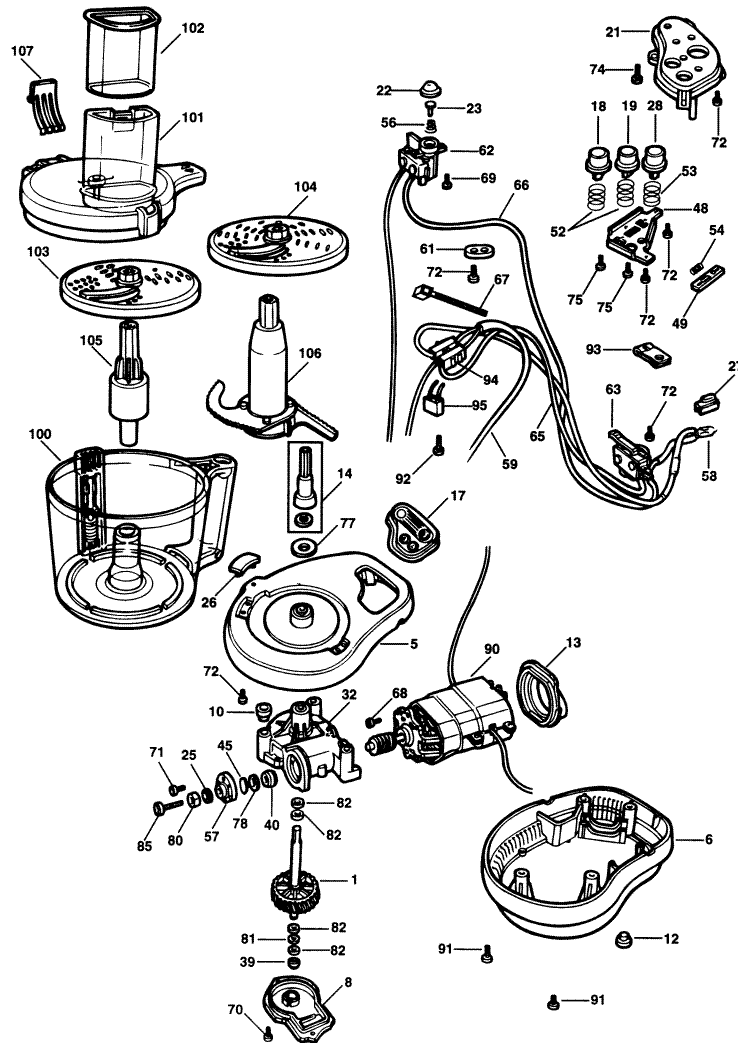
Growth Assumptions in Extant Implied COE Measures

- Uniform growth assumptions:
 - risk-free rate - 3% (Claus and Thomas, 2001)
 - 0% after 12 years (Gebhardt, Lee and Swaminathan 2001)

BUT growth in RI can be non-zero and is firm-specific (conservatism, investment rates, Zhang (2000))

=> biased COE estimates
- Endogenously estimated growth:
 - Easton et al. (2002) – only for portfolios
- Our goal – *firm-specific* implied COE with *endogenously* estimated growth

Our Method





Method's Intuition

- Risk-growth profile:
 - Ex.: High beta \Rightarrow higher COE
 - Ex.: Depressed ROE \Rightarrow higher growth
 - Embed risk and growth characteristics into implied COE estimation
 - Let data determine premiums (if any)
 - Let valuation equation determine risk and growth due to unobservable characteristics
- \Rightarrow COE and g that fit risk-growth profile and satisfy valuation equation**



Risk and growth drivers

- Risk drivers (FF + momentum)
 - CAPM beta
 - Log of size
 - Market-to-book
 - Momentum (past 12-month stock return)
- Growth drivers (Chan et al. 2003)
 - 3-5 years ahead analyst growth forecast, Ltg
 - Deviation of industry ROE from firm's forecasted ROE, $dIndROE$
 - Ratio of R&D expenses to Sales, $RdSales$

Estimation

$$P_0^i = B_0^i + \frac{X_{cT}^i - (R^i - 1)B_0^i}{R^i - G^i}$$

- $G-1$ - expected growth in 4-year RI
- $R-1$ - 4-year return on equity
- X_{cT} - expected 4-year cum-dividend earnings

- Rearrange and substitute risk and growth drivers

(x_R and x_G):

$$X_{cT}^i / B_0^i = \gamma_0 + \gamma_1 MB^i + \lambda_R MB^i x_R^i + \lambda_G (1 - MB^i) x_G^i + \varepsilon^i$$

=> Estimate using WLS

COE Validation

- Our COE measure is significantly positively correlated with future realized returns
 - Statistically and economically significant at portfolio and firm level
- Our COE measure subsumes predictive ability of benchmark COE measures
- Predictive ability comes from both observable and unobservable risk characteristics

COE Benchmarks

- RIM with zero growth after year 4 $\Rightarrow r_{Zero}$
 - not used in prior literature
- Gebhardt et al. (2002) (GLS) $\Rightarrow r_{GLS}$
 - assume ROE converges to industry ROE from $t+4$ to $t+12$
- Easton (2004): $\Rightarrow r_{PEG}$
 - assume zero terminal growth in abnormal earnings



Adjusted Analysts' Forecasts

- Two sets of estimates:
 - using raw forecasts
 - using forecasts adjusted for predictable forecast errors
- Use Gode and Mohanram (2009) method:
 - Run cross-sectional prediction of forecast errors
 - Adjust forecasts for predictable errors => better proxy for market expectations
 - Use adjusted forecasts to calculate alternative COE measures

Predicting Future Returns by Firm

Table 3, Panel A

	Unadjusted COE Measures				Adjusted COE Measures			
	1	2	3	4	1	2	3	4
Intercept	0.074 [2.79]**	0.11 [4.6]***	0.094 [2.88]***	0.155 [4.98]***	0.015 [0.39]	0.076 [3.39]***	0.056 [1.66]	0.106 [3.94]***
r_{SE}	0.709				1.502			
=0	[2.12]**				[3.20]***			
=1	[0.87]				[1.07]			
r_{zero}		0.397				0.934		
=0		[1.54]				[2.80]***		
=1		[2.34]**				[0.20]		
r_{GLS}			0.521				0.934	
=0			[1.55]				[2.58]**	
=1			[1.43]				[0.18]	
r_{PEG}				-0.04				0.439
=0				[0.16]				[1.60]
=1				[4.08]***				[2.04]*

Predicting Future Returns by Firm

Table 3, Panel B

	Unadjusted COE Measures			Adjusted COE Measures		
	2	3	4	2	3	4
Intercept	0.072 [2.53]**	0.074 [2.19]**	0.096 [3.48]***	0.018 [0.45]	0.010 [0.21]	0.019 [0.54]
r_{SE}	0.926	0.599	0.962	1.604	1.265	1.411
=0	[1.77]*	[1.73]*	[2.32]**	[2.7]**	[3.26]***	[2.9]***
=1	[0.14]	[1.16]	[0.09]	[1.02]	[0.68]	[0.85]
r_{zero}	-0.201			-0.168		
=0	[0.52]			[0.44]		
=1	[3.09]***			[3.08]***		
r_{GLS}		0.118			0.281	
=0		[0.34]			[0.83]	
=1		[2.53]**			[2.13]**	
r_{PEG}			-0.405			0.040
=0			[1.49]			[0.16]
=1			[5.17]***			[3.91]***

Growth Validation

- Our growth measure is positively correlated with future realized growth
 - Significant if predicting EBEI or using adjusted forecasts
 - 5.5% - 10.4% per annum difference from 5th to 1st quintile
- Results are unlikely entirely explained by the survivorship bias
- Predictive ability comes mostly from observable growth characteristics
 - Superior to simple statistical predictions out of sample

Additional Analyses

- Comparison with GLS
 - Our measure better predicts returns where GLS growth assumptions are most amiss
- Comparison with ETSS
 - Our measure provides smaller risk premium estimates



Robustness Tests

- Survivorship bias
 - Significant survivorship issue
 - Results are unlikely entirely due to survivorship
- Easton and Monahan (2005) tests
 - Unadjusted (adjusted) measure does not have (has) construct validity
 - Unadjusted and adjusted measures display lowest measurement error compared to benchmarks



Conclusion

- A firm-specific implied COE measure with endogenously estimated growth
 - Stronger construct validity than conventional measures
 - Subsumes return-predictive ability of conventional measures
- A firm-specific implied growth rate estimate
 - Predicts future long-term growth
 - Superior to simple statistical long-term growth forecasts



Thank you