Table 3. Predicting Future Returns using COE Measures

Panel A: Univariate Cross-Sectional Regressions of Future Returns on COE Measures

	Unadjusted COE Measures				Adjusted COE Measures			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Intercept	0.072 [2.56]**	0.136 [6.86]***	0.094 [2.74]***	0.155 [4.98]***	0.018 [0.44]	0.125 [6.89]***	0.060 [1.83]*	0.106 [3.94]***
r_{SE}	**0.714**				**1.453**			
0	**[2.28]****				**[3.34]*****			
1	**[0.91]**				**[1.04]**			
r_{CT}		0.119				0.280		
0		[0.81]				[1.79]*		
1		[6.00]***				[4.60]***		
r_{GLS}			0.507				0.888	
0			[1.47]				[2.52]**	
1			[1.43]				[0.32]	
r_{PEG}				-0.040				0.439
0				[0.16]				[1.60]
1				[4.08]***				[2.04]*
R^2	0.02	0.00	0.01	0.01	0.02	0.00	0.02	0.01

Panel B: Cross-Sectional Regressions of Future Returns on Pairs of COE Measures

	Unadjusted COE Measures			Adjusted COE Measures		
	1	**2**	**3**	**1**	**2**	**3**
Intercept	0.078 [2.58]**	0.072 [2.02]**	0.096 [3.48]***	0.027 [0.76]	0.009 [0.20]	0.019 [0.54]
r_{SE}	**1.067** **[2.36]****	**0.668** **[2.15]****	**0.962** **[2.32]****	**1.649** **[2.98]*****	**1.284** **[3.59]*****	**1.411** **[2.9]*****
r_{CT}	-0.363 [1.39]			-0.263 [1.01]		
r_{GLS}		0.055 [0.15]			0.245 [0.73]	
r_{PEG}			-0.405 [1.49]			0.040 [0.16]
R^2	0.03	0.03	0.04	0.03	0.03	0.03

Table 3 (continued)

Panel C: Cross-Sectional Regressions of Future Returns on COE Measures and Risk Drivers

	Unadjusted COE Measures				Adjusted COE Measures			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Intercept	0.118 [1.95]**	0.168 [2.49]**	0.139 [2.06]*	0.187 [2.66]**	0.088 [1.64]*	0.167 [2.49]**	0.125 [1.75]*	0.163 [2.29]**
r_{SE}	**0.534** **[2.71]***				**1.047** **[3.79]***			
r_{CT}		0.088 [0.98]				0.126 [1.04]		
r_{GLS}			0.435 [1.54]				0.731 [2.00]**	
r_{PEG}				-0.023 [0.12]				0.190 [0.77]
Beta	-0.008 [0.59]	-0.011 [0.76]	-0.011 [0.75]	-0.011 [0.88]	-0.005 [0.36]	-0.011 [0.74]	-0.011 [0.79]	-0.014 [1.06]
LogSize	-0.014 [0.71]	-0.015 [0.77]	-0.014 [0.73]	-0.018 [0.94]	-0.015 [0.77]	-0.015 [0.78]	-0.014 [0.75]	-0.016 [0.82]
B/M	0.014 [1.05]	0.020 [1.38]	0.003 [0.18]	0.022 [1.36]	0.007 [0.51]	0.022 [1.41]	-0.011 [0.48]	0.021 [1.30]
Ret_{-12}	0.068 [3.99]***	0.065 [3.78]***	0.066 [3.93]***	0.067 [3.88]***	0.058 [3.65]***	0.065 [3.79]***	0.060 [3.81]***	0.068 [3.76]***
R^2	0.074	0.068	0.072	0.070	0.076	0.068	0.073	0.070

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The table reports results of cross-sectional regressions of one-year-ahead returns on COE measures and risk proxies. The sample consists of 50,636 firm-year observations from 1980 to 2007.

Reported values are the means of by-year regression coefficients. Absolute values of Fama-MacBeth *t*-statistics with the Newey-West adjustment for autocorrelation are reported in brackets. Slopes on the COE measures have two corresponding *t*-statistics, where =0 (=1) denotes a null of zero (one).

r_{SE} is the COE measure based on our model, g_{SE} is our implied terminal growth in residual earnings, r_{CT} is the COE measure based on Claus and Thomas (2001) model, r_{GLS} is the COE measure based on the GLS (Gebhardt et al. 2001) model, r_{PEG} is the COE measure based on the PEG model (Gode and Mohanram 2003). *Beta* is the CAPM beta, *LogSize* is the log of the market capitalization, *B/M* is the book-to-market ratio, Ret_{-12} is the past one-year buy-and-hold return. Unadjusted (adjusted) COE are based on raw analyst earnings forecasts (forecasts adjusted for predictable errors).

Table 4. Predicting Earnings Growth using Implied Growth Estimates

Panel A. Descriptive Statistics for Realized Growth Rates

Variable	Number of Observations	Mean	10%	25%	Median	75%	90%
Growth in EBEI	18,801	0.48	-1.17	-0.25	0.30	0.93	2.06
Growth in OI	20,267	0.52	-0.39	-0.01	0.32	0.79	1.52

Panel B. Regressions of Realized Growth Rates on Quintile Ranks of Unadjusted Implied Growth

	Dependent Variable = Future Growth in *EBEI*		Dependent Variable = Future Growth in *OI*	
	1	2	3	4
$R(g_{SE})$	**0.122**	**0.04**	**0.026**	**-0.002**
	[4.35]* **	**[1.35]**	**[1.64]**	**[0.15]**
Ltg		0.711		1.666
		[1.00]		[8.19]***
dIndROE		2.226		1.007
		[3.40]***		[3.75]***
RDSales		-3.086		-0.378
		[2.05]**		[0.52]
Intercept	-0.099	0.07	0.350	0.189
	[1.75]*	[0.65]	[10.90]***	[4.38]***
Observations	18,801	18,801	20,267	20,267
R^2	0.03	0.03	0.02	0.04

Panel C. Regressions of Realized Growth Rates on Quintile Ranks of Adjusted Implied Growth

	Dependent Variable = Future Growth in *EBEI*		Dependent Variable = Future Growth in *OI*	
	1	2	3	4
$R(g_{SE})$	**0.098**	**0.011**	**0.060**	**0.006**
	[2.77]* **	**[0.38]**	**[4.24]*** **	**[0.49]**
Ltg		0.683		1.637
		[0.95]		[7.30]***
dIndROE		2.574		0.923
		[4.40]***		[3.16]***
RDSales		-3.038		-0.387
		[2.04]**		[0.53]
Intercept	-0.053	0.145	0.280	0.174
	[0.76]	[1.46]	[9.67]***	[5.91]***
Observations	18,801	18,801	20,267	20,267
R^2	0.03	0.03	0.02	0.04

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The table documents association between implied earnings growth and future realized earnings growth. The analyses are based on observations with available realized growth rates in four-year cum-dividend earnings before extraordinary items (operating income before depreciation) for a period from 1980 to 2001.

Panel A contains descriptive statistics for the realized earnings growth. Realized growth rates are calculated as $GR_{t+4,\ t+8} = X_{t+8}^{cumd} / X_{t+4}^{cumd} - 1$, where $X_T^{cumd} = \Sigma_{[t=T-3,T]}(E_t) + \Sigma_{[t=T-3,T-1]}((1+r)^{4-t} - 1)d_t$, and E_t is realized earnings for year t, d_t is dividends declared in year t, and r is the risk-free rate at t. Growth in *EBEI* (*OI*) refers to growth in earnings before extraordinary items (operating income before depreciation).

Panels B and C report coefficients from regressing growth in *EBEI* (*OI*) on the quintile ranks of unadjusted (adjusted) implied earnings growth, $R(g_{SE})$, and control variables: *Ltg* - analysts' long-term growth forecast, *dIndROE* - the difference between the industry ROE and the firm's average forecasted ROE over years $t+1$ to $t+4$, and *RDSales* - R&D expenses scaled by sales. Industry ROE is calculated as a ten-year moving median ROE excluding loss firms (Gebhardt et al. 2001). Unadjusted (adjusted) implied growth is based on raw analyst earnings forecasts (forecasts adjusted for predictable errors (Gode and Mohanram 2009)).

All regressions are based on a pooled sample, with year fixed effects and standard errors clustered by firm and year as in Petersen (2009). Absolute values of t-statistics are reported in brackets.

Table 5. Predicting Returns and Earnings Growth Using Statistical Models

Panel A. Predicting Realized Returns

Independent Variables	Dependent Variable = Future Realized Return		
	1	2	3
Unadjusted $R(r_{SE})$	0.017		
	[2.44] **		
Adjusted $R(r_{SE})$		0.024	
		[3.19] ***	
R(*Stat_pRET*)			0.005
			[0.81]
Intercept	0.116	0.103	0.133
	[5.28] ***	[4.89] ***	[4.95] ***
Observations	50,636	50,636	49,875
R^2	0.02	0.02	0.02

Panel B. Predicting Earnings Growth: Unadjusted Implied Growth

Independent Variables	Dependent Variable = Future Growth in *EBEI*				Dependent Variable = Future Growth in *OI*			
	1	2	3	4	5	6	7	8
***R*(g_{SE})**	**0.148**			**0.133**	**0.050**			**0.034**
	[5.01]* **			**[5.22]*** **	**[2.76]*** **			**[1.83]***
R(*Stat_pGrEBEI*)		0.093		0.047		0.028		
		[2.03]**		[1.00]		[0.94]		
R(*Stat_pGrOI*)			0.077				0.105***	0.099
			[1.51]				[5.62]	[5.54]***
Intercept	0.449	0.533	0.571	0.386	0.348	0.384	0.241	0.189
	[11.05]***	[6.10]***	[6.63]***	[3.98]***	[11.08]***	[6.68]***	[7.21]***	[4.08]***
Observations	15,416	15,416	15,416	15,416	16,766	16,766	16,766	16,766
R^2	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.03

Panel C. Predicting Earnings Growth: Adjusted Implied Growth

Independent Variables	Dependent Variable = Future Growth in *EBEI*				Dependent Variable = Future Growth in *OI*			
	1	2	3	4	5	6	7	8
***R*(g_{SE})**	**0.149**			**0.133**	**0.085**			**0.051**
	[4.73]* **			**[4.50]*** **	**[5.14]*** **			**[2.71]*** **
R(*Stat_pGrEBEI*)		0.093		0.048		0.028		
		[2.03]**		[0.96]		[0.94]		
R(*Stat_pGrOI*)			0.077				0.105	0.084
			[1.51]				[5.62]***	[4.20]***
Intercept	0.435	0.533	0.571	0.374	0.274	0.384	0.241	0.183
	[9.70]***	[6.10]***	[6.63]***	[3.94]***	[9.07]***	[6.68]***	[7.21]***	[4.57]***
Observations	15,416	15,416	15,416	15,416	16,766	16,766	16,766	16,766
R^2	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.03

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The table documents predictive ability of statistically predicted returns (earnings growth). The analyses in Panel A (Panels B and C) are based on the 1981 to 2007 (1987 to 2001) period.

Panel A reports coefficients from regressing realized one-year-ahead returns on quintile ranks of our implied COE, $R(r_{SE})$, and statistically predicted return, $R(Stat\_pRET)$. Statistically predicted returns are based on (1) estimating the slope coefficients in the hold-out cross-sectional regressions of past realized one-year returns on the risk drivers lagged by one year, and (2) applying slope coefficients to current risk drivers (market-to-book ratio, logarithm of market value of equity, CAPM beta, and prior twelve-month return). Reported values are the means of by-year regression coefficients. Absolute values of Fama-MacBeth *t*-statistics with the Newey-West adjustment for autocorrelation are reported in brackets.

Panels B and C report coefficients from regressing realized growth in *EBEI* (*OI*) on the quintile rank of unadjusted (adjusted) implied earnings growth, $R(g_{SE})$, and the quintile rank of statistically predicted growth in earnings, $R(Stat\_pGrEBEI)$ or $R(Stat\_pGrOI)$. Realized growth rates are calculated as $GR_{t+4,\,t+8} = X_{t+8}^{cumd} / X_{t+4}^{cumd} - 1$, where $X_T^{cumd} = \Sigma_{[t=T-3,T]}(E_t) + \Sigma_{[t=T-3,T-1]}((1+r)^{4-t} - 1)d_t$, and E_t is realized earnings for year *t*, d_t is dividends declared in year *t*, and *r* is the risk-free rate at period *t*. Growth in *EBEI* (*OI*) refers to growth in earnings before extraordinary items (operating income before depreciation). Statistically predicted growth in earnings is based on (1) estimating the slope coefficients in the hold-out cross-sectional regressions of past realized growth in *EBEI* (*OI*) on the growth drivers lagged by eight years, and (2) applying slope coefficients to current growth drivers (analysts' long-term growth forecasts, deviations of firm's forecasted ROE from the industry ROE, and R&D expenses scaled by sales). All regressions use a pooled sample, with year fixed effects and standard errors clustered by firm and year as in Petersen (2009). Absolute values of *t*-statistics are reported in brackets.

Table 6. Cross-Sectional Determinants of COE's Return Predictive Ability

Panel A. Return Predictability by Quintiles of Absolute Difference between r_{SE} and r_{GLS}

	Quintiles of $\|r_{SE} - r_{GLS}\|$				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**
Adjusted r_{GLS}					
r_{GLS}	**1.889**	**1.515**	**1.414**	**0.801**	**0.315**
	[3.99]* **	**[2.39]** **	**[3.03]*** **	**[1.62]**	**[0.80]**
Intercept	-0.020	0.005	0.01	0.053	0.106
	[0.55]	[0.10]	[0.22]	[1.13]	[2.17]**
R^2	0.03	0.04	0.03	0.03	0.01
Adjusted r_{SE}					
r_{SE}	**1.968**	**1.657**	**1.640**	**0.940**	**1.211**
	[4.04]* **	**[2.49]** **	**[3.16]*** **	**[1.90]***	**[2.99]*** **
Intercept	-0.019	-0.004	0.003	0.043	0.062
	[0.48]	[0.08]	[0.06]	[1.05]	[1.75]*
R^2	0.03	0.04	0.03	0.02	0.02
Slope(r_{SE}) – Slope(r_{GLS})	**0.079**	**0.142**	**0.226**	**0.139**	**0.896**

Panel B. Average Firm Characteristics by Quintiles of Absolute Difference between r_{SE} and r_{GLS}

	Quintiles of $\|r_{SE} - r_{GLS}\|$						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**T-Statistics**
$\|g_{SE}\|$	0.022	0.020	0.020	0.023	0.027	**0.005**	**[3.24]*** **
$\|ROE - iROE\|$	0.081	0.074	0.081	0.101	0.137	**0.056**	**[5.24]*** **
$\|RDSales - iRDSales\|$	0.039	0.061	0.100	0.172	0.163	**0.124**	**[2.23]** **
$\|Ltg - iLtg\|$	0.064	0.058	0.058	0.066	0.085	**0.020**	**[5.78]*** **
$\|SalesGr - iSalesGr\|$	0.095	0.092	0.096	0.113	0.129	**0.034**	**[4.53]*** **
$\|Beta - mBeta\|$	0.470	0.468	0.469	0.502	0.548	**0.077**	**[4.25]*** **
$\|LogSize - mLogSize\|$	0.584	0.585	0.573	0.568	0.618	**0.034**	**[3.07]*** **
$\|B/M - mB/M\|$	0.227	0.220	0.239	0.285	0.568	**0.341**	**[12.78]*** **
$\|Ret_{-12} - mRet_{-12}\|$	0.295	0.251	0.262	0.316	0.402	**0.107**	**[6.04]*** **

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

This table examines the divergence in the return predictability between our and GLS measures and its cross-sectional determinants.

The quintile portfolios in both panels are formed each year based on the absolute difference between r_{SE} and r_{GLS}. r_{SE} is the COE measure based on our model, r_{GLS} is the COE measure based on the GLS model (Gebhardt et al. 2001)

Panel A reports results of cross-sectional regressions of one-year-ahead returns on the COE measures within the quintile portfolios. Reported values are the means of by-year regression coefficients. The absolute values of Fama-MacBeth *t*-statistics with the Newey-West autocorrelation adjustment are reported in brackets.

Panel B reports time-series means of by-year variable means by quintiles of $|r_{SE} - r_{GLS}|$. $|g_{SE}|$ is the absolute value of our implied growth measure; $|ROE - iROE|$ is the absolute difference between firm and industry mean ROE; $|RDSales - iRDSales|$ is the absolute difference between firm and industry mean R&D expense scaled by sales; $|Ltg - iLtg|$ is the absolute difference between firm and industry mean long-term growth forecast form I/B/E/S; $|SalesGr - iSalesGr|$ is the absolute difference between firm and industry mean sales growth over previous five years; $|Beta - mBeta|$ is the absolute difference between firm and sample mean CAPM bets; $|LogSize - LogSize|$ is the absolute difference between firm and sample mean log of market capitalization; $|B/M - mB/M|$ is the absolute difference between firm and sample mean book-to-market ratio; $|Ret_{-12} - mRet_{-12}|$ is the absolute difference between firm and sample mean past twelve-month stock return. The last two columns report average differences between the top and the bottom quintiles and the corresponding Fama-MacBeth *t*-statistics with the Newey-West adjustment for autocorrelation.

Table 7. Easton and Monahan (2005) Analysis

Panel A: Regressing Realized Returns on Unadjusted COE Measures, Cash Flow News, and Discount Rate News

COE Measure	*Intercept*	***LOG_ER***	*LOG_CN*	*LOG_RN*	Adjusted R^2	**Modified Noise Variable**
r_{SE}	0.119	**-0.127**	0.802	0.082	0.25	0.0002
=0	[2.77]**	**[0.26]**	[10.67]***	[10.23]***		
=1	[20.6]***	**[2.29]****	[2.63]**	[113.84]***		
r_{CT}	0.128	**-0.098**	0.805	0.044	0.19	0.0009
=0	[5.58]***	**[0.51]**	[10.08]***	[7.34]***		
=1	[38.04]***	**[5.70]*****	[2.44]**	[159.89]***		
r_{GLS}	0.199	**-0.900**	0.799	0.201	0.37	0.0002
=0	[6.69]***	**[3.07]*****	[11.22]***	[22.17]***		
=1	[26.87]***	**[6.47]*****	[2.83]***	[88.21]***		
r_{PEG}	0.187	**-0.633**	0.842	0.074	0.23	0.0095
=0	[7.44]***	**[2.40]****	[9.90]***	[11.79]***		
=1	[32.26]***	**[6.20]*****	[1.86]*	[146.69]***		

Panel B: Regressing Realized Returns on Adjusted COE Measures, Cash Flow News, and Discount Rate News

COE Measure	*Intercept*	***LOG_ER***	*LOG_CN*	*LOG_RN*	Adjusted R^2	**Modified Noise Variable**
r_{SE}	0.033	**1.169**	0.750	0.004	0.18	-0.0003
=0	[0.82]	**[1.98]***	[10.59]***	[0.36]		
=1	[23.75]***	**[0.29]**	[3.53]***	[95.61]***		
r_{CT}	0.079	**0.489**	0.757	0.015	0.16	0.0015
=0	[2.63]**	**[1.94]***	[10.25]***	[2.34]**		
=1	[30.65]***	**[2.03]***	[3.29]***	[149.40]***		
r_{GLS}	0.138	**-0.250**	0.746	0.178	0.32	-0.0001
=0	[4.97]***	**[0.80]**	[10.95]***	[13.87]***		
=1	[30.96]***	**[4.00]*****	[3.73]***	[64.13]***		
r_{PEG}	0.049	**0.784**	0.828	-0.004	0.16	0.0004
=0	[2.35]**	**[2.34]****	[9.46]***	[0.54]		
=1	[45.27]***	**[0.64]**	[1.97]*	[129.24]***		

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

The table evaluates the reliability of the COE estimates using the Easton and Monahan (2005) method.

The second to sixth columns contain mean regression coefficients and adjusted R^2 for the annual cross-sectional regressions of (log) realized returns on a COE measure, cash flow news, and expected return

news: $LOG\_RET_{i,t+1} = Intercept + \alpha_1 * LOG\_ER_{i,t} + \alpha_2 * LOG\_CN_{i,t+1} + \alpha_3 * LOG\_RN_{i,t+1} + \varepsilon_i$, where $LOG\_RET_{i,t+1}$ is the realized return over the one year after the COE estimation, LOG_ER_i is the expected return, i.e. one of the COE estimates, $LOG\_CN_{i,t+1}$ is the cash flow news measured over the one year after the COE estimation, and $LOG\_RN_{i,t+1}$ is the discount rate news over the one year after the COE estimation. All return measures are continuously compounded. The last column reports the modified noise coefficient for each COE measure.

Cash flow news is measured as a sum of the forecast error realized over year $t+1$, the revision in one-year-ahead forecasted ROE, and the capitalized revision in the two-year-ahead forecasted ROE: $LOG\_CN_{i,t+1}=LOG\_FERR_{i,t+}\Delta LOG\_FROE_{i,t+1}+\rho/(1-\rho\omega)*\Delta LOG\_FROE_{i,t+2}$, where LOG_FERR_{it} is the realized forecast error on the EPS_t forecast made at the end of fiscal year t,[41] and revisions refer to changes in forecasts from June of year t to June of year $t+1$. Forecasted ROE is defined as EPS forecast divided by book value of equity divided by number of shares used to calculate EPS. We use ρ estimates reported in Easton and Monahan (2005). Persistence coefficients ω_t are estimated through a pooled time-series cross-sectional regression for each of the 48 Fama-French industries: $LOG\_ROE_{i,t-\tau} = \omega_{0t} + \omega_t \times LOG\_ROE_{i,t-(\tau-1)}$, where τ is a number between zero and nine, and ROE is return on equity.

Discount rate news is measured as $LOG\_RN_{i,t+1}= \rho/(1-\rho)*(LOG\_ER_{1,t+1}-LOG\_ER_{i,t})$, where $LOG\_ER_{i,t}$ is the continuously compounded COE estimate measured as of June of year t, and $LOG\_ER_{i,t+1}$ is the continuously compounded COE estimate measured as of June of year $t+1$.

The details of estimating the modified noise coefficient are described in Easton and Monahan (2005) pp. 506-507.

Reported values are the means of by-year regression coefficients. Absolute values of Fama-MacBeth t-statistics with the Newey-West adjustment for autocorrelation are reported in brackets. Slopes on the COE measures have two corresponding t-statistics, where =0 (=1) denotes a null of zero (one).

All estimations are performed after deleting observations that fall in the top and bottom 0.5% for $LOG\_RET_{i,t+1}$, $LOG\_ER_{i,}$, $LOG\_CN_{i,}$ or $LOG\_RN_{i,}$ distributions.

[41] $FERR_{it}$ captures a revision in expectations that occurs in year $t+1$ due to announcement of actual year t earnings.

Table 8. Survivorship Bias in Earnings Growth Prediction

Panel A. Regressions of Realized Growth Rates on Quintile Ranks of Implied Growth. Substituted Missing Realized Growth for Bad Performance Delistings

	Dependent Variable = Future Growth in *EBEI* 1	Dependent Variable = Future Growth in *OI* 2
	Unadjusted Implied Growth	
$R(g_{SE})$	**0.088**	**0.025**
	[3.32]* **	**[1.95]***
Intercept	-0.032	0.348
	[0.59]	[13.25]***
Observations	21,357	23,508
R^2	0.023	0.016
	Adjusted Implied Growth	
$R(g_{SE})$	**0.050**	**0.050**
	[1.57]	**[3.87]*** **
Intercept	0.042	0.298
	[0.66]	[11.34]***
Observations	21,357	23,508
R^2	0.022	0.018

Panel B. Regressions of Realized Growth Rates on Quintile Ranks of Implied Growth. Substituted Missing Realized Growth for Bad Performance and Merger Delistings

	Dependent Variable = Future Growth in *EBEI* 1	Dependent Variable = Future Growth in *OI* 2
	Unadjusted Implied Growth	
$R(g_{SE})$	**0.061**	**0.014**
	[3.33]* **	**[1.54]**
Intercept	0.006	0.302
	[0.17]	[15.68]***
Observations	25,589	28,290
R^2	0.020	0.012
	Adjusted Implied Growth	
$R(g_{SE})$	**0.032**	**0.031**
	[1.47]	**[3.31]*** **
Intercept	0.063	0.268
	[1.43]	[13.90]***
Observations	25,589	28,290
R^2	0.020	0.013

The table examines sensitivity of growth prediction results in Table 4 to the survivorship bias. Both panels report coefficients from regressing growth in *EBEI* (*OI*) on the quintile rank of unadjusted (adjusted)

implied earnings growth rate, $R(g_{SE})$. The missing realized growth rates are substituted with assumed rates depending on the reason of firms' exit from the sample.

In Panel A, missing realized growth rates of firms delisted due to bad performance are calculated as $GR_{t+4, t+8} = -BV_{t+4} / X_{t+4}^{cumd} - 1$, where BV_{t+4} is the book value of equity at the end of $t+4$, $X_T^{cumd} = \Sigma_{[t=T-3,T]}(E_t) + \Sigma_{[t=T-3,T-1]}((1+r)^{4-t} - 1)d_t$, and E_t is realized earnings for year t, d_t is dividends declared in year t, and r is the risk-free rate at period t. Growth in *EBEI* (*OI*) refers to growth in earnings before extraordinary items (operating income before depreciation).

In Panel B, in addition to substitution from Panel A, missing realized growth rates of firms delisted due to mergers are set equal to zero.

All regressions use a pooled sample, with year fixed effects and standard errors clustered by firm and year as in Petersen (2009). The absolute values of *t*-statistics are reported in brackets.

NEUBERGER BERMAN

Investing at a Crossroads: Three Themes for Today's New Challenges

The global economy and financial markets have benefitted from several significant tailwinds over the past four decades. Inflation moderated and stabilized, giving central banks greater policy flexibility; global interest rates declined; geopolitical tensions eased during the 1990s, creating the conditions for the efficiency gains of globalization; labor markets lost pricing power and grew more flexible; corporate tax burdens lifted; natural resource- and fossil fuel-intensive growth raised living standards and generated investment opportunities worldwide. It was a particularly golden era for investors in fixed income securities, technology and other "long-duration" assets.

Many of those tailwinds are now turning to headwinds, and we believe this demands a new investment playbook. Here, we distill an era of sometimes bewildering change into three themes for managing risk and seeking return opportunities in the new regime.

Contents

Our Three Themes At a Glance

OUTLOOK: Adapt to Today's New Challenges

Two multi-decade economic tailwinds are under threat. Globalization is hitting geopolitical, strategic, populist and practical roadblocks, and unsustainable growth powered by fossil fuels faces a difficult transition to ultimately more efficient growth powered by renewables.

Potential economic implications:

- A return to structurally higher inflation and more hawkish central bank policy
- A return to shorter and more volatile business cycles
- A global energy transition

Investment playbook:

- Favoring the fittest
- Rethinking regional risk
- Harvesting global macro trends, tactical dislocations and volatility premia
- Accounting for "Net Zero"
- Prioritizing real assets: Commodities, real estate, infrastructure

RETURNS: Mind the Gap

Lower and more volatile growth, together with higher inflation and interest rates, could slow the performance of many equity and bond indices, opening a wider gap between targeted returns and return outlooks. This "exhausted beta" phenomenon, together with the potential for higher price volatility and an upward bias in rates, is likely to make return profiles more reliant on income, illiquidity and niche-market premia, as well as active management (asset-allocation, stock-selection, corporate-engagement and operational "alpha").

Potential portfolio implications:

- Lower asset class return outlooks, with higher volatility

Investment playbook:

- Looking beyond "exhausted beta"
- Going short as well as long
- Rebalancing toward value investing
- Becoming fully flexible in fixed income and credit
- Prioritizing income across asset classes
- Integrating public and private market investments
- Exploiting your natural advantages while seeking effective partners

RISK: Diversify Differently

Higher volatility and economic uncertainty, as well as the use of increased portfolio risk to align return profiles with return targets, make portfolio diversification more important than ever. Diversification could be more difficult to achieve, however, as equity-bond correlation tends to rise in more inflationary environments.

Potential portfolio implications:

- Higher equity-bond correlation leading to higher portfolio volatility

Investment playbook:

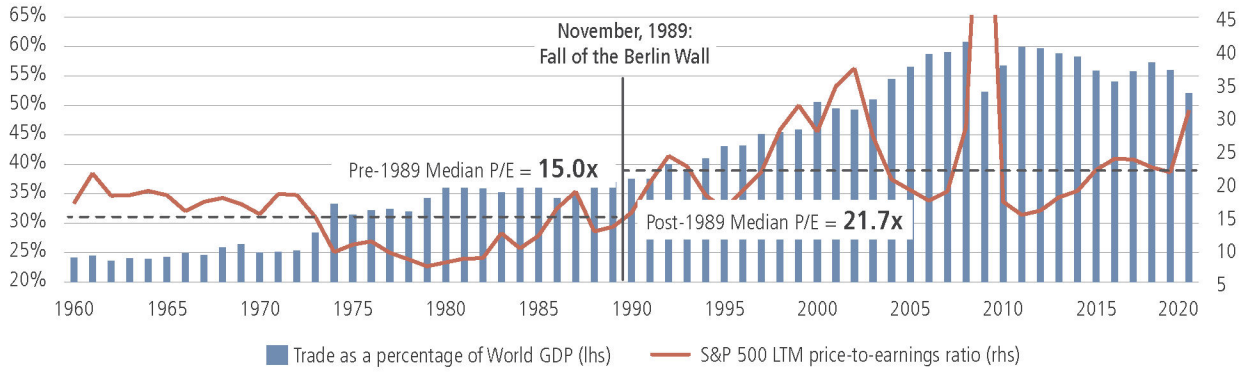
- Adding flexibility and shortening duration in fixed income
- Seeking out uncorrelated markets and strategies
- Prioritizing inflation-sensitive real and financial assets
- Identifying and hedging the tail risks that matter to you

Why Do They Matter? Charting Our Three Themes

OUTLOOK: Adapt to Today's New Challenges

Two multi-decade tailwinds are under threat: globalization…

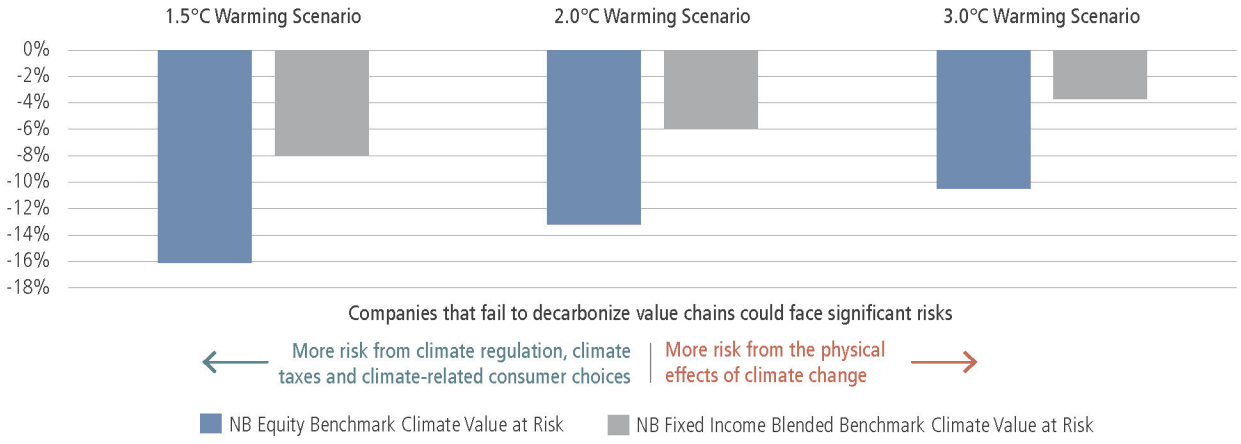
U.S. EQUITY MARKET MULTIPLES AND WORLD TRADE, PRE- AND POST-1989



Source: World Bank, Robert Shiller, Neuberger Berman. As of December 2020. The pre- and post-1989 median price-to-earnings ratios were calculated by taking the mean average of 12 monthly readings for last-12-month earnings per share for each calendar year, and calculating the median average of those calendar-year readings for the two periods. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Indices are unmanaged and not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

… and consequence-free growth powered by fossil fuels

EQUITY AND FIXED INCOME CLIMATE VALUE AT RISK IN THREE DIFFERENT GLOBAL WARMING SCENARIOS

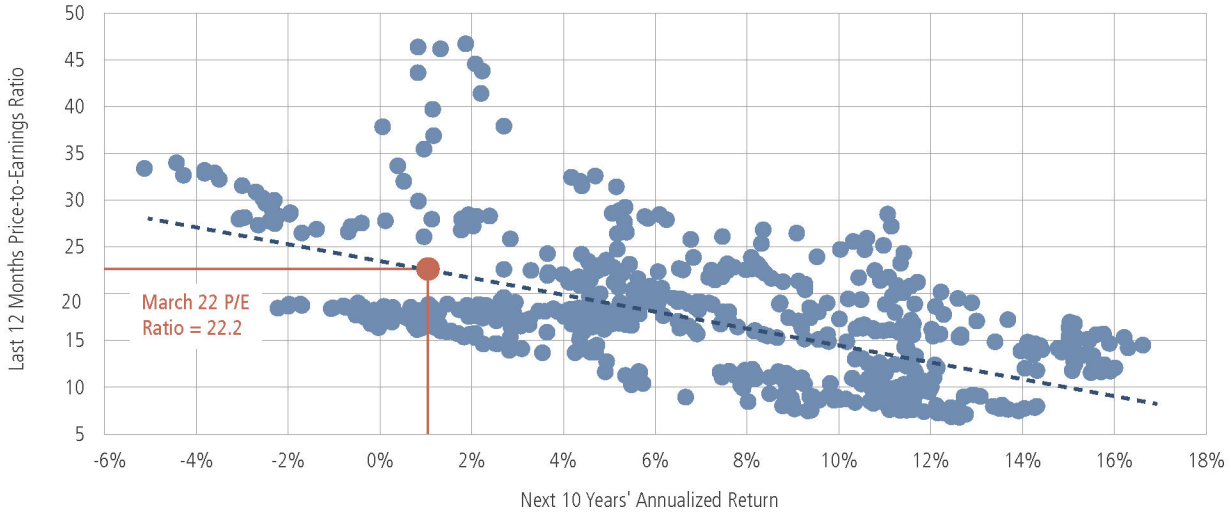


Source: Neuberger Berman. As of August 2022. Neuberger Berman has implemented top-down scenario analysis for modelling transition risks (business risks associated with the net-zero transition), physical risks (from the impact of extreme weather events, wildfires and floods), regulatory costs and commercial opportunities at the company level, in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), for different levels of global warming above pre-industrial temperatures. Different securities and companies will have varying levels of exposure to physical risk depending on the nature of their business models and physical locations. Additionally, the analysis considers potential regulatory costs, as well as technology opportunities related to low-carbon technology solutions for companies that need to comply with greenhouse gas reduction requirements. The Equity Benchmark is the MSCI All Country World Index; the Fixed Income Blended Benchmark is 50% Bloomberg Global Aggregate Index and 50% ICE BoA Global High Yield Index.

RETURNS: Mind the Gap

Higher market valuations suggest lower return outlooks (especially if risk premia are expected to rise)…

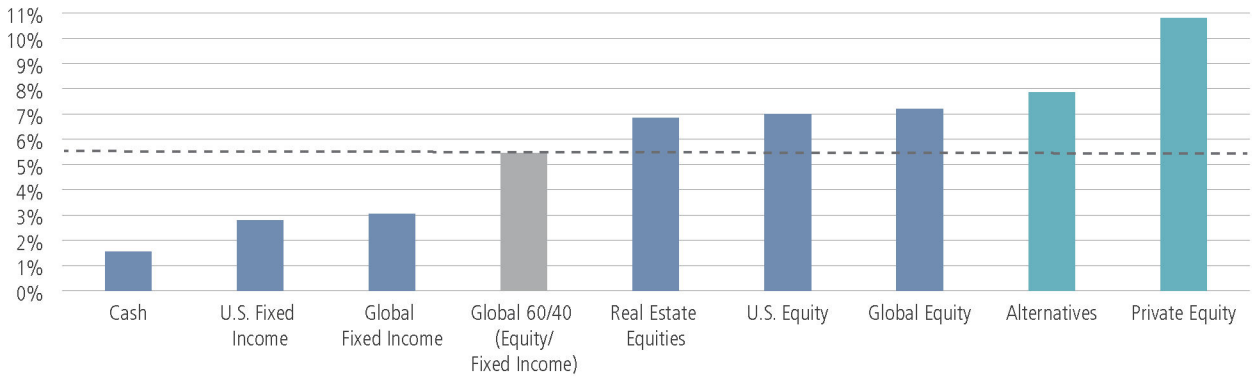
S&P 500 INDEX, VALUATION MULTIPLES AND SUBSEQUENT 10-YEAR RETURNS, 1960 – 2012



Source: Robert Shiller, Neuberger Berman. Data as of March 2022. Data excludes the P/E ratios for November 2008 through October 2009, which were extraordinarily high not due to rising valuations but due to the earnings depression that followed the Great Financial Crisis. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Indices are unmanaged and not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

… strengthening the case for private markets and other alternatives…

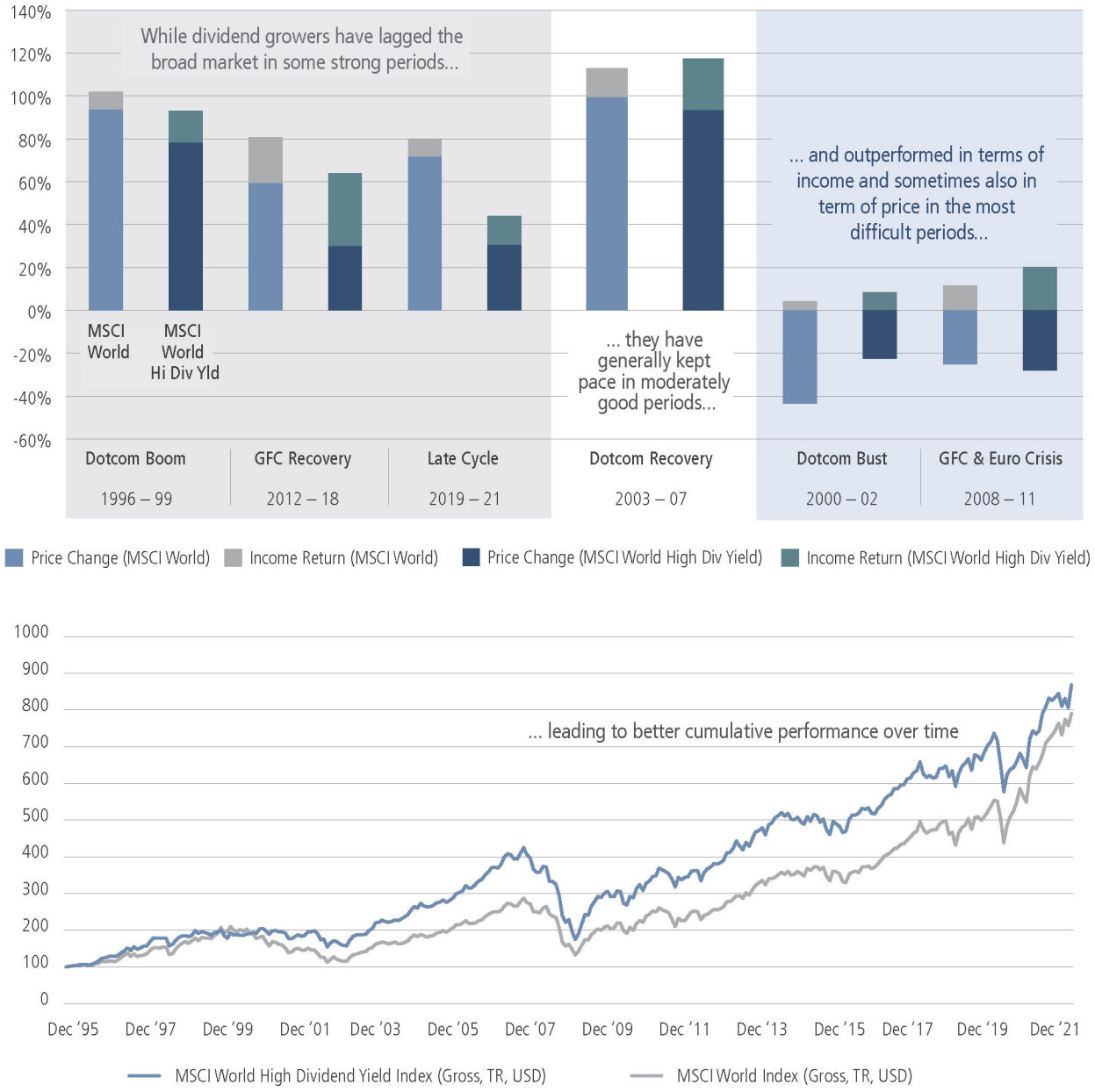
FORWARD-LOOKING ESTIMATED RETURNS



Source: Neuberger Berman, Bloomberg-Barclays, Cambridge Associates, FactSet; Analytics are as of June 7, 2022. Alternatives basket includes hedged strategies (15%), Commodities (5%), Private debt (10%), Value add real estate (10%), Core real estate (30%), Private Equity (30%). The Global 60/40 basket includes the MSCI All Country World Index (60%) and the Bloomberg Global Aggregate Index (40%). IMPORTANT: The performance estimates are hypothetical in nature and reflect the Neuberger Berman's Capital Market Assumptions. The estimates do not reflect actual investment results and are not guarantees of future results. Alternative Assets may include investment vehicles that are subject to investor eligibility restrictions and may not be suitability for all investors. Please see Additional Disclosures at the end of the presentation for asset class and index definitions, terminology definitions and Neuberger Berman's Capital Market Assumptions. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal.

… and potentially making income a more important component of total return (and a more highly valued characteristic)

HIGH-DIVIDEND STOCKS VERSUS THE BROAD MARKET, 1996 – 2021

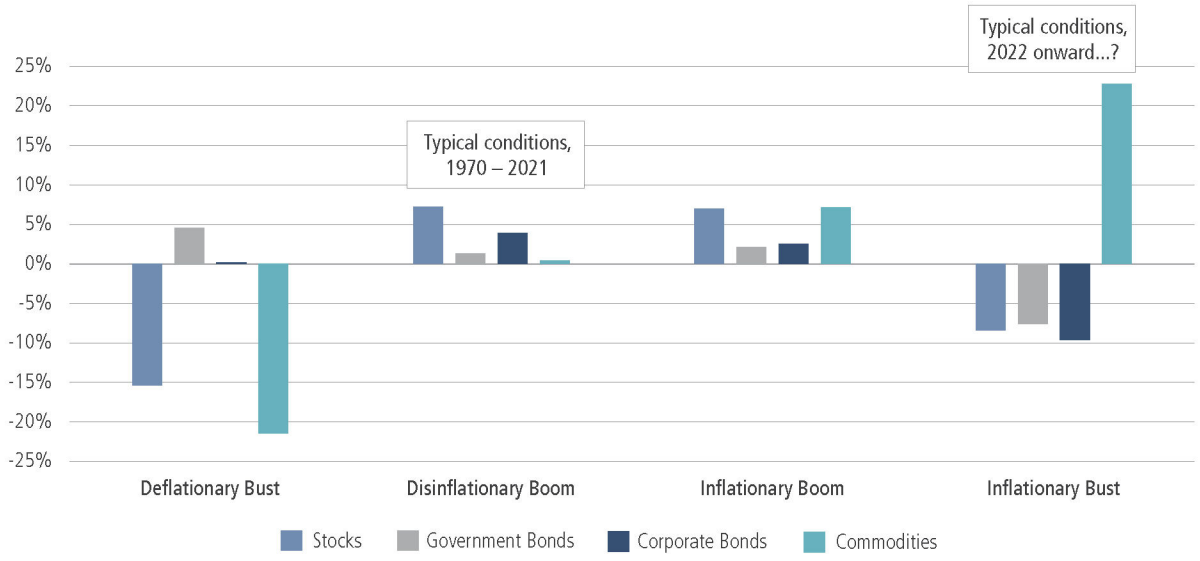


Source: MSCI. Data as of December 31, 2021. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Indices are unmanaged and not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

RISK: Diversify Differently

Structurally higher inflation makes a case for real assets…

AVERAGE ANNUAL REAL RETURNS DURING FOUR DIFFERENT GROWTH AND INFLATION REGIMES, 1961 – 2021

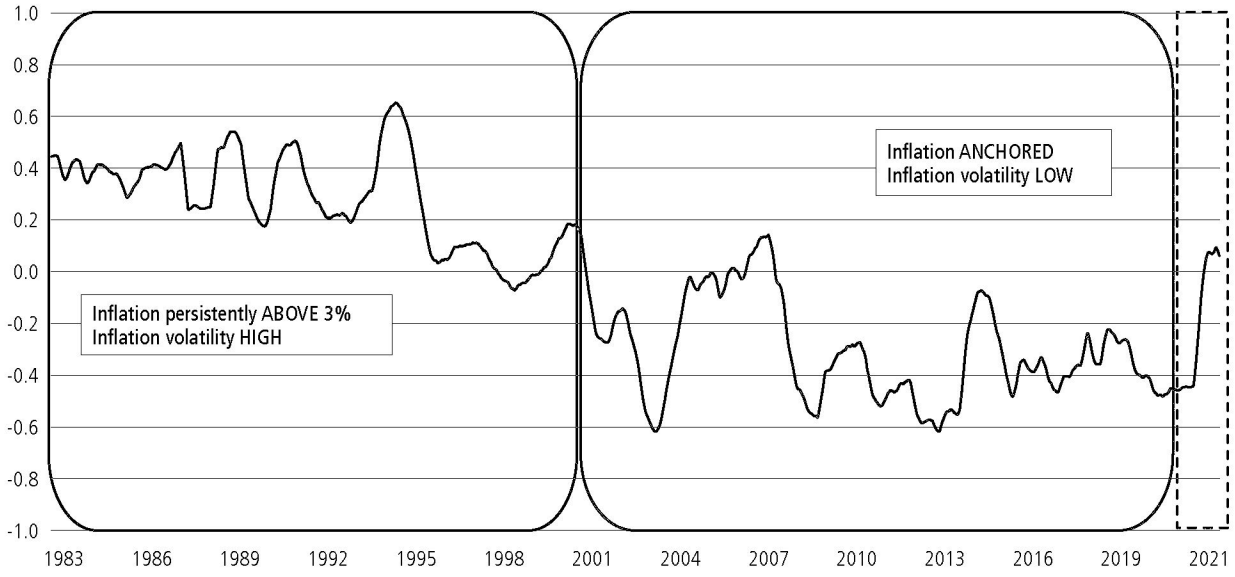


Source: Bloomberg, Federal Reserve Bank of St. Louis (FRED), Bank of America, Ibbotson. Data from January 1, 1961 to December 31, 2021. Stocks are represented by the MSCI World Index (backfilled with the S&P 500 Index by Ibbotson prior to Jan 1970); Government Bonds by the ICE BoA Global Sovereign Bond Index (backfilled with the Bloomberg U.S. Long Term Government Bond Index by Ibbotson prior to Jan 1986); Corporate Bonds by the ICE BoA Global Corporate Bond Index (backfilled with the Bloomberg U.S. Long Term Corporate Bond Index by Ibbotson prior to Jan 1997); and Commodities by the Bloomberg Commodity Index. Inflationary regime is defined by the year-over-year (YoY) percent change in the OECD CPI (backfilled with the U.S. CPI prior to Feb 1971). Bust and boom regimes are defined by the change in the level of OECDGDP compared to the previous year. If the current YoY GDP minus the YoY GDP lagged one year is less than zero, it is considered a bust regime and vice versa. If the current YoY CPI minus the YoY CPI lagged one year is less than zero, it is considered a deflationary regime and vice versa. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

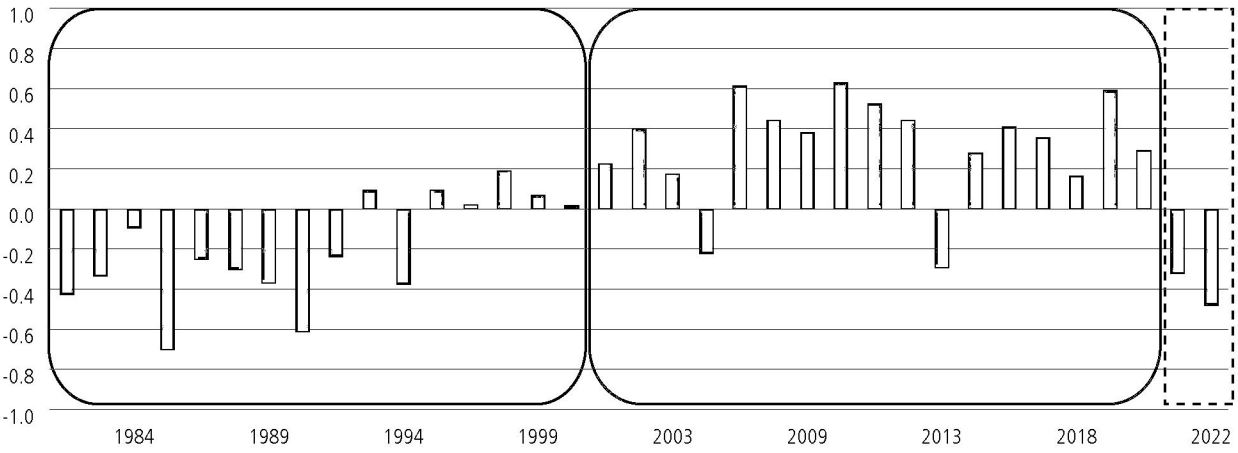
… as part of a wider effort to "diversify differently", as higher inflation could raise equity-bond correlation

EQUITY-BOND CORRELATION, 1983 – 2022

One-year rolling correlation of daily returns, S&P 500 Index versus U.S. 10-year Treasury



Average U.S. 10-year Treasury return on days when the S&P 500 Index ended down by 2% or more



Source: Bloomberg. Data as of April, 2022. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

What Is Our Thinking? Macro Inflections and Their Economic Implications

Macro Inflections: Deglobalization, Labor Power, A Changing Policy Environment

Deglobalization

Since the Great Financial Crisis of 2008 – 09 (GFC), we have seen protectionism, economic populism and nationalism rewarded at the ballot box. We have seen democracies chastened and autocracies emboldened around the world. Russia's invasion of Ukraine is a grave threat to both the post-Cold War strategic settlement and the flow of global trade. The European Union, home to the world's largest single market for goods, services, capital and labor, has faced financial fragility in the south, Brexit in the west and threats to the rule of law and its core values in the east.

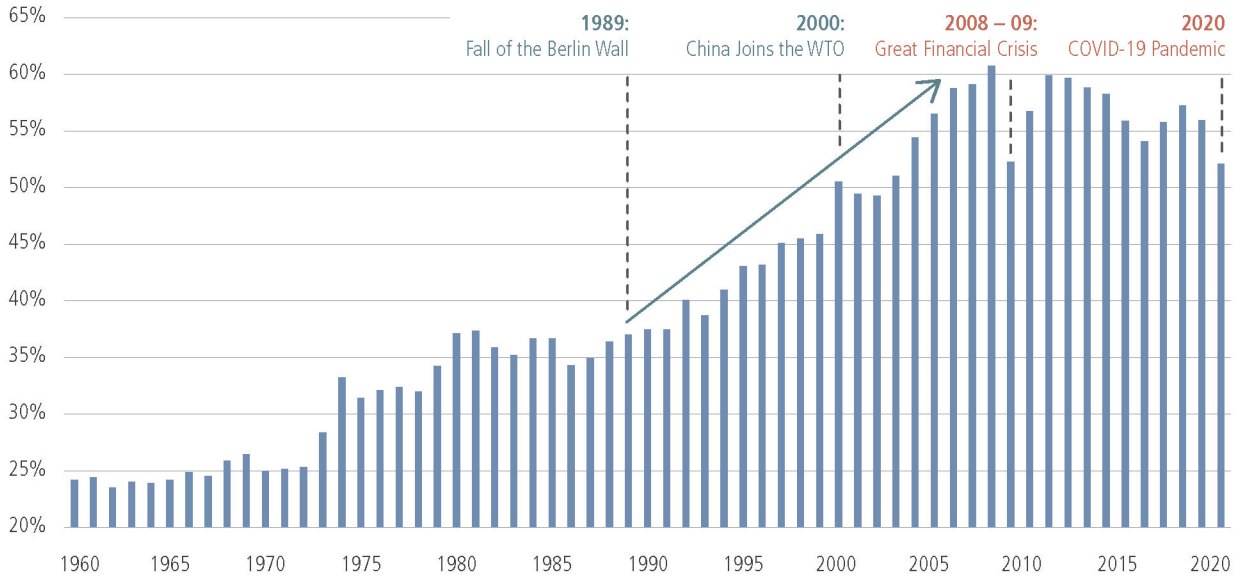
We have also seen the most important economic relationship underpinning globalization, that between the U.S. and China, come under strain. The rise of China as an economic power, once a potent symbol of globalization, has become a major reason why it is stalling and reversing. As the country's workforce has simultaneously aged and moved up the manufacturing value chain, China has become increasingly self-sufficient and focused on "common prosperity," and correspondingly less reliant on fast-paced, export-driven growth. Concerns over security and strategic industries have led to a regional decoupling in technology, and the development of new U.S.- and China-led "spheres of influence." The growing importance of China's renminbi as a reserve currency raises the possibility that it could one day rival the U.S. dollar's dominance in international trade; the decarbonization of the economy and consequent decline in the circulation of "petrodollars" could further fragment the dollar-centric, post-Bretton Woods global trade regime.

Finally, in addition to populist, nationalist and strategic concerns, the COVID-19 pandemic continues to raise profound questions about the fragility of the globalized, just-in-time supply chains that industry has built over the past three decades.

Even without the increased probability of potentially highly disruptive events, such as tit-for-tat trade wars or financial crises that are not met with 2008-style central bank solidarity, these developments are likely to generate substantial new headwinds to global growth, as well as structurally higher global inflation.

THE END OF 20 YEARS OF HYPER-GLOBALIZATION

Trade as a proportion of world GDP



Source: World Bank. As of December 2020. For illustrative purposes only.

Labor Power

Apart from a brief recovery in the late 1990s, in many developed economies the share of GDP that accrues not to owners of capital but to labor, via wages and social welfare benefits, has been declining for 50 years. We think there are several reasons to anticipate a swing back in favor of labor.

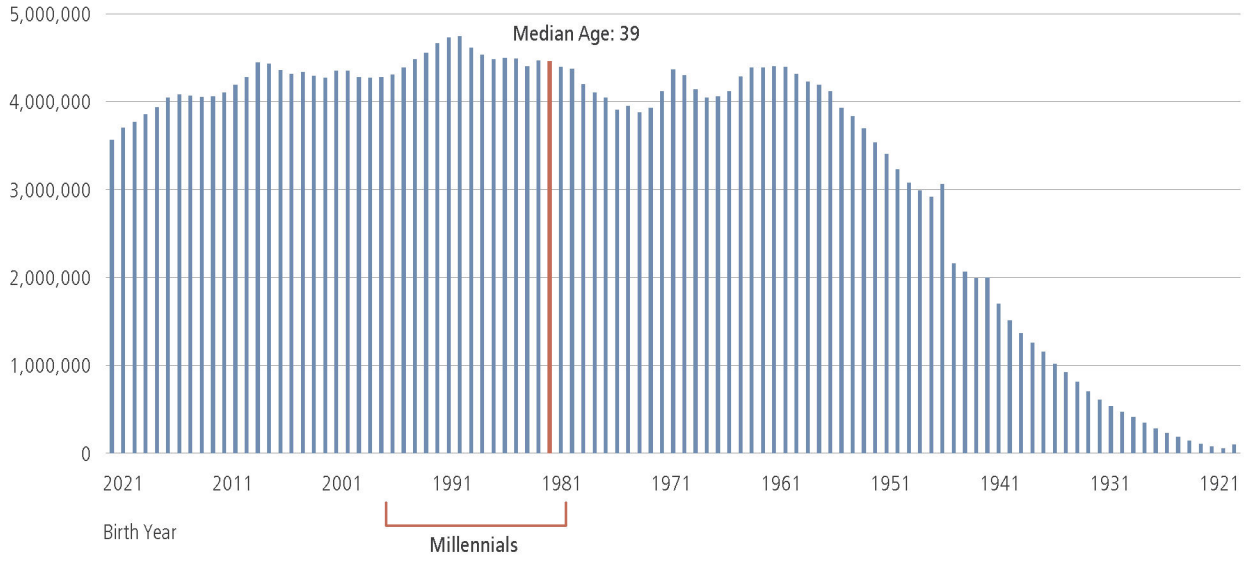
An important dynamic behind this loss of labor share of GDP, particularly since China joined the World Trade Organization in 2000, was globalization: the shifting of productivity-enhancing manufacturing jobs out of developed economies and into low-cost economies. This was made politically sustainable via a grand bargain in developed economies: the working and middle classes accepted stagnating real wage growth in return for cheaper consumer goods, moderate inflation and wider access to credit at low interest rates.

It is notable that the sharp decline in labor share of GDP in the U.S. was arrested by the GFC. This event revealed the grand bargain between capital and labor to be financially unsustainable. Thereafter, an aging, more consumption-oriented China ceased to be a low-cost manufacturing center, and more recently it has redirected its policy goals toward greater economic self-sufficiency and "common prosperity" at home. At the same time, in developed economies the hardships and perceived injustices of the GFC fueled a rise in populist demands for protectionism and the return of manufacturing jobs. Governments are now recognizing that security concerns and the low-carbon transition offer convenient additional reasons to support a domestic manufacturing renaissance. Finally, the COVID-19 pandemic appears to have put an end to the moderate inflation and low interest rates that enabled those without substantial capital to sustain their lifestyles, and changed what economists would call the utility function of lower-paid work: the health crisis and lockdowns were a sharp reminder of how dependent wealthy economies are on low-wage workers.

At the same time, powerful demographic forces are in play—and not only in China. The median American is now a Millennial. Because Millennials began to enter the workforce around the turn of the century, they have borne a particularly sharp fall in labor share of GDP. They have also been highly exposed because they tend to own less capital than older cohorts. This might explain why the data from a 2019 YouGov survey of 2,100 Americans suggested that 70% of U.S. Millennials would vote for a self-proclaimed socialist and only 50% of under-40s had a favorable opinion of capitalism. As this cohort hits its 40s and begins to dominate politics and the economy, economic populism—and especially redistributive and pro-labor policies—could find more support.

THE MEDIAN AMERICAN IS NOW A MILLENNIAL…

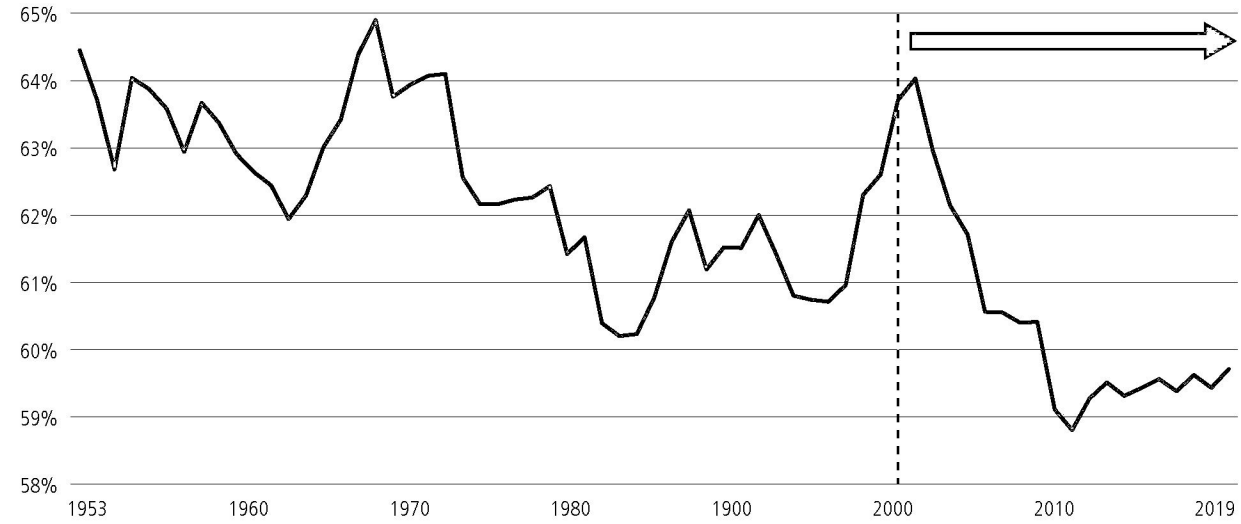
Population of U.S. by birth year



Source: U.S. Census Bureau, as of July 2021.

… AND MILLENNIALS, JOINING THE WORKFORCE FROM AROUND 2000, HAVE BORNE THE BRUNT OF THE LOSS OF LABOR SHARE OF GDP SINCE THE 1950s

Labor share of U.S. GDP



Source: University of Groningen Penn World Table 10.0, as of 2019.

A Changing Policy Environment

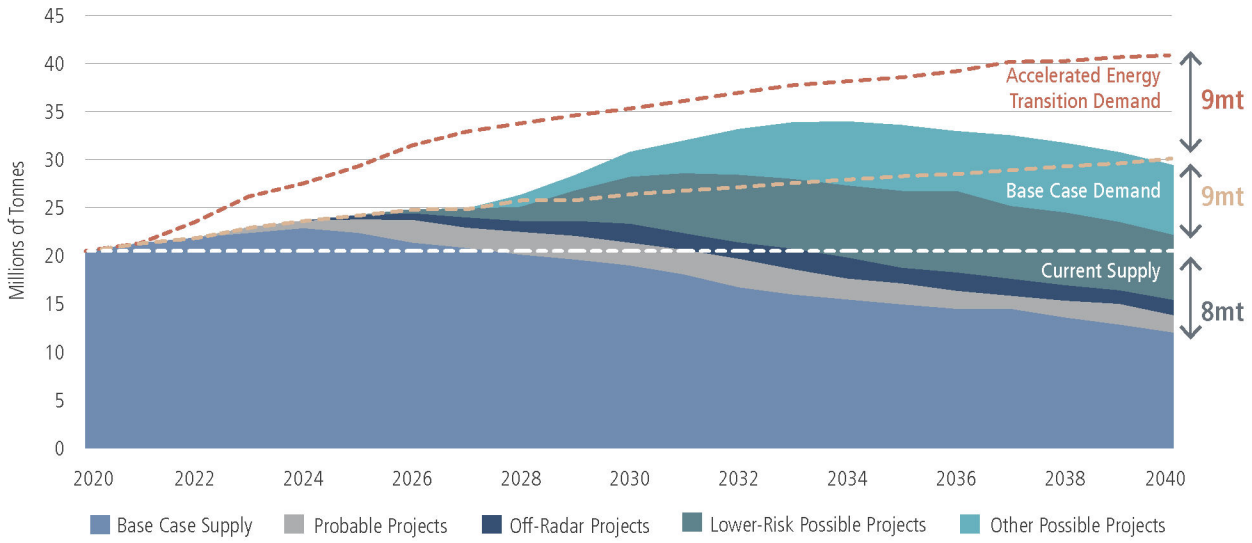
Deglobalization and the shift back to a multipolar world, as well as economic populism and a swing back to redistributive and pro-labor policies, suggest to us that the accommodative fiscal stance adopted during and in response to the COVID-19 pandemic is largely here to stay. We arguably see evidence for that in the reflexive response of many governments to the current energy crisis: policies such as gasoline tax subsidies and caps on energy bills are designed to save consumers from immediate hardship today, but they risk embedding higher inflation over the longer term. In addition, a potentially more volatile geostrategic environment than we have seen for many decades suggests a return to higher defense spending on top of this higher social welfare spending—and therefore, in all likelihood, broader and higher taxes.

Another major policy trend is the drive to decarbonize the global economy, with a view to achieving net-zero greenhouse gas emissions by 2050. When delegates met to negotiate the Paris Agreement on climate in 2015, the world was on a trajectory toward global temperatures of 4°C to 6°C above pre-industrial levels. The commitments made since then, and at the COP26 conference last year, are considered enough to limit that warming to 1.8°C. The current energy crisis highlights the challenges of the transition, but it arguably strengthens the energy-security case against reliance on imported fossil fuels.

If companies fail to respond to the energy transition and decarbonize their value chains, they are likely to face significant political, regulatory and physical risks. In our illustration of Climate Value at Risk on p.4, we have shown how we think that risk could translate to market valuations. But the energy transition also offers a range of potential investment opportunities, from venture capital investments in new renewable technologies and the financing of critical infrastructure and the raw materials that will go into it, to adaptations to help us live with some of the climate change-induced events that have already started to affect us.

THE ENERGY TRANSITION: GOING TO THE WIRE

Projected global copper supply and demand scenarios



Source: Wood Mackenzie. Data as of March 31, 2022. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

Economic Implications: Structurally Higher Inflation, Shorter and More Volatile Cycles

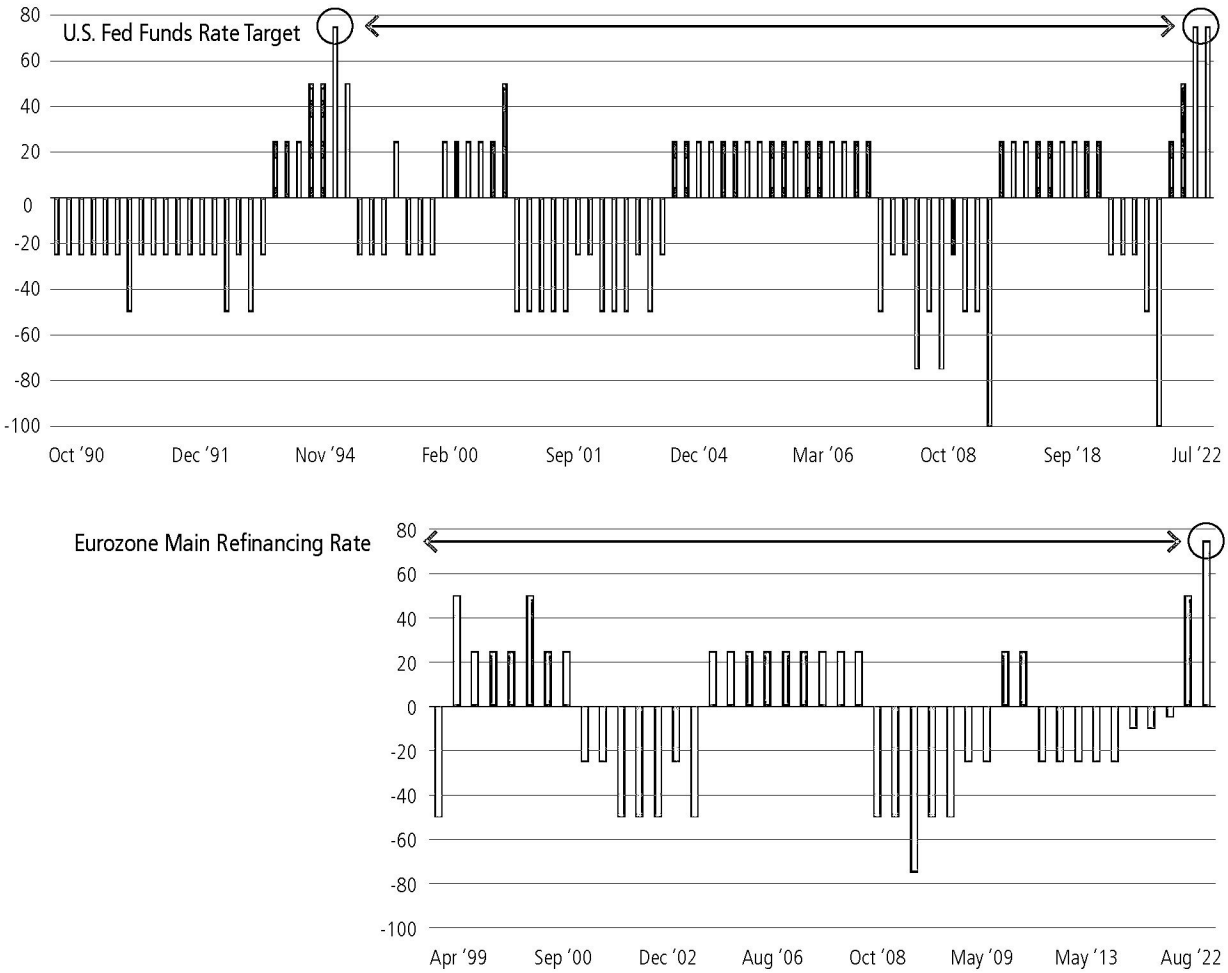
Structurally Higher Inflation

Spending on productivity-enhancing training, education and infrastructure expenditure, particularly for the energy transition, would be one way to mitigate the inflationary impact of higher government expenditure. On balance, however, we believe this new fiscal and environmental policy mix, combined with the deglobalization themes of economic nationalism and shorter, more robust supply chains, is likely to lead to structurally higher inflation than we have experienced over the past 20 years.

That could have profound implications for monetary policy, as it places even more onus on central banks to contain the volatility of consumer prices. We anticipate greater tolerance for inflation running slightly hotter than official targets, and we suspect that debt burdens will effectively cap the level that interest rates can reach—the European Central Bank has already had to develop a "Transmission Protection Instrument" to enable it to raise rates without causing excessive volatility in southern Eurozone bond markets. Overall, however, the appearance of 75-basis-point rate hikes at the U.S. Federal Reserve and the European Central Bank suggests to us that the age of the "central bank put option" underneath risky financial asset markets is now a thing of the past.

CENTRAL BANKS ARE HIKING AT SPEEDS UNSEEN FOR 20 – 30 YEARS

U.S. Federal Reserve Fed Funds Rate (upper limit of target range) (top) and European Central Bank Main Refinancing Operations Rate (bottom), change from previous level in basis points, all changes since 1990



Source: U.S. Federal Reserve (top), European Central Bank (bottom). Data as of September 8, 2022. For illustrative purposes only. Nothing herein constitutes a prediction or projection of future events or future market behavior. Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed or any historical results. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future**

Shorter and More Volatile Cycles

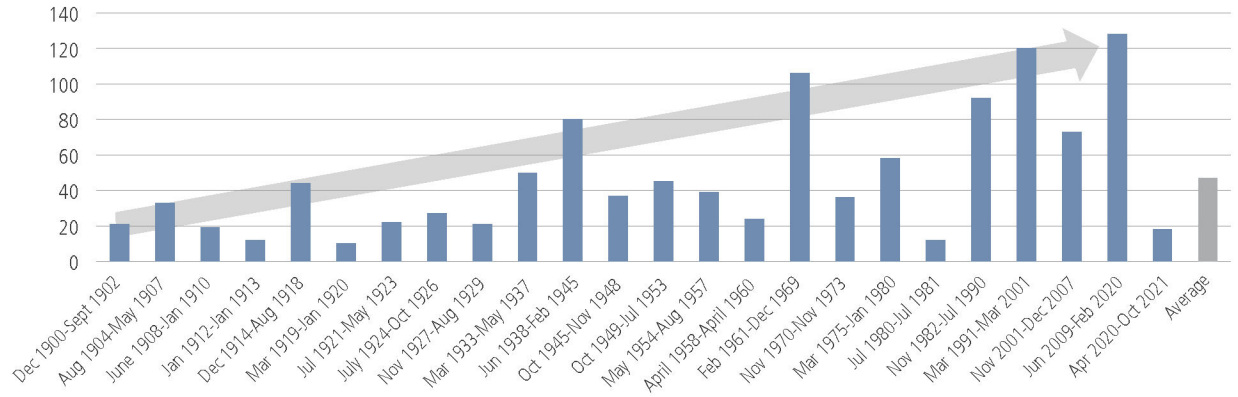
Over the course of the 20th century, and particularly since the 1980s, U.S. economic expansions tended to get longer—culminating in the record-breaking 128-month expansion that began after the GFC and was ended by the COVID-19 pandemic.

When we look at the principal causes of the recessions that ended those expansions, they suggest some reasons for this lengthening trend. Between 1945 and 1982, recessions were primarily caused by manufacturing inventory imbalances, energy shocks and restrictive monetary policy responses to high inflation. As labor- and energy-intensive manufacturing was progressively exported to lower-cost economies, and just-in-time supply chains rendered large stock inventories unnecessary, the impact of these traditional causes of recession dissipated. The primary causes of the three U.S. recessions after 1982 were financial imbalances—a reflection of the excessive risks that governments, corporations and consumers tend to take on when they begin to believe that the traditional business cycle has been abolished.

It is notable that, should the current U.S. slowdown develop into a recession, the 2020 – 2022 expansion will be not only one of the shortest on record, but also one that was ended by all three of the old-fashioned principal causes of recession. We think the COVID-19 and Ukraine shocks, coming on top of the GFC, have revealed the fragility of the economic model that underpinned the lengthening expansions of the past 60 years, and we anticipate at least a partial reversal: more manufacturing and fixed-asset investment in the developed economies; shorter and more diversified supply chains; fewer financial excesses (albeit alongside expansionary fiscal policy that could generate imbalances); and, as a result, shorter business cycles with potentially slightly longer but relatively shallow recessions.

U.S. ECONOMIC EXPANSIONS HAD BEEN TRENDING LONGER, ESPECIALLY SINCE THE 1960s…

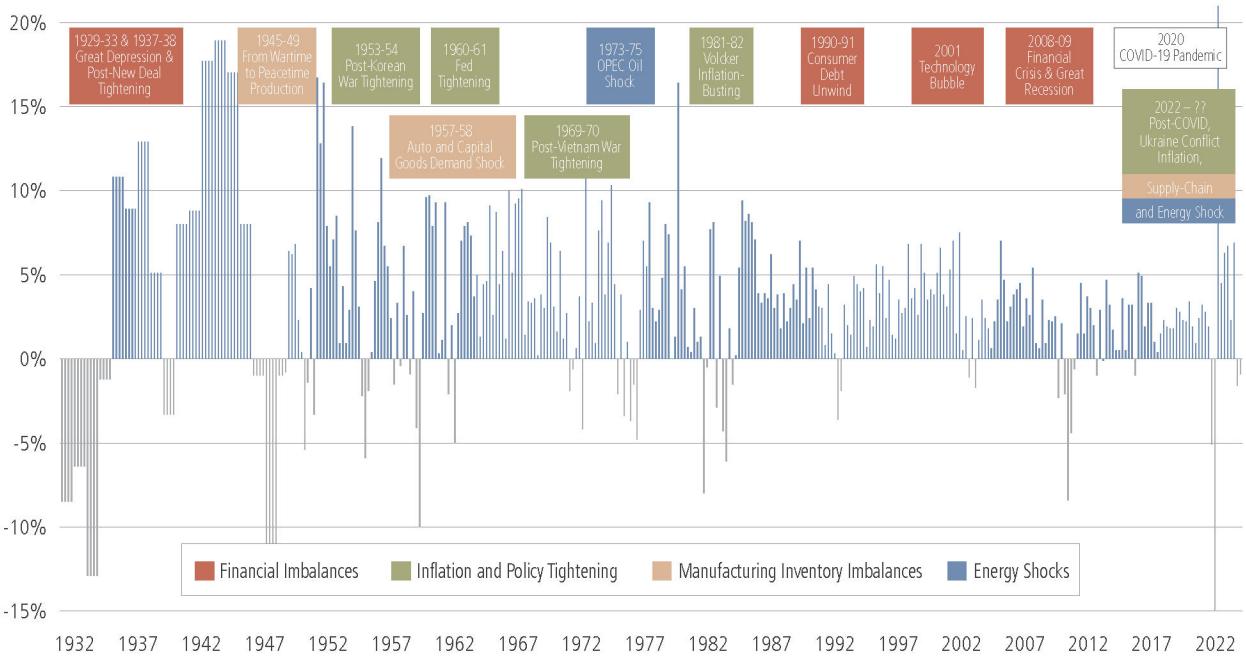
U.S. economic expansions without recessions, number of months trough-to-peak, 1900 – 2022



Source: National Bureau of Economic Research, Bureau of Economic Analysis. Data as of June 2022.

… AS TRADITIONAL RECESSIONARY FORCES WERE TAMED

U.S. GDP growth, quarter-over-quarter annualized, with principal causes of recessions, 1930 – 2022



Source: Bureau of Economic Analysis, Neuberger Berman. Data as of June 2022. The National Bureau of Economic Research has yet to classify the current U.S. downturn as a technical recession; however, the advance report of U.S. GDP growth for 2Q 2022 suggests that the U.S. may have experienced two consecutive quarters of negative real GDP growth, and eight consecutive months of negative real GDP growth beginning in November 2021.

How Can We Respond? Playbooks for the New Regime

OUTLOOK: Adapt to Today's New Challenges

Two multi-decade economic tailwinds are under threat. Globalization is hitting geopolitical, strategic, populist and practical roadblocks, and unsustainable growth powered by fossil fuels faces a difficult transition to ultimately more efficient growth powered by renewables.

FAVORING THE FITTEST. We think owners of capital face growing headwinds, including higher taxes to fund a more accommodative fiscal stance, rising costs of raw materials and debt, increasing labor power, and deglobalization both voluntary and involuntary. Margins are likely to be squeezed and some growing markets could be cut off by deglobalization. Higher interest rates could mean lower valuation multiples and fewer debt-financed share buybacks, while investors demanding higher risk premia could effectively cap broad-market valuations at lower levels than we have become used to. We think quality and fundamental selectivity are likely to be more important determinants of return outlooks from now on.

RETHINKING REGIONAL RISK. The return to a multipolar world of rising geopolitical tensions, new "spheres of influence" and more localized supply chains is likely to complicate and increase the importance of regional asset allocation. Think of the starkly different impact of the Ukraine crisis on Europe, the U.S. and Japan, for example; the differing exposure to deglobalization of large, relatively closed economies and small, open economies; the specific risks around Eurozone fragmentation; the trifurcation of U.S., Chinese and European technology markets and regulatory regimes; the growing need to consider China's huge equity and bond markets on their own terms rather than just another part of the emerging world; or the way some emerging markets are highly positively exposed to strengthening commodity prices, but highly negatively exposed to geopolitical and strong-dollar risk. The picture may be too complex to favor particular regional allocations, but we do believe it will be more important to avoid unconscious regional biases in portfolios.

HARVESTING GLOBAL MACRO TRENDS, TACTICAL DISLOCATIONS AND VOLATILITY PREMIA. Shorter business cycles and investors' demands for higher risk premia are likely to result in more volatile, sideways-trending markets. Collateralized equity index put option writing can be used to sell and monetize equity market volatility in this environment, potentially generating valuable additional return opportunities. Many Uncorrelated Strategies, such as short-term trading strategies and global macro funds, are also able to take advantage of these dynamics. Global macro strategies, in particular, could generally perform well in an environment of higher foreign exchange volatility, diverging inflation and interest rate conditions, and heightened geopolitical tensions.

ACCOUNTING FOR "NET ZERO". Governments, corporations and institutional investors are increasingly adopting net-zero emissions commitments. The ways investors respond to this will differ. Some will wish to divest from carbon-intensive sectors and achieve net-zero emissions in their portfolios as soon as possible, cognizant of the financial risk this carries; others may take a more active approach focused on real-world outcomes, encompassing engagement, climate risk assessment and investment in climate solutions. Those anticipating a longer, more difficult transition may favor longer exposure to fossil fuels and greater emphasis on investments in climate-change adaptation. There is certainly a case that the lack of investment in fossil fuels over the past decade has created a major opportunity for capital allocation in these sectors over the next decade, to help make the transition less inflationary, but also to finance the decarbonization of these sectors. Whatever your view, we think it is risky to assume that the past—whether the past 50 years or the past decade—is a useful guide to the future in the energy sector.

PRIORITIZING REAL ASSETS: COMMODITIES, REAL ESTATE, INFRASTRUCTURE. Keeping the lights on is a real-assets investment theme. New energy and power-transmission infrastructure will be required, and stricter specifications for energy sustainability are likely to generate a premium for high-quality new or upgraded real estate. Renewable energy infrastructure could be particularly attractive: the feedstock is free, but, especially during the decarbonization transition, it can benefit from the same high consumer energy prices set by fossil fuel utilities. It's important to note that a more sustainable economy is not necessarily a less commodity-intensive economy: renewable energy infrastructure is metals-intensive, for example. In addition, a multipolar world may be one in which raw materials are hoarded within nations or between geostrategic partners—especially food, energy and the metals

that are critical to the energy transition. Finally, greater policy focus on equality implies more spending power for those on lower incomes, who tend to spend more on commodities.

RETURNS: Mind the Gap

Lower and more volatile growth, together with higher inflation and interest rates, could slow the performance of many equity and bond indices, opening a wider gap between targeted returns and return outlooks. This "exhausted beta" phenomenon, together with the potential for higher price volatility and an upward bias in rates, is likely to make return profiles more reliant on income, illiquidity and niche-market premia, as well as active management (asset-allocation, stock-selection, corporate-engagement and operational "alpha").

LOOKING BEYOND "EXHAUSTED BETA". After four decades in which bond yields trended downward, we are now in an era where they are more likely to trend upward or sideways, with heightened volatility. We believe this strengthens the case for flexibility in fixed income portfolios, but it also suggests that the broad equity market may no longer benefit from declining discount rates on future earnings—the source of mechanically rising valuation multiples over recent years. Stock dispersion is likely to rise as investors refocus on finding two types of company: those that are undervalued; and those judged more likely to actually achieve their earnings-growth projections, as opposed to having them baked into today's stock prices by near-zero discount rates. As investors demand higher risk premia, the era of generous valuations, especially for speculative growth, is likely at an end.

GOING SHORT AS WELL AS LONG. Many Uncorrelated Strategies, such as short-term trading strategies and equity or credit market-neutral strategies, have the potential to generate positive returns when broad markets are volatile and trending sideways. Should "alpha" become a more important component of returns, investors may favor higher allocations to long/short equity strategies to amplify exposure to this active element.

REBALANCING TOWARD VALUE INVESTING. Before 2022, the performance of value investing lagged that of growth investing for a decade. This was largely because of declining rates: growth companies' projected earnings are weighted further into the future, making their present value more sensitive to the decline in the discount rate. Now, by contrast, value stocks are sought after because of their lower sensitivity to rising rates. Investors should also be aware that the long period of outperformance by growth stocks has made them dominant in many core equity indices—which could mean that passive equity investing is more growth-biased than it seems. Careful manager selection is important, too, as even some value managers have drifted toward growth exposures over recent years to mitigate underperformance.

BECOMING FULLY FLEXIBLE IN FIXED INCOME AND CREDIT. The first half of 2022 suggested the benefits of a flexible approach to credit investing. When interest rates were low and credit spreads tight in 2021, it was tempting to try to maintain yield targets by simply holding longer-dated bonds, investing in lower-grade securities and accepting less liquidity. Positioning like that would have left you exposed to the rising rates and widening credit spreads of 2022, however, with little ability to trade into higher yields as they became available. In volatile and often low-yielding fixed income markets, we favor a flexible approach that enables investment and rotation across the widest range of fixed income markets. We think that is more likely to meet portfolio yield targets with a more diverse spread of risk exposures. The opportunity set stretches from ordinary investment grade and high yield corporate bonds to loans, securitized credit, emerging markets debt, mortgages, corporate hybrid securities, semi-liquid credit markets and beyond.

PRIORITIZING INCOME ACROSS ASSET CLASSES. In an environment in which investors demand higher risk premia and valuations tend to be volatile and trend sideways, income becomes a bigger proportion of total return. The attractiveness of income can also support the prices of higher-yielding stocks and bonds over those with lower yields, as our chart comparing the MSCI World with the MSCI World High Dividend Yield indices, on p.6, suggests (the cumulative outperformance of income is still more evident in the U.S. market). Rising rates also make "cash today" more attractive than "growth tomorrow": longer-dated cash flows are more sensitive to changes in rates, and cash today can be reinvested in higher rates tomorrow. We think this supports the case for seeking income as an asset in its own right, across multiple markets. This could include the full range of fixed income markets, particularly short-duration credit; cash-generative and higher-yielding equities, including real estate investment trusts (REITs); rent- and fee-generating assets such as real estate and infrastructure; alternative sources of income such as catastrophe bonds and other insurance-linked strategies; and

even commodities—where substantial "roll yield" can be generated when scarcity leads to near-dated futures trading at higher prices than longer-dated futures.

INTEGRATING PRIVATE AND PUBLIC MARKET INVESTMENTS. Private markets are generally at the mercy of the same economic forces as public markets. Nonetheless, they have particular qualities. Illiquidity and exposure to specialized, niche assets often deliver risk premia to investors over and above those available from public, easily accessible markets. Private companies often have more flexibility to adapt operationally to the changing economic environment; and sustaining margins through a slowdown may be easier for a smaller company working out of the glare of the public market. Private debt can be a useful source of relatively high risk-adjusted yields and floating rates. Private real estate and infrastructure are generally useful sources of often inflation-linked rental and fee-based cash flows. But as well as private assets being attractive in themselves, we believe they can be made still more attractive when managed together with public assets as a truly integrated portfolio. We believe that enables investors to identify and take advantage of relative value opportunities or dislocations between liquid and illiquid equity or credit markets; it makes it easier to measure and monitor equity, credit and other economic risk exposures across the whole portfolio, agnostic of the assets' liquidity profiles; and it can help to make the complex cash-flow management associated with private assets more efficient.

EXPLOITING YOUR NATURAL ADVANTAGES WHILE SEEKING EFFECTIVE PARTNERS. When returns are easier to come by, it is all too easy to follow the investing crowd. By that, we don't only mean index investing, but also failing to recognize the natural advantages that each investor can have as a single participant in the market. Do you have more freedom than most to hold illiquid or more volatile investments, for example? Does the size of your portfolio give you economies of scale? Are you free of the regulatory constraints that prohibit some investors from exploring niche markets? Shorter, more volatile cycles and less liquid markets make value dislocations more likely: do you benefit from a lighter governance structure that makes it easier to move quickly? Exploiting these potential advantages, and accessing other niche investment opportunities, can add complexity to an investment program that might require more tailored solutions. If this complexity stopped you from acting in the past, seeking help from trusted partners might remove some of those obstacles.

RISK: Diversify Differently

Higher volatility and economic uncertainty, as well as the use of increased portfolio risk to align return profiles with return targets, make portfolio diversification more important than ever. Diversification could be more difficult to achieve, however, as equity-bond correlation tends to rise in more inflationary environments.

ADDING FLEXIBILITY AND SHORTENING DURATION IN FIXED INCOME. Traditionally, government bonds have been seen as an important source of income for portfolios, but also of diversification against equity exposures—as in the classic "60/40" allocation. An environment of structurally higher inflation and heightened market volatility makes it more likely that government bond yields could rise at the same time as equity markets decline, however, as we saw in the first half of 2022. A broader, more flexible approach to fixed income allocations, which enables investment and rotation across the widest range of fixed income markets—from ordinary investment grade and high yield corporate bonds to loans, securitized credit, emerging markets debt, mortgages, corporate hybrid securities, semi-liquid credit markets and beyond—could deliver higher overall yield than government bonds with less exposure to rising interest rates. Short-duration credit, in particular, can offer investors the advantage of less exposure to volatile interest rates while giving up very little yield relative to longer-dated bonds. Exposure to credit risk is likely to come with some correlation with equity markets, but the more diversified the fixed income portfolio, the lower that correlation is likely to be.

SEEKING OUT UNCORRELATED MARKETS AND STRATEGIES. Some market risks are entirely different from the economic risks of equities and bonds, such as those associated with catastrophe bonds and other insurance-linked securities, whose cash flows and pricing respond to events such as earthquakes and hurricanes. Low correlation can also potentially be achieved with relative-value and market-neutral hedge funds; or with short- and medium-term trading strategies.

PRIORITIZING INFLATION-SENSITIVE REAL AND FINANCIAL ASSETS. Inflation-sensitive real assets classes include commodities, real estate and infrastructure. As we have seen in 2022, rising prices in raw materials often drive spikes in broader consumer-price inflation, while over the longer term, the decarbonization of the economy is likely to increase demand for many commodities, especially metals. In real estate, as construction costs rise, the value of existing real assets also tends to rise; many sectors have longer-term leases with contractual inflation-linked escalators, while others have annually renewable leases, whose rents rise and fall with consumer prices and wages. Similarly, in infrastructure, long-term usage contracts often adjust in line with a producer or consumer price index or, in the case of a utility, the price of its commodity feedstock; other assets are often critical enough to have considerable pricing power. Among financial assets, Treasury Inflation Protected Securities (TIPS) and other index-linked bonds, especially those with short maturities, are one of the few bond markets where total returns can match severe spikes in inflation. Real yields have risen rapidly this year, creating more attractive entry points in some markets. And in equity markets, some stocks are more "real" than others: commodity producers, real-asset owners, semiconductor manufacturers, banks and capital goods manufacturers generally find it easier to pass on their costs than "downstream" business, such as retailers.

IDENTIFYING AND HEDGING AGAINST THE TAIL RISKS THAT MATTER TO YOU. It is often prohibitively expensive to implement hedges against general market tail risk (such as buying equity index put options). It can be more cost-effective to identify the specific tail events that most concern you, or to which you are particularly exposed due to the nature of your liabilities or investment program, and work with a trusted partner to analyze and design tailored hedging solutions for them.

Summary: Not Just Another Turn in the Business Cycle

The global economy and financial markets have benefitted from several significant tailwinds over the past four decades. But many of those tailwinds began to dissipate after the GFC of 2008 – 09, and over the past six years, some have turned to headwinds—particularly the trends of moderate inflation and declining rates; the lengthening and stabilization of business cycles engendered by globalized just-in-time supply chains and low-cost manufacturing; and fossil fuel-intensive growth.

We believe this new economic regime demands a new investment playbook. In our view, portfolios steering into the next decade need to **ADAPT TO TODAY'S NEW CHALLENGES** of deglobalization and potentially lower returns to capital; **MIND THE GAP** that has opened up between return targets and the nominal- and real-return outlooks for traditional asset classes; and **DIVERSIFY DIFFERENTLY** due to rising equity-bond correlations and the renewed importance of inflation as a determinant of financial market risk and return outlooks.

Our investment ideas presented here are meant as a framework for that thinking. They are likely to evolve as we see the new regime take shape. But recognizing that we are in a fundamentally more challenging new environment, and not just another turn in the business cycle, is in our view an important first step in seeking an effective long-term investment strategy.

Index Definitions

The **S&P 500 Index** consists of 500 U.S. stocks chosen for market size, liquidity and industry group representation. It is a market value-weighted index (stock price times number of shares outstanding), with each stock's weight in the Index proportionate to its market value.

The **MSCI All Country World Index** is a market value-weighted index of more than 2,700 stocks from 23 developed and 24 emerging countries.

The **Bloomberg Global Aggregate Bond Index** is a broad-base, market capitalization-weighted bond market index representing intermediate term investment grade bonds traded worldwide.

The **ICE BofAML Global High Yield Index** tracks the performance of of USD, CAD, GBP and EUR denominated below investment grade, but not in default, corporate debt publicly issued in the major domestic or Eurobond markets, and includes issues with a credit rating of BBB or below, as rated by Moody's and S&P.

The **S&P 500 Dividend Aristocrats Index** measures the performance of S&P 500 Index companies that have increased dividends every year for the last 25 consecutive years.

The **MSCI World Index** tracks the performance of large- and mid-cap stocks across 23 developed markets countries.

The **MSCI World Index High Dividend Yield Index** tracks the performance of large- and mid-cap stocks across 23 developed markets countries. The index is designed to reflect the performance of equities in the MSCI World Index (excluding REITs) with higher dividend income and quality characteristics than average dividend yields that are both sustainable and persistent. The index also applies quality screens and reviews 12-month past performance to omit stocks with potentially deteriorating fundamentals that could force them to cut or reduce dividends.

The **ICE BoA Global Sovereign Bond Inde**x measures the market capitalization-weighted performance of public debt of investment-grade sovereign issuers, issued and denominated in their own domestic market and currency

The **ICE BoA Global Corporate Bond Index** measures the market capitalization-weighted performance of public debt of investment-grade corporate issuers, issued and denominated in their own domestic market and currency.

The **Bloomberg U.S. Long Treasury Total Return Index** measures the performance of USD-denominated, fixed-rate, nominal debt issued by the U.S. Treasury with a maturity greater than 10 years, excluding STRIPS. The U.S. Treasury Index is a component of the U.S. Aggregate Index.

The **Bloomberg U.S. Long Credit Total Return Index** measures the performance of investment grade, USD-denominated, fixed-rate, taxable corporate and government-related bond markets with a maturity greater than 10 years. It is composed of the U.S. Corporate Index and a non-corporate component that includes non-U.S. agencies, sovereigns, supranationals and local authorities, and is a subset of the U.S. Aggregate Index.

The **Bloomberg Commodity Index (BCOM)** is designed to be a highly liquid and diversified benchmark for commodities investments. The index provides broad-based exposure to commodities as an asset class, since no single commodity or commodity sector dominates the Index. This index is composed of futures contracts on 20 physical commodities traded on U.S. exchanges, with the exception of aluminum, nickel and zinc, which are traded on the London Metal Exchange (LME).

Asset Class Assumptions and Estimates

Capital market assumptions used herein reflect Neuberger Berman's forward-looking estimates of the benchmark return or volatility associated with an asset class. Estimated returns and volatilities are hypothetical return and risk estimates generated by Neuberger Berman's Institutional Solutions Group. Estimated returns and volatilities do not reflect the alpha of any investment manager or investment strategy/vehicle within an asset class. Information is not intended to be representative of any investment product or strategy and does not reflect the fees and expenses associated with managing a portfolio or any other related charges, such as commissions and surrender charges. Estimated returns and volatilities are hypothetical and generated by Neuberger Berman based on various assumptions and inputs, including current market conditions, historical market conditions and subjective views and estimates. Capital market assumptions shown reflect Neuberger Berman's long-term (20+ years into the future) estimates and are reviewed and revised at least annually. Neuberger Berman also produces intermediate-term (5–7 years into the future) capital market assumptions. If Neuberger Berman's intermediate-term (5–7 years into the future) capital market assumptions were used, the results presented would be different. Neuberger Berman's capital market assumptions are derived using a building block approach that reflects historical, current, and projected market environments, forward-looking trends of return drivers, and the historical relationships asset classes have to one another. These hypothetical returns are used for discussion purposes only and are not intended to represent, and should not be construed to represent, predictions of future rates of return. Actual returns may vary significantly. Neuberger Berman makes no representations regarding the reasonableness or completeness of any such assumptions and inputs. Assumptions, inputs, and estimates are periodically revised and subject to change without notice. Estimated returns and volatilities should not be used, or relied upon, to make investment decisions.

Asset Class	Index Source	Geometric Est. Return (%)	Arithmetic Est. Return (%)	OAS	OASD	OAD	Est. Annual Vol (%)
Cash (risk-free rate)	Bloomberg-Barclays	1.53	1.53	0	0	0.3	0.4
Investment Grade Credit	Bloomberg-Barclays	3.76	3.92	80	8.2	8.4	5.5
Municipals	Bloomberg-Barclays	2.95	3.04	50	5.5	5.2	4.2
U.S. Government/Agency	Bloomberg-Barclays	2.74	2.81	0	0	7	3.9
Investment Grade Corporates	Bloomberg-Barclays	3.88	4.06	84	8.5	8.7	6
Agency MBS	Bloomberg-Barclays	3.43	3.46	27	5	4.6	2.4
U.S. TIPS	Bloomberg-Barclays	2.37	2.52	0	0	7.9	5.5
High Yield (U.S. BB & B)	Bloomberg-Barclays	5.28	5.64	251	4.1	4.1	8.5
Non-US Fixed Income (Hedged to USD)	Bloomberg-Barclays	2.9	2.95	82	7.8	7.9	3
Non-US Dev Market Fixed Income (Hedged to USD)	Bloomberg-Barclays	2.47	2.51	97	7.9	8.1	2.7
Global Bonds (Hedged to USD)	Bloomberg-Barclays	2.98	3.04	65	7.4	7.5	3.5
ABS/CMBS	Bloomberg-Barclays	3.97	4.28	62	4.6	4.6	7.9
Emerging Market Debt	JPM EMBI/CEMBI	4.51	4.91	313	6.7	6.3	8.9
Bank Loans	S&P/LSTA LL 100	4.81	5.13	335	3.5	0.3	8
Munis 1-3 yrs	Bloomberg-Barclays	1.74	1.74	8	1.8	1.8	1.1

Asset Class	Index Source	Geometric Est. Return (%)	Arithmetic Est. Return (%)	OAS	OASD	OAD	Est. Annual Vol (%)
Corporates A above 1-3 yrs	Bloomberg-Barclays	2.72	2.76	23	1.9	1.9	2.6
Preferred Stock	ICE BofA	4.12	4.83	146	4.7	4.7	11.8
U.S. All Cap	Russell 3000	5.74	7	-	-	-	15.9
U.S. Large Cap	S&P 500	5.79	6.97	-	-	-	15.4
Large Cap Growth	S&P 500 Growth	5.85	7.21	-	-	-	16.4
Large Cap Value	S&P 500 Value	5.58	6.74	-	-	-	15.2
U.S. Small Cap	Russell 2000	5.29	7.36	-	-	-	20.4
Small Cap Growth	Russell 2000 Growth	5.23	7.4	-	-	-	20.8
Small Cap Value	Russell 2000 Value	5.2	7.33	-	-	-	20.6
Non-US Equities	MSCI ACWI ex US	6	7.6	-	-	-	17.9
Developed International Equities	MSCI EAFE	5.98	7.51	-	-	-	17.5
Emerging Market Equities	MSCI EM	5.54	7.86	-	-	-	21.5
Global Equities	MSCI ACWI	5.91	7.25	-	-	-	16.4
Public Real Estate	NAREIT Equity	4.25	6.83	-	-	-	22.7
Core Real Estate	NCREIF ODCE Index	5.52	6.62	-	-	-	14.8
Value Add Real Estate	Leveraged NPI	5.95	7.76	-	-	-	19
Commodities	Bloomberg	4.91	6.26	-	-	-	16.5
Hedged Strategies	HFRI	4.2	4.4	-	-	-	6.4
Private Equity	Cambridge Associates	9.06	10.79	-	-	-	18.6
Private Debt	Credit Suisse LL	7.72	8.59	534	3.5	0.3	10.1

This material is provided for informational purposes only and nothing herein constitutes investment, legal, accounting or tax advice. This material is general in nature and is not directed to any category of investors and should not be regarded as individualized, a recommendation, investment advice or a suggestion to engage in or refrain from any investment-related course of action. Investment decisions and the appropriateness of this material should be made based on an investor's individual objectives and circumstances and in consultation with his or her advisors. Information is obtained from sources deemed reliable, but there is no representation or warranty as to its accuracy, completeness or reliability. All information is current as of the date of this material and is subject to change without notice. The firm, its employees and advisory accounts may hold positions of any companies discussed. Any views or opinions expressed may not reflect those of the firm as a whole. Neuberger Berman products and services may not be available in all jurisdictions or to all client types. Diversification does not guarantee profit or protect against loss in declining markets. Investing entails risks, including possible loss of principal. Investments in hedge funds and private equity are speculative and involve a higher degree of risk than more traditional investments. Investments in hedge funds and private equity are intended for sophisticated investors only. Indexes are unmanaged and are not available for direct investment. **Past performance is no guarantee of future results.**

The views expressed herein include those of the Neuberger Berman Multi-Asset Class (MAC) team and Neuberger Berman's Asset Allocation Committee. The Asset Allocation Committee is comprised of professionals across multiple disciplines, including equity and fixed income strategists and portfolio managers. The Asset Allocation Committee reviews and sets long-term asset allocation models, establishes preferred near-term tactical asset class allocations and, upon request, reviews asset allocations for large diversified mandates. Tactical asset allocation views are based on a hypothetical reference portfolio. The views of the MAC team or the Asset Allocation Committee may not reflect the views of the firm as a whole and Neuberger Berman advisers and portfolio managers may take contrary positions to the views of the MAC team or the Asset Allocation Committee. The MAC team and the Asset Allocation Committee views do not constitute a prediction or projection of future events or future market behavior. The information in this material may contain projections, market outlooks or other forward-looking statements regarding future events, including economic, asset class and market outlooks or expectations, and is only current as of the date indicated. There is no assurance that such events, outlook and expectations will be achieved, and actual results may be significantly different than that shown here. The duration and characteristics of past market/economic cycles and market behavior, including any bull/bear markets, is no indication of the duration and characteristics of any current or future be market/economic cycles or behavior. Information on historical observations about asset or sub-asset classes is not intended to represent or predict future events. Historical trends do not imply, forecast or guarantee future results. Information is based on current views and market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons. Any target returns referenced reflect client established return objectives. There is no guarantee that any target returns will be achieved or that an investment strategy will be successful.

A bond's value may fluctuate based on interest rates, market conditions, credit quality and other factors. You may have a gain or loss if you sell your bonds prior to maturity. Of course, bonds are subject to the credit risk of the issuer. If sold prior to maturity, municipal securities are subject to gain/losses based on the level of interest rates, market conditions and the credit quality of the issuer. Income may be subject to the alternative minimum tax (AMT) and/or state and local taxes, based on the investor's state of residence. High-yield bonds, also known as "junk bonds," are considered speculative and carry a greater risk of default than investment-grade bonds. Their market value tends to be more volatile than investment-grade bonds and may fluctuate based on interest rates, market conditions, credit quality, political events, currency devaluation and other factors. High yield bonds are not suitable for all investors and the risks of these bonds should be weighed against the potential rewards. Neither Neuberger Berman nor its employees provide tax or legal advice. You should contact a tax advisor regarding the suitability of tax-exempt investments in your portfolio. Investing in the stocks of even the largest companies involves all the risks of stock market investing, including the risk that they may lose value due to overall market or economic conditions. Small- and mid-capitalization stocks are more vulnerable to financial risks and other risks than stocks of larger companies. They also trade less frequently and in lower volume than larger company stocks, so their market prices tend to be more volatile. Investing in foreign securities involves greater risks than investing in securities of U.S. issuers, including currency fluctuations, interest rates, potential political instability, restrictions on foreign investors, less regulation and less market liquidity. The properties held by REITs could fall in value for a variety of reasons, such as declines in rental income, poor property management, environmental liabilities, uninsured damage, increased competition, or changes in real estate tax laws. There is also a risk that REIT stock prices overall will decline over short or even long periods because of rising interest rates. The sale or purchase of commodities is usually carried out through futures contracts or options on futures, which involve significant risks, such as volatility in price, high leverage and illiquidity.

NEUBERGER | BERMAN

Neuberger Berman
1290 Avenue of the Americas
New York, NY 10104-0001

www.nb.com

May 08, 2013

832

Are Stocks Cheap? A Review of the Evidence

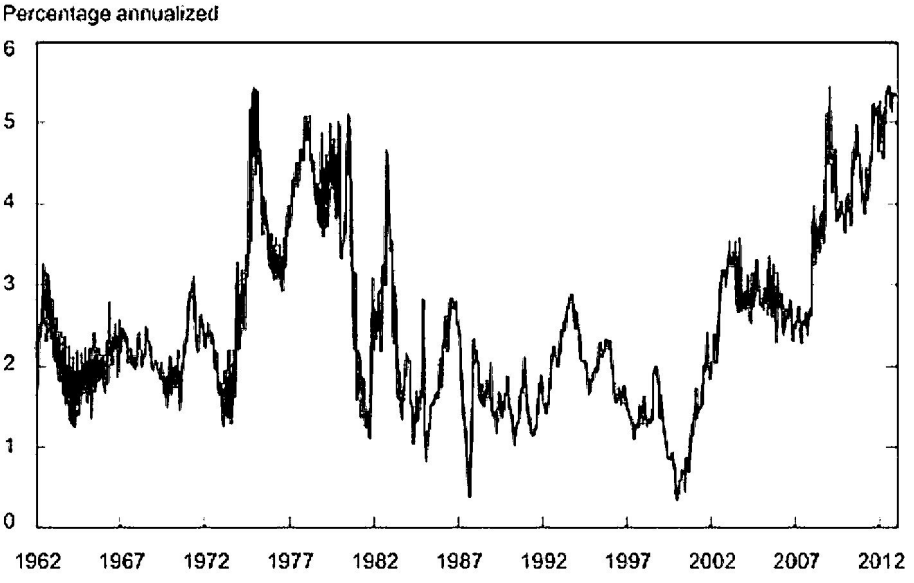
Fernando Duarte and Carlo Rosa

We surveyed banks, we combed the academic literature, we asked economists at central banks. It turns out that most of their models predict that we will enjoy historically high excess returns for the S&P 500 for the next five years. But how do they reach this conclusion? Why is it that the equity premium is so high? And more importantly: Can we trust their models?

The equity risk premium is the *expected* future return of stocks minus the risk-free rate over some investment horizon. Because we don't directly observe market expectations of future returns, we need a way to figure them out indirectly. That's where the models come in. In this post, we analyze twenty-nine of the most popular and widely used models to compute the equity risk premium over the last fifty years. They include surveys, dividend-discount models, cross-sectional regressions, and time-series regressions, which together use more than thirty different variables as predictors, ranging from price-dividend ratios to inflation. Our calculations rely on real-time information to avoid any look-ahead bias. So, to compute the equity risk premium in, say, January 1970, we only use data that was available in December 1969.

Let's now take a look at the facts. The chart below shows the weighted average of the twenty-nine models for the one-month-ahead equity risk premium, with the weights selected so that this single measure explains as much of the variability across models as possible (for the geeks: it is the first principal component). The value of 5.4 percent for December 2012 is about as high as it's ever been. The previous two peaks correspond to November 1974 and January 2009. Those were dicey times. By the end of 1974, we had just experienced the collapse of the Bretton Woods system and had a terrible case of stagflation. January 2009 is fresher in our memory. Following the collapse of Lehman Brothers and the upheaval in financial markets, the economy had just shed almost 600,000 jobs in one month and was in its deepest recession since the 1930s. It is difficult to argue that we're living in rosy times, but we are surely in better shape now than then.

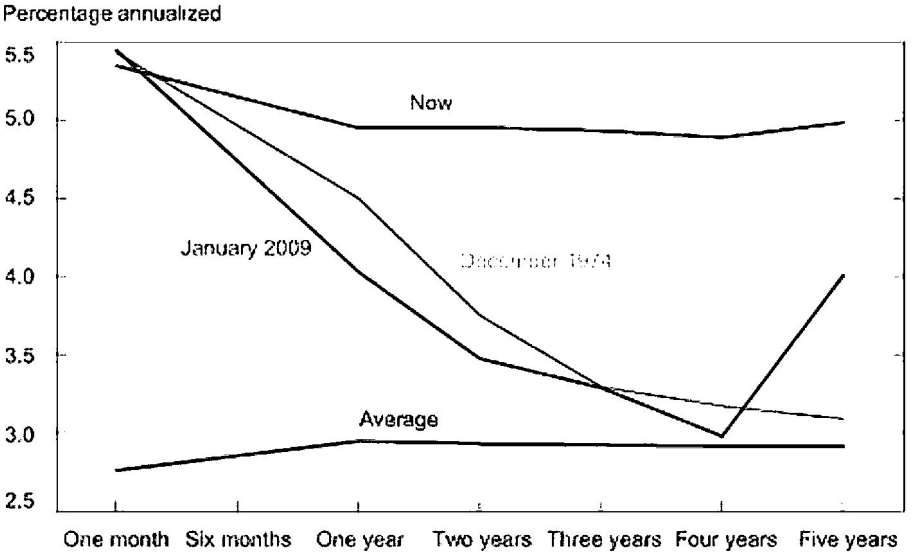
Today's equity premium has reached a historic high



Sources: Authors' calculations; Barclays; Deutsche Bank; Duke/CFO Business Outlook survey; Federal Reserve Board; Federal Reserve Bank of New York; Goldman Sachs; J.P. Morgan; Nomura; the Center for Research in Security Prices; Federal Reserve Economic Data; Thomson Reuters; the websites of NYU's Aswath Damodaran; Dartmouth's Kenneth French, University of Lausanne's Amit Goyal, University of California at Berkeley's Martin Lettau, Yale's Robert Shiller.

The next chart shows a comparison between those two episodes and today. For 1974 and 2009, the green and red lines show that the equity risk premium was high at the one-month horizon, but was decreasing at longer and longer horizons. Market expectations were that at a four-year horizon the equity risk premium would return to its usual level (the black line displays the average levels over the last fifty years). In contrast, the blue line shows that the equity risk premium today is high irrespective of investment horizon.

The equity premium is elevated at all horizons



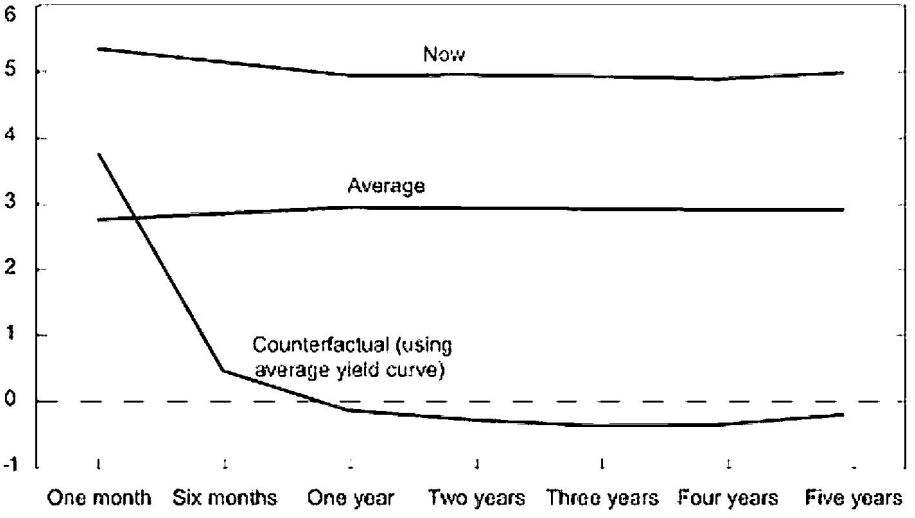
Sources: Authors' calculations; Barclays; Deutsche Bank; Duke/CFO Business Outlook survey; Federal Reserve Board; Federal Reserve Bank of New York; Goldman Sachs; J.P. Morgan; Nomura; the Center for Research in Security Prices; Federal Reserve Economic Data; Thomson Reuters; the websites of NYU's Aswath Damodaran; Dartmouth's Kenneth French, University of Lausanne's Amit Goyal, University of California at Berkeley's Martin Lettau, Yale's Robert Shiller.

Why is the equity premium so high right now? And why is it high at all horizons? There are two possible reasons: low discount rates (that is, low Treasury yields) and/or high current or future expected dividends. We can figure out which factor is more important by comparing the twenty-nine models with one another. This strategy works because some models emphasize changes in dividends, while others emphasize changes in risk-free rates. We find that the equity risk premium is high mainly due to exceptionally low Treasury yields at all foreseeable horizons. In contrast, the current level of dividends is roughly at its historical average and future dividends are expected to grow only modestly above average in the coming years.

In the next chart we show, in an admittedly crude way, the impact that low Treasury yields have on the equity risk premium. The blue and black lines reproduce the lines from the previous chart: the blue is today's equity risk premium at different horizons and the black is the average over the last fifty years. The new purple line is a counterfactual: it shows what the equity premium would be today if nominal Treasury yields were at their average historical levels instead of their current low levels. The figure makes clear that exceptionally low yields are more than enough to justify a risk premium that is highly elevated by historical standards.

The equity premium is high because Treasury yields are low

Percentage annualized



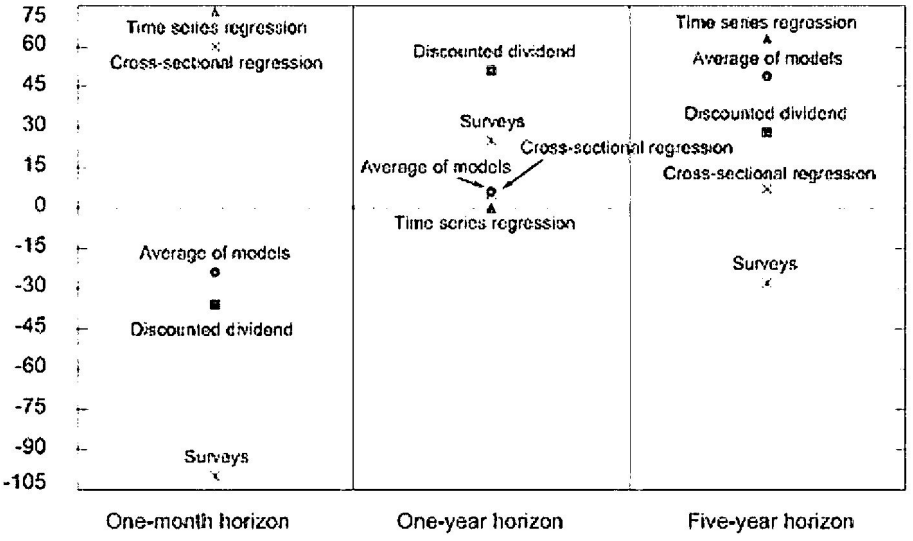
Sources: Authors' calculations; Barclays; Deutsche Bank; Duke/CFO Business Outlook survey; Federal Reserve Board; Federal Reserve Bank of New York; Goldman Sachs; J.P. Morgan; Nomura; the Center for Research in Security Prices; Federal Reserve Economic Data; Thomson Reuters; the websites of NYU's Aswath Damodaran; Dartmouth's Kenneth French, University of Lausanne's Amit Goyal, University of California at Berkeley's Martin Lettau, Yale's Robert Shiller.

But none of this analysis matters if excess returns are unpredictable because the equity risk premium is all about expected returns. So...*are* returns predictable? The jury is still out on this one, and the debate among academics and practitioners is alive and well. The simplest predictive method is to assume that future returns will be equal to the average of all past returns. It turns out that it is remarkably tricky to improve upon this simple method. However, with so many models at hand, we couldn't help but ask if any of them can, in fact, do better.

The table below gives the extra returns that investors could have earned by using the models instead of the historical mean to predict future returns. For investment horizons of one month, one year, and five years, we pick the best model in each of the four classes we consider together with the weighted average of all twenty-nine models. We compute these numbers by assuming that investors can allocate their wealth in stocks or bonds, and that they are not too risk-averse (for the geeks again, we solved a Merton portfolio problem in real time assuming that the coefficient of relative risk aversion is equal to one). The table shows positive extra returns for most of the models, especially at long horizons.

Model performance is varied, but better at longer horizons

Basis points per year



Sources: Authors' calculations; Barclays; Deutsche Bank; Duke/CFO Business Outlook survey; Federal Reserve Board; Federal Reserve Bank of New York; Goldman Sachs; J.P. Morgan; Nomura; the Center for Research in Security Prices; Federal Reserve Economic Data; Thomson Reuters; the websites of NYU's Aswath Damodaran; Dartmouth's Kenneth French, University of Lausanne's Amit Goyal, University of California at Berkeley's Martin Lettau, Yale's Robert Shiller.

Notes: We tested twenty-nine models in four classes (surveys, dividend-discount models, cross-sectional regressions, and time series regressions) over three investment horizons. In this chart, we plot the single best-performing model in each category. We also show how the optimal weighted average (the first principal component) of all models performs.

At face value, this result means that the models are actually helpful in forecasting returns. However, we should keep in mind some of the limitations of our analysis. First, we have not shown confidence intervals or error bars. In practice, those are quite large, so even if we could have earned extra returns by using the models, it may have been solely due to luck. Second, we have selected models that have performed well in the past, so there is some selection bias. And of course, past performance is no guarantee of future performance.

Disclaimer

The views expressed in this post are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. Any errors or omissions are the responsibility of the authors.

NORTHERN TRUST

CAPITAL MARKET ASSUMPTIONS

FIVE-YEAR OUTLOOK
2023 EDITION

Released August 2022

Every year, Northern Trust's Capital Market Assumptions Working Group develops forward-looking, historically aware forecasts for global economic activity and financial market returns that drive our five-year asset class return expectations and inform our asset allocation decisions.

All of this comes together in the form of our long-term strategic asset allocations, which are used by institutional and individual investors worldwide.

Contributors

DAN PHILLIPS, CFA
Director, Asset Allocation Strategy
CMA Working Group Chair

DAN BALLANTINE, CFA
Investment Strategist

RYAN BOYLE
Senior Economist

MARK CARLSON, CFA
Senior Investment Strategist, Fixed Income

COLIN CHEESMAN, CFA
Senior Investment Analyst

MICHAEL DE JUAN
Director, Portfolio Strategy

DAN FARRELL
Director, EMEA Cash Management

CHRIS HUEMMER, CFA
Senior Investment Strategist, Equities

MICHAEL HUNSTAD, PH.D.
Chief Investment Officer, Global Equities

TIM JOHNSON
Head of Portfolio Solutions,
Global Fixed Income

ERIC LEE, CFA
Investment Strategist

ANGELO MANIOUDAKIS
Chief Investment Officer

JIM MCDONALD
Chief Investment Strategist

JULIE MORET
Global Head of Sustainable Investing
and Stewardship

KATIE NIXON, CFA
Chief Investment Officer
Wealth Management

DAN PERSONETTE, CFA
Director, Interest Rate Strategy

BRAD PETERSON, CFA
National Portfolio Advisor
Wealth Management

COLIN ROBERTSON
Co-Head of Fixed Income

CHRIS SHIPLEY
Chief Investment Strategist, North America

WOUTER STURKENBOOM, CFA
Chief Investment Strategist,
EMEA and APAC

THOMAS SWANEY
Chief Investment Officer,
Global Fixed Income

CARL TANNENBAUM
Chief Economist

ERIC WILLIAMS
Director, Credit Strategy

PETER YI, CFA
Director, Cash Management

CAPITAL MARKET ASSUMPTIONS

FIVE-YEAR OUTLOOK: 2023 EDITION

Published August 10, 2022

We expect market returns to drift modestly below long-term historical averages. Lower stock valuations may provide some support, but higher interest rates likely will limit how high valuations can go. Higher yields support bond returns, but we expect flatter global yield curves to cap further gains. Our six key investment themes inform these forecasts.

Six key themes have emerged for our five-year outlook.

1 **SLOW GROWTH TRANSITIONS** — Slow transitions — pandemic to endemic; globalization to regionalization; and fossil fuels to renewables — mean investors must navigate a challenging global economy with high debt and unfavorable demographics. Slow transitions will likely lead to continued slow growth.

2 **INFLATION RECALIBRATION** — Just as investors thought pandemic-related inflation would settle down, the war in Ukraine forced them to recalibrate their inflation assumptions. Automation and digitization still produce powerful disinflationary forces, but they will likely need time to overcome recent supply shocks.

3 **MONETARY DROUGHT** — The monetary flood has evaporated, and the next five years may bring much drier financial conditions. Investors must adjust for higher interest rates in their decision-making and no longer depend on central banks to rescue the economy.

4 **REGIONAL REBUILDING BLOCS** — Countries are rebuilding their economic and military security by limiting their dependence on imports such as energy and technology, especially from political adversaries. Investors will decide whether — or how best — to deglobalize their portfolios accordingly.

5 **GREEN TRANSITION STILL A GO** — Russia's energy battle with Europe triggered a search for other sources — climate-friendly or not. While this may delay the green transition, the focus on national energy security and high fossil fuel prices creates potential investment opportunities for renewable energy.

6 **NOT SO NEGATIVE** — Higher interest rates — including a move out of negative territory for Europe and Japan — bring investors closer to positive real after-inflation cash returns. This is good for economic functioning and savers, but a risk for other investment returns.

2023 FIVE-YEAR ASSET CLASS OUTLOOK

Our five-year themes identify the trends we see affecting the markets and economy over the next five years, providing the foundation for our asset class outlooks.

We expect ***Slow Growth Transitions*** as we go through an ***Inflation Recalibration*** and a ***Monetary Drought*** — certainly when compared to the recent central bank flood. Globalization will likely evolve into ***Regional Rebuilding Blocs*** focused on energy security, but the ***Green Transition is Still a Go***. Lastly, with interest rates ***Not So Negative***, we finally exit a very odd period in economic and market history.

Fixed Income

Bonds, aided by higher yields, may bounce back some from historically high losses, but we expect modest performance. Flat yield curves likely mean dependence on coupon payments, due to little price appreciation. High yield bonds could benefit from higher credit spreads and stable fundamentals.

Equities

Lower valuations provide some support, but higher interest rates likely will cap the upside for valuations. Further, historically high corporate profit margins face deterioration with inflation and a slowing economy. China's COVID-19 struggles increase the likelihood of economic shutdowns, a risk for emerging markets.

Real Assets

With the inflation surge, inflation-sensitive real assets play an increasingly key role in a diversified portfolio. We expect all real assets to perform well over five years, but surging commodity prices because of shortages make natural resources particularly attractive.

Alternatives

Private investments provide premiums over public market counterparts. Hedge funds recently have shown more potential to deliver alpha[1]. The wide return dispersion among strategies means the manager selection process remains paramount.

FIXED INCOME

OUTLOOK: HIGHER RATES AT LAST

We see bond performance, aided by higher yields, bouncing back some from historically high losses, but still we expect modest performance. Flat global yield curves likely mean more dependence on coupon payments and little support from price appreciation.

Interest Rates

While *Inflation Recalibration* and *Monetary Drought* set the stage for short-end rates to move and stay higher, *Slow Growth Transitions* will likely cap longer term rates at fairly low levels by most historical comparisons. U.S. rates in particular should also be capped by demographics and insatiable fixed income demand globally.

Investment Grade Bonds

Over the past 40 years, the five-year annualized U.S. investment grade return has averaged 0.6% higher than the starting-point yield, or the yield at the beginning of the forecast period[2]. This "outperformance" has been driven by generally positive yield curves and the perpetual nature of fixed income indexes, as new higher yielding bonds replace lower yielding maturing bonds. However, with today's flat yield curves, we expect returns to only match yield to maturity.

High Yield Bonds

Default risk shows up most with high yield bonds, where five-year returns have trailed starting-point yields by a historical average of 1.3%[3]. Over the next five years, *Slow Growth Transitions* may act as a headwind. But better index quality, solid interest coverage ratios and reduced issuance may prevent a materially worse outcome. A 2% cut to the June 30 yield of 9.5% results in a 7.5% global high yield forecast.

2.7%

GLOBAL INVESTMENT GRADE BONDS ANNUALIZED RETURN FORECAST

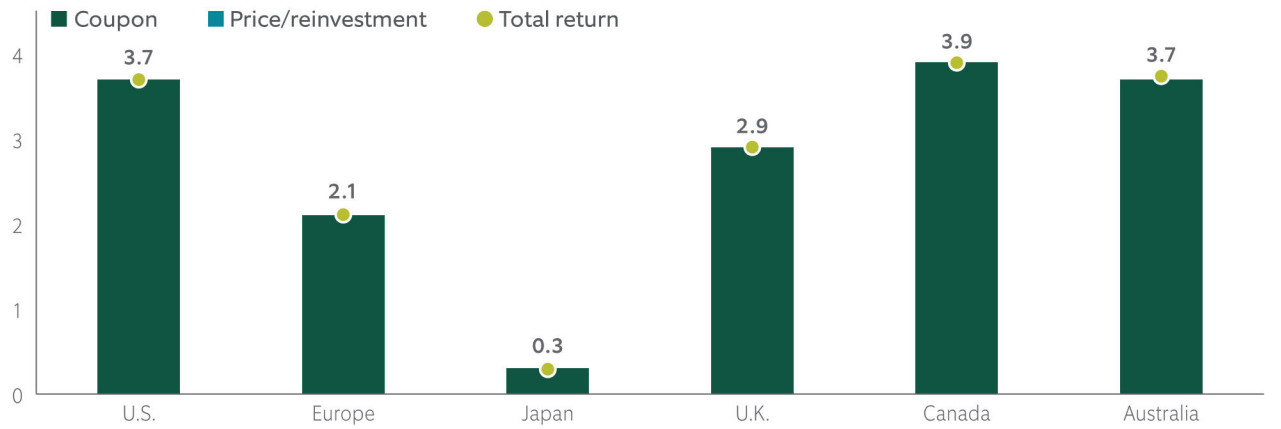
7.5%

GLOBAL HIGH YIELD BONDS ANNUALIZED RETURN FORECAST

CLIPPING COUPONS

Flat yield curves and appropriately priced securities mean we expect returns to match yield to maturity.

Northern Trust Five-Year Annualized Investment Grade Fixed Income Return Forecast by Country (%)



Source: Northern Trust Asset Management, Bloomberg. Coupon return calculated as yield to worst on June 30, 2022.

EQUITIES

OUTLOOK: MID-SINGLE-DIGIT RETURNS

Potentially higher interest rates — which tend to depress valuations — and deteriorating corporate profit margins may work against equities. In emerging markets, China's struggles with COVID-19 increase the risk to economic growth.

Developed Equities

Our five-year annualized forecast for developed market equities is 6.2%, compared to the 8.8% return of the past five years. As for corporate fundamentals that drive the forecast, higher inflation can encourage sales growth, so we expect sales to rise 5.1% on an annualized basis over the next five years versus 4.0% over the last five years. But what matters is the bottom line, and inflation also may increase costs and compress profit margins. Given the increasing likelihood of a more difficult economy, we believe profit margins will deteriorate somewhat to around 11% from the historically high level of 11.8%. Valuations are coming off the highs of recent years, partly because of previous low interest rates. But we still expect valuations to rise to 15 times earnings, above the current level of 14.5, providing some boost to returns.

Emerging Markets Equities

We expect emerging market equities to return 5.8% annualized over the next five years versus 4.7% over the past five years. Economic and financial uncertainties, in particular in China, may keep valuations low at about 11 times forward earnings, though somewhat higher than current valuations to add 1% to the forecasted return. Meanwhile, we see high sales growth of 6.9%, but we think chronic share dilution and profit margin pressures will cut into returns.

6.1%

GLOBAL EQUITIES ANNUALIZED RETURN FORECAST

6.2%

DEVELOPED MARKET EQUITIES ANNUALIZED RETURN FORECAST

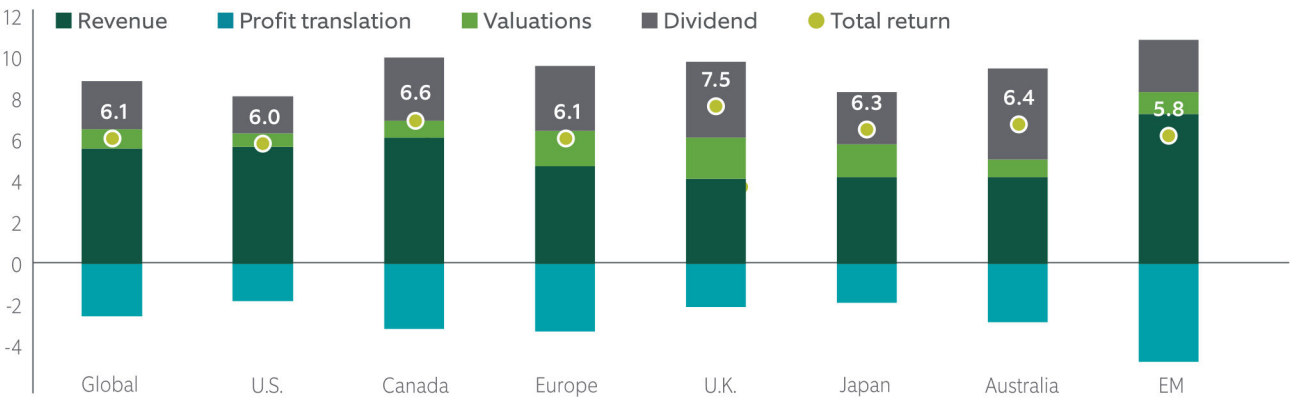
5.8%

EMERGING MARKET EQUITIES ANNUALIZED RETURN FORECAST

FIVE-YEAR FORECASTS ARE LOWER — BUT ACCEPTABLE

We think high profit margins will shrink, but lower valuations will revert higher — allowing decent returns.

Northern Trust Five-Year Annualized Equity Return Forecast by Country (%)



Source: Northern Trust Asset Management. EM is emerging markets.

REAL ASSETS

OUTLOOK: NATURAL RESOURCES ATTRACTIVE

Natural resources can protect against unexpected inflation, while real estate and infrastructure offer additional portfolio diversification and higher yields than traditional equities.

Natural Resources

Supply-chain disruptions *(Inflation Recalibration)* and demand to secure critical resources *(Regional Rebuilding Blocs)* should support commodity prices for years. Further, reduced investment in commodity production has underpinned tight commodity markets for years now. *Green Transition Still a Go* may continue to cap longer term financial incentives for capital investment in "dirty" resources, but it does at least recognize the need for a more inclusive energy strategy.

Global Real Estate

The work-from-home trend and e-commerce have lessened demand for office and retail space. We think developers will repurpose these spaces into buildings such as warehouses, condominiums and apartments, which have higher returns on investment. But repurposing takes time, and rising *Not So Negative* interest rates may drag down advancement on these projects.

Global Listed Infrastructure

Infrastructure's historical ability to limit losses in down markets will likely be valued amid higher volatility. We think elevated commodity prices will provide some support to the energy and utilities sectors. Industrial companies may benefit from the reshuffling of supply chains (*Regional Rebuilding Blocs*). Higher interest rates may weigh on the asset class a bit, but with those higher rates will also come more attractive income yields.

7.3%

NATURAL RESOURCES ANNUALIZED RETURN FORECAST

6.8%

GLOBAL REAL ESTATE ANNUALIZED RETURN FORECAST

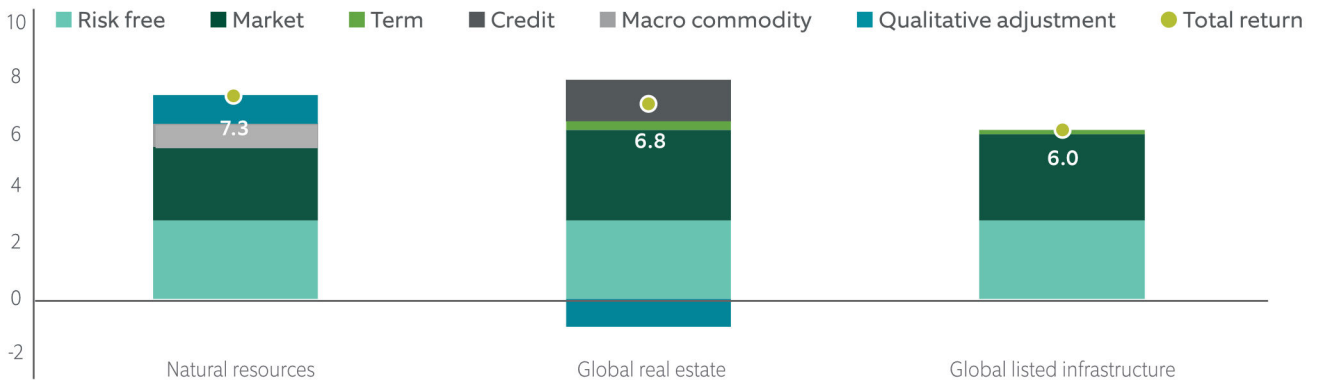
6.0%

GLOBAL LISTED INFRASTRUCTURE ANNUALIZED RETURN FORECAST

DIVERSIFICATION ON DISPLAY

Real assets should shine in a more uncertain and higher inflationary risk regime.

Northern Trust Five-Year Annualized Real Assets Return Forecast (%)



Source: Northern Trust Asset Management, Bloomberg. **Definitions: risk free** - theoretical rate of return of an investment with zero risk, **market** - exposure to global equity movements, **term** - exposure to interest rate movements, **credit** - exposure to default risk, **macro commodity** - exposure to commodity price movements, **qualitative adjustment** - modifications to the quantitative model, specifically relating to natural resources and global real estate.

ALTERNATIVES

OUTLOOK: APPEALING PREMIUMS FOR SOME INVESTORS

Alternatives can enhance portfolio performance and diversification, but through a wide range of strategies with broad performance dispersion. As a result, manager selection is extremely important.

Private Investments

Private equity, broadly speaking, continues to offer material return premiums to equities. A 3.5% return premium, which represents a 2% "haircut" from the historical 5.5% return premium, drives our 9.6% five-year annualized return forecast. The lower premium addresses the modest concerns we have over increasing money flows into private equity to capture potentially reduced investment opportunities. We believe opportunities remain, but the higher price of entry driven by private-equity demand warrants a haircut.

Using a similar approach, we calculate return premiums across private real assets. We assign a 2% premium to our public-equity-based natural resources forecast to arrive at a 9.3% return forecast. Direct real estate also earns a 2% premium (8.8% total return forecast) to public real estate equities, while private infrastructure earns a 3% premium (9.0%) to infrastructure stocks. Private credit data shows historical returns of 2% over high yield bond returns, but adding 2% to our already-elevated high yield forecast is the wrong comparison at the moment. Our 6.5% private credit annualized return forecast is more appropriately compared to our 9.6% private equity forecast.

Hedge Funds

Alpha generation by the decade had been in decline, falling from an annualized 7.1% in the 1990s to 3.0% in the 2000s — and then barely positive in the 2010s. Thus far this decade, hedge funds' alpha has increased to 3.8%. The blend of more alpha and lower return premiums, as cash returns creep higher, has increased hedge funds' potential role in the diversified portfolio for cases where hedge fund investing is appropriate.

9.6%

PRIVATE EQUITY ANNUALIZED RETURN FORECAST

5.4%

HEDGE FUND ANNUALIZED RETURN FORECAST

FOUR PREMIUMS AND A DISCOUNT

Private credit — still an attractive income provider — has a difficult comparison with high yield.

Northern Trust Five-Year Annualized Private Investments Return Forecast (%)

Source: Northern Trust Asset Management, Bloomberg.

DETAILED FIVE-YEAR ASSET CLASS RETURN FORECASTS

All Returns in % Annualized				5-Year Return Forecasts by CMA Year						5-Year Actual Return
		Asset Class	Proxy Index	2023	2022	2021*	2019	2018	2017	
Fixed Income	U.S.	Cash	3-Month U.S. T-Bill	2.8	0.3	0.1	1.1	2.2	1.7	1.1
		Inflation linked	Bloomberg U.S. TIPS	3.4	2.2	2.4	2.6	2.9	3.0	3.2
		Investment grade	Bloomberg U.S. Aggregate	3.7	2.4	2.3	3.0	3.6	3.2	0.9
		High yield	Bloomberg U.S. High Yield	7.4	3.5	5.5	5.0	4.9	4.8	2.1
		Municipal	Bloomberg Municipal	3.2	2.0	2.6	2.4	3.2	3.2	1.5
	Canada	Cash	3-Month Canada T-Bill	3.3	0.2	0.2	0.7	1.6	1.3	1.0
		Inflation linked	FTSE Canada Real Return Bond	3.5	2.0	2.2	2.0	2.3	2.5	0.7
		Investment grade	FTSE Canada Universe	3.9	2.4	1.9	2.6	2.9	2.5	0.2
		High yield	BofAML Canadian High Yield	6.0	3.8	5.2	4.5	4.5	4.5	4.0
	Europe	Cash	3-Month German Bunds	0.3	-0.4	-0.5	-0.3	-0.3	-0.2	-0.7
		Inflation linked	Bloomberg Euro Inf. Linked	2.2	1.0	1.5	1.0	1.2	1.5	2.3
		Investment grade	Bloomberg Euro Aggregate	2.1	1.0	1.0	1.2	1.8	1.5	-0.9
	U.K.	Cash	3-Month Gilts	2.1	0.2	0.1	0.3	0.9	0.5	0.5
		Inflation linked	Bloomberg Inflation Linked Gilt	3.3	1.0	1.3	2.2	1.7	1.6	-0.5
		Investment grade	Bloomberg Sterling Aggregate	2.9	1.5	1.3	2.2	2.5	2.5	-0.6
	Japan	Cash	3-Month JGB	0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2
		Inflation linked	Bloomberg Inflation Linked JGB	0.1	0.2	0.5	0.2	0.5	0.8	0.8
		Investment grade	Bloomberg Japanese Aggregate	0.3	0.2	0.2	0.2	0.5	0.7	-0.3
	Aus.	Cash	3-Month Australia Gov't Bond	3.2	0.3	0.2	0.8	2.5	2.4	1.0
		Investment grade	Bloomberg Australian Composite	3.7	1.5	1.2	2.2	3.5	3.2	0.7
	Global	Inflation linked	Bloomberg Global Inflation Linked	2.9	1.5	1.8	2.0	2.0	2.2	2.5
		Investment grade	Bloomberg Global Aggregate	2.7	1.6	1.6	2.1	2.7	2.2	1.2
		High yield	Bloomberg Global High Yield	7.5	4.0	5.6	4.8	4.6	4.5	0.1
Equities	Developed markets	U.S.	MSCI United States	6.0	4.3	4.7	5.7	5.8	5.9	11.2
		Canada	MSCI Canada	6.6	5.2	4.5	4.5	5.5	6.0	7.5
		Europe	MSCI Europe ex U.K.	6.1	4.7	5.4	6.0	6.3	7.2	4.5
		U.K.	MSCI United Kingdom	7.5	6.2	5.6	7.4	6.3	6.6	3.7
		Japan	MSCI Japan	6.3	4.1	3.8	4.5	6.0	6.0	6.1
		Australia	MSCI Australia	6.4	4.7	5.8	5.7	7.7	7.7	7.0
	Agg.	Developed markets	MSCI World	6.2	4.5	4.8	5.7	6.0	6.4	8.8
		Emerging markets	MSCI Emerging Markets	5.8	5.3	5.4	6.1	8.3	8.4	4.7
		Global equities	MSCI All Country World	6.1	4.6	4.9	5.8	6.2	6.9	8.3
Real	Global	Natural resources	S&P Global Natural Resources	7.3	5.0	3.6	6.1	7.2	7.4	8.9
		Listed real estate	MSCI ACWI IMI Core Real Estate	6.8	5.1	6.3	6.3	6.0	6.1	2.5
		Listed infrastructure	S&P Global Infrastructure	6.0	5.5	5.8	5.8	5.4	5.8	4.8
Alts		Private equity	Cambridge Global Private Equity	9.6	7.6	7.9	7.7	8.0	8.4	N/A
		Private credit	Cambridge Global Private Credit	6.5	6.0	7.6	6.8	6.6	6.5	N/A
		Hedge funds	HFRI Fund Weighted Comp	5.4	2.9	2.6	3.7	4.3	4.4	5.7

*Naming convention of five-year outlook was changed to the forward year, so the 2021 edition was published in 2020. For each CMA edition, the five-year forecast period is as follows in parentheses: 2023 (June 2022-June 2027), 2022 (June 2021-June 2026), 2021 (June 2020-June 2025), 2019 (June 2019-June 2024), 2018 (June 2018-June 2023), 2017 (June 2017-June 2022). Forecasts listed here represent total return forecasts for primary asset classes, annualized using geometric averages. Forecasted returns are based on estimates and reflect subjective judgments and assumptions. They are not necessarily indicative of future performance, which could differ substantially. Five-year actual returns are listed in local currency (with the exception of real assets, which are in USD) and annualized for the five-year period ending 6/30/2022. Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. Past performance is no guarantee of future results.

ABOUT NORTHERN TRUST

Principles that Endure

Through our expertise and dedication, we transform the plans of the world's most successful individuals, families and institutions into action to help our clients reach their most ambitious goals. Spanning decades and generations, our longevity comes from the recognition that we are more than a financial institution. We are active participants in our communities, global leaders in business and philanthropy and thoughtful architects of innovative employee benefit and support programs.

Founded in Chicago in 1889, Northern Trust has a global presence with offices in 23 U.S. states and Washington, D.C., and across 23 locations in Canada, Europe, the Middle East and the Asia-Pacific region. As of June 30, 2022, Northern Trust had assets under custody/administration of US $13.7 trillion, and assets under management of US $1.3 trillion. For more than 130 years, Northern Trust has earned distinction as an industry leader for exceptional service, financial expertise, integrity and innovation.

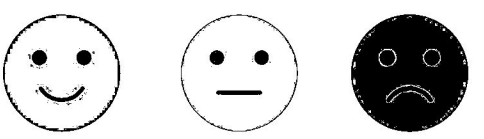
Explore Our Full Five-Year Outlook

Explore our long-term asset class return expectations and forecasts at **capitalmarketassumptions.com.** Visit today to:

- Gain valuable insights from our investment experts
- Get exclusive access to our full research paper
- Explore our detailed return/risk and correlation matrix

NORTHERN TRUST

How helpful was this paper?



northerntrust.com

[1] Alpha is risk-adjusted outperformance

[2] Source: Bloomberg, based on data from March 1976 to June 2022

[3] Source: Bloomberg, based on data from January 1990 to June 2022

P-083022-2383828-083023

nuveen
A TIAA Company

Capital market assumptions

Nuveen's Target Date Multi-Asset Team generates a series of capital market assumptions (CMAs) for each major asset and sub-asset class, including expected returns, expected volatility and cross asset-class correlations. These assumptions are based on our capital market premia framework. This framework combines the near-term investment views of Asset Allocation Committee and Nuveen's Global Investment Committee (GIC) with the team's longer-term views on the economy and financial markets, as well as industry consensus and survey data. Importantly, the framework maintains cross-asset relationships that are consistent with historical financial market relationships (e.g inflation, bond yield, earnings yield, risk premia, earnings growth and earnings payout ratio).

Due to the range of investment objectives of our clients, the team produces return estimates for various time horizons, including one-year, five-years, 10-years, extending to 75-years. Exhibit 1 shows the 10-year returns and volatility estimates for approximately 25 asset classes as of 31 Dec 2022.

Exhibit 1: 10-year asset class returns and volatility estimates (as of 31 Dec 2022)

Asset class	10-year estimated total return (%)	10-year estimated volatility (%)
Cash	3.48	0.33
2-Year Govt Bond	3.87	1.79
10-Year Govt Bond	3.89	7.33
30 Year Govt Bond	3.71	14.37
Short Term Bond	4.11	1.67
U.S. Bond	4.67	5.10
Inflation-linked Bond	4.23	4.97
Corporate IG Bond	5.39	6.94
High Yield (BB-B) Bond	7.06	8.23
Corporate HY Bond	6.99	8.70
Muni Bond	3.58	5.41
Preferred	6.53	13.16
Leveraged Loan	6.89	7.42
International Agg Bond	4.88	4.21
Emerging Market debt	7.55	9.43
U.S. Equity	6.96	15.95
International Equity	7.94	17.72
Emerging Market Equity	8.85	21.21
Real Estate	4.96	7.44
U.S. LC Growth	7.04	17.67
U.S. LC Value	6.82	15.23
U.S. Small Cap	7.44	20.12
Canada Equity	7.36	20.35
Intl Small Cap	8.36	18.61
U.S. REIT	4.56	17.89

METHODOLOGY OF CAPITAL MARKET ASSUMPTIONS

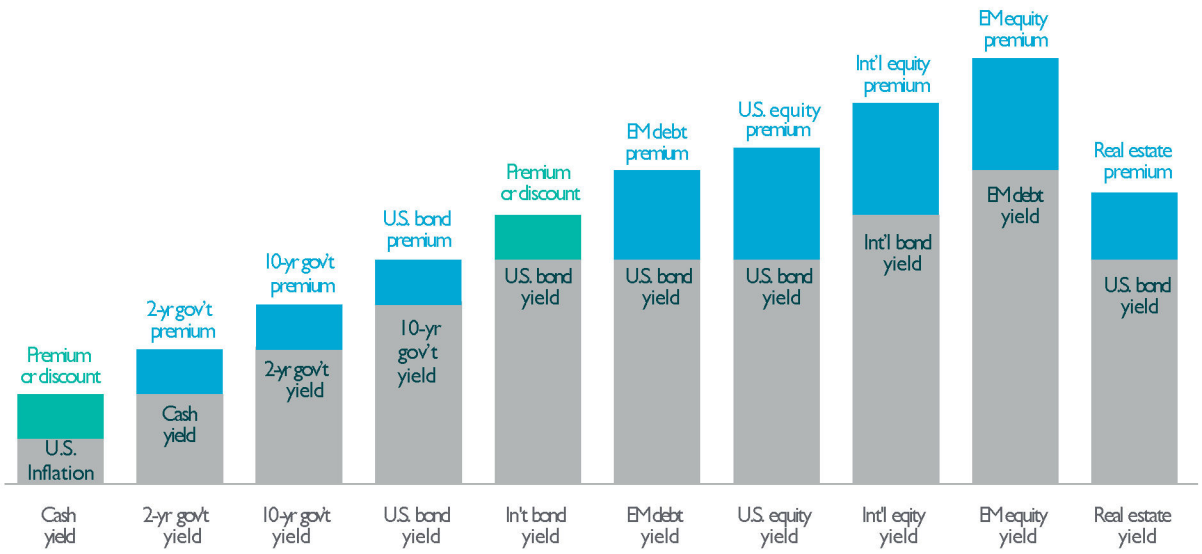
Drawing upon the Nuveen Global Investment Committee's quarterly investment outlook and asset class views as key inputs, the Target Date Multi-Asset Team assesses cross-asset risk-adjusted return potential for the next 12 months. These forward-looking views help drive near-term (one-year) CMAs, as well as tactical positioning within diversified portfolios designed for various client outcomes.

Beyond the one-year CMAs, the Target Date Multi-Asset Team utilizes a building block approach in developing its CMAs, taking into consideration current and historical yields and risk premia of the various asset classes. This building block/premium approach allows for all asset classes to be analyzed under a consistent framework which utilizes assumptions that are aligned with time-tested financial market theory (e.g. long-term equity forward earnings yield should be higher than long-term bond yields).

Premia and yields

The fundamental elements in the process are the premia (or discounts) of assets, defined as the "excess yield" needed to compensate an investor for taking on the additional perceived risk of that asset class. Exhibit 2 below illustrates the relationship between premia and yields. For example, cash premium (or discount) is defined as the differential between cash yield and inflation; short term bond premium is measured as the differential between short-term bond yield and 2-year government yield; and premium of emerging market equity (EM Equity) is defined as the difference between emerging market equity forward earnings yield and emerging market debt yield, etc.

Exhibit 2: illustrative example of the relationship between premia and yields



As noted earlier, the premia and yields are determined by combining Asset Allocation Committee and Nuveen GIC market views for the forward one-year period with analysis of longer-term consensus and industry survey investment views. The team sets short-term valuation targets for the various asset classes. Inputs for fixed income return estimates include inflation, yields, spreads, duration and default/recovery rate, while earnings yield, earnings growth and payout ratios are used for equity return estimates.

For longer-term periods, the premium of each asset is assumed to follow a mean-reversion process, in which the premium moves from the short-term valuation target towards the long-term estimated target. By analyzing the longest historical monthly data stream available for each asset class, we determine the long-term average risk premia for each asset class, as well as establish the length of time typically taken for that risk premia to revert back to its mean. Each asset class has its own distinct reversion rate (pace at which premia tends to move back to long-term equilibrium).

Once we determine the path of all asset premia, their yields between the near-term and the long-term can be derived from the calculated premia. For any period, fixed income asset returns are computed based off yield data, while equity and real estate returns are computed based on earnings yield and earnings growth data.

Volatility and correlation

In addition to our expected return estimates, our process generates expected volatility and correlations among assets. The forecasted volatility and correlations among assets are based on historical data for assets from 1995, with more emphasis on the past few years. The most recent estimates are shown in Exhibit 4.

Exhibit 3: asset class benchmarks

Categories	Benchmark
Cash (T-bill)	IA SBBI US 30 Day TBill
2-year government bond	2 Year Government Bond
10-year government bond	10 Year Government Bond
30-year government bond	30 Year Government Bond
U.S. Corporate bond - IG	Bloomberg Investment Grade Corporate Index
Short-term bond	Bloomberg U.S. 1-3 Year Government/Credit Index
U.S. bond	Bloomberg U.S. Aggregate Bond Index
Inflation-linked bond	Bloomberg U.S. Treasury Inflation Notes 1-10Y Index
High yield bond (BB-B)	ICE BofA BB-B U.S. Cash Pay High Yield Constrained Index
High yield bond	Bloomberg U.S. High Yield Corporate Index
Muni bond	Bloomberg Municipal Bond Index
Preferred	ICE BofA Fixed Rate Preferred Security Index
Leveraged loans	S&P/LSTA Leveraged Loan 100 Index
Non-U.S. bond	Bloomberg Global Aggregate ex-USD Index
Emerging market debt	JP Morgan EMBI Global Diversified Index
U.S. equity	Russell 3000 Index
Developed non-U.S. equity	MSCI EAFE Index
Emerging market equity	MSCI Emerging Markets Index
Real estate	NCREIF Property Index - Open End Funds
U.S. REIT	S&P U.S. REIT Index
Canada equity	MSCI Canada Index
Int'l small	MSCI ACWI Ex USA Small Index

Exhibit 4: correlation estimates as of 31 Dec 2022

	Cash	2-Year Govt Bond	10-Year Govt Bond	30-Year Govt Bond	Short-Term Bond	U.S. Bond	Inflation-linked Bond	Corporate IG Bond	High Yield (BB-B) Bond	Corporate HY Bond	Muni Bond	Preferred	Leveraged Loan	International Agg Bond	Emerging Market debt	U.S. Equity	International Equity	Emerging Market Equity	Real Estate	U.S. LC Growth	U.S. LC Value	U.S. Small Cap	Canada Equity	Intl Small Cap	U.S. REIT
Cash	1.00																								
2-Year Govt Bond	0.15	1.00																							
10-Year Govt Bond	-0.01	0.80	1.00																						
30-Year Govt Bond	0.02	0.62	0.91	1.00																					
Short-Term Bond	0.13	0.96	0.77	0.58	1.00																				
U.S. Bond	0.00	0.83	0.92	0.78	0.88	1.00																			
Inflation-linked Bond	0.11	0.40	0.31	0.26	0.40	0.37	1.00																		
Corporate IG Bond	-0.08	0.45	0.55	0.44	0.66	0.75	0.21	1.00																	
High Yield (BB-B) Bond	-0.05	0.02	0.04	-0.06	0.25	0.31	0.13	0.71	1.00																
Corporate HY Bond	-0.05	-0.03	-0.02	-0.11	0.20	0.26	0.13	0.67	0.98	1.00															
Muni Bond	-0.05	0.50	0.59	0.47	0.60	0.68	0.27	0.67	0.42	0.39	1.00														
Preferred	-0.03	0.12	0.15	0.10	0.25	0.33	0.12	0.48	0.52	0.54	0.35	1.00													
Leveraged Loan	-0.05	-0.14	-0.17	-0.23	0.06	0.05	0.17	0.51	0.75	0.76	0.22	0.24	1.00												
International Agg Bond	-0.04	0.71	0.79	0.66	0.74	0.82	0.38	0.59	0.22	0.18	0.67	0.28	0.06	1.00											
Emerging Market debt	-0.06	0.20	0.30	0.21	0.39	0.50	0.18	0.78	0.77	0.75	0.56	0.48	0.58	0.42	1.00										
U.S. Equity	-0.04	-0.19	-0.21	-0.24	-0.02	0.01	-0.01	0.39	0.70	0.71	0.14	0.56	0.45	-0.03	0.56	1.00									
International Equity	-0.06	-0.18	-0.21	-0.25	0.00	0.03	-0.06	0.43	0.69	0.70	0.14	0.48	0.46	-0.08	0.61	0.86	1.00								
Emerging Market Equity	-0.05	-0.17	-0.18	-0.22	0.01	0.05	-0.01	0.43	0.64	0.66	0.13	0.44	0.49	-0.09	0.62	0.73	0.85	1.00							
Real Estate	0.16	-0.02	-0.04	-0.04	-0.09	-0.13	0.17	-0.19	-0.16	-0.15	-0.09	-0.11	-0.11	-0.07	-0.11	-0.05	-0.03	-0.05	1.00						
U.S. LC Growth	-0.04	-0.18	-0.20	-0.24	-0.02	0.01	-0.01	0.38	0.68	0.68	0.14	0.54	0.43	-0.03	0.54	0.97	0.83	0.70	-0.05	1.00					
U.S. LC Value	-0.04	-0.18	-0.20	-0.23	-0.02	0.01	-0.01	0.37	0.67	0.67	0.14	0.53	0.42	-0.03	0.53	0.95	0.81	0.69	-0.05	0.92	1.00				
U.S. Small Cap	-0.04	-0.17	-0.18	-0.22	-0.02	0.01	-0.01	0.35	0.63	0.63	0.13	0.50	0.40	-0.03	0.50	0.89	0.77	0.65	-0.05	0.86	0.85	1.00			
Canada Equity	-0.03	-0.17	-0.22	-0.26	-0.01	0.01	0.02	0.37	0.64	0.64	0.10	0.44	0.46	-0.08	0.55	0.82	0.81	0.80	-0.03	0.79	0.78	0.73	1.00		
Intl Small Cap	-0.05	-0.17	-0.19	-0.23	0.01	0.04	-0.04	0.42	0.66	0.67	0.13	0.46	0.46	-0.08	0.60	0.79	0.93	0.88	-0.04	0.77	0.75	0.71	0.79	1.00	
U.S. REIT	-0.04	-0.15	-0.05	-0.05	0.00	0.11	0.08	0.40	0.65	0.68	0.19	0.47	0.46	0.06	0.56	0.72	0.65	0.55	0.01	0.70	0.69	0.65	0.59	0.60	1.00

For more information, please visit nuveen.com/retirement

nuveen
A TIAA Company

GGN-2633693CR-Q1222P 235612

The Relation Between Analysts' Forecasts of Long-Term Earnings Growth and Stock Price Performance Following Equity Offerings

by

PATRICIA M. DECHOW
University of Michigan Business School
Ann Arbor, MI 48109-1234

AMY P. HUTTON
Harvard Business School, Harvard University
Boston, MA 02163

and

RICHARD G. SLOAN[*]
University of Michigan Business School
Ann Arbor, MI 48109-1234

First Version: July, 1996
This Version: June, 1999

---

[*] We thank Chris Allen, Sarah Eriksen and Sarah Woolverton for their research assistance. We are grateful for the comments and suggestions of two anonymous referees, S.P. Kothari (the discussant), Gordon Richardson (the editor), and participants of the 1998 Contemporary Accounting Research Conference. We also are grateful for the comments of participants in the summer research colloquiums at Harvard University and Stanford University and workshops at the University of California at Berkeley, Emory University, the University of Georgia, the University of Illinois at Urbana-Champaign, the University of Michigan, University of North Carolina at Chapel Hill, Washington University, and University of Waterloo. We thank I/B/E/S/ for providing earnings forecast data.

The Relation Between Analysts' Forecasts of Long-Term Earnings Growth and Stock Price Performance Following Equity Offerings

Abstract

We evaluate the role of sell-side analysts' long-term earnings growth forecasts in the pricing of common equity offerings. We find that, in general, sell-side analysts' long-term growth forecasts are systematically overly optimistic around equity offerings and that analysts employed by the lead managers of the offerings make the most optimistic growth forecasts. Additionally, we find a positive relation between the fees paid to the affiliated analysts' employers and the level of the affiliated analysts' growth forecasts. We also document that the post-offering under performance is most pronounced for firms with the highest growth forecasts made by affiliated analysts. Finally, we demonstrate that the post-offering under performance disappears once we control for the over optimism in earnings growth expectations. Thus, the evidence presented in this paper is consistent with the 'equity issue puzzle' arising from overly optimistic earnings growth expectations held at the time of the offerings.

I. INTRODUCTION

This paper evaluates the role of sell-side analysts' long-term earnings growth forecasts in the pricing of common equity offerings. While it is well documented that firms experience unusually low stock returns in the five years following equity offerings (Loughran and Ritter 1995 and Spiess and Affleck-Graves 1995), the reason for this under performance is not well understood. Competing explanations include mismeasured risk-premia, research design biases, and overly optimistic expectations about future firm performance.[1] In this paper we examine the overly optimistic expectations explanation for the 'equity issue puzzle.' We investigate whether sell-side analysts' long-term growth forecasts are overly optimistic at the time of equity offerings and whether these overly optimistic expectations are reflected in stock prices. We also investigate whether the over optimism in analysts' forecasts and the corresponding overpricing of equity offerings is greatest for offers covered by analysts affiliated with the lead investment bank underwriting the offering.

The concern that sell-side analysts compromise their objectivity and independence in order to win investment-banking business is often discussed in the financial press.[2] This concern arises because analysts' employers, the investment banks, provide both brokerage services to investor clients and underwriting services to client firms. A conflict of interests arises when an analyst issues a negative recommendation for a stock that is simultaneously being solicited for underwriting business. This conflict of interest is

---

[1]Brav and Gompers (1997), Barber and Lyon (1997) and Kothari and Warner (1997) discuss potential problems with measurement of risk premia and stock returns. Loughran and Ritter (1997) provide evidence suggesting that pricing multiples around the equity offerings are consistent with investors having overly optimistic expectations about future profitability.

[2]Examples include: "Who is pulling the strings?" by M. Celarier, *Euromoney*, April 1996; "Today's analyst often wears two hats," by R Lowenstein, *Wall Street Journal*, May 2, 1996; "Some analysts enter land of big bucks," by M. Baker, *Wall Street Journal*, July 2, 1996; and "Today, delivering good news is a way to ensure good business relationships," by M. Siconolfi, *Wall Street Journal*, May 18, 1998.

intensified by the fact that analysts earn large bonuses for bringing investment banking clients to his or her firm.[3]

Demonstrating the pressures on analysts, the *Wall Street Journal* has reported several alleged incidents of top executives withholding underwriting business from investment banks whose analysts reduce earnings forecasts or downgrade their firms' stock ratings. Most recently on March 23, 1999, the *Wall Street Journal* reported that after an analyst at Salomon Smith Barney, Colin Devine, cut his target price for Conseco from 36 to 32 and downgraded his rating of its stock from 'outperform' to 'neutral,'

> … people close to Salomon say Mr Hilbert [*CEO of Conseco*] called the head of research at Salomon to complain, and said Conseco would withhold business unless Mr Devine recanted. … Last year, Salomon was lead or co-manager on more than $7 billion of Conseco … securities. Salomon didn't participate in Conseco's two offerings this year, and won't be in on the next one, Conseco confirms.[4]

This conflict of interest has potentially costly consequences for investors purchasing underwritten securities.[5] For example, *Fortune Magazine* blames the rise and fall in Boston Chicken's stock price not on management's failure to disclose losses at the franchises, but rather on the aggressive pushing of the stock by the brokerage firms who underwrote Boston Chicken's many security offerings:

> Truth be told, the trouble is less with Boston Chicken and more with the folks who pushed its stock in spite of the warnings. Those red flags, for instance, didn't prevent analysts from Merrill Lynch, Alex Brown, and Morgan Stanley—Boston Chicken's recent underwriters—from strongly recommending the stock. Indeed, even as the share plunged in April [*1997*] amid reports of slowing sales, these three firms pushed through a mammoth $287.5 million bond offering.[6]

---

[3] See "Some analysts enter land of big bucks," by M. Baker, *Wall Street Journal*, July 2, 1996, page C1.

[4] "Are there cracks in Conseco's house of acquisitions?" by S.J. Paltrow, *Wall Street Journal*, March 23, 1999, page C1.

[5] See also "Wild week for PIA Merchandising includes plummeting stock price, duel of underwriters," by E.S. Browning, *Wall Street Journal*, May 30, 1996, page C2.

[6] "The Boston Chicken Problem - The restaurant chain's rise and fall has been breathtaking. Who is to blame for the mess? Try all those brokerage firms that have been flacking the chichen peddler's puffed-up stock – even as problems mounted," by N. D. Schwartz, *Fortune*, July 7, 1997.

The objective of our research is to provide empirical evidence on whether analyst affiliation affects forecast optimism and in turn whether analysts' optimism is reflected in the stock prices of firms issuing equity. We focus our analysis on analysts' long-term earnings growth forecasts and directly relate the over optimism in these forecasts to the post-offering under performance, the 'equity issue puzzle.'

Compared to buy/sell recommendations and annual earnings forecasts, long-term growth forecasts provide a more powerful measure of market expectations useful for explaining the post-offering under performance. Since stock recommendations fall into only five categories, their ability to explain cross-sectional variation in post-offering returns is limited. The use of annual earnings forecasts as a measure of expectations is also limited because the long-run under performance in stock prices does not begin until several (usually six) months after the offerings and then continues for up to five years (see Loughran and Ritter 1995). Revisions in expectations about currently reported annual earnings are therefore not likely to explain the long-run under performance. The use of long-term growth forecasts also increases the power of our tests since analysts are frequently evaluated on the accuracy of their buy/sell recommendations and annual earnings forecasts, but not their long-term growth forecasts.[7] Thus, reputation effects are less likely to deter analysts from issuing overly optimistic long-term earnings growth forecasts. Finally, recent evidence in Stickel (1998) and Bradshaw (1999) indicate that forecast of long-term growth is an important factor in formulating the recommendation made by analysts. Thus, long-term growth is a number that is followed and used by the investment community.

The evidence presented in this paper is consistent with analysts biasing their forecasts of firms' long-term earnings growth around new equity offerings. The over-optimism in

[7]For example, the *Institutional Investor's* evaluation criteria for ranking analysts for their All-American Research Team specifically mentions short-term price performance and annual earnings forecast accuracy. Long-term growth forecast accuracy is not listed as a criteria (see, Stickel 1992).

these forecasts is most pronounced when the forecasting analyst is affiliated with the lead manager underwriting the offering. Additionally, the level of the growth forecast is positively related to the fees paid to the affiliated analysts' employers. We also document that the post-offering under performance is most pronounced for firms with the highest growth forecasts made by affiliated analysts. Our empirical tests demonstrate that once we control for the over optimism in earnings growth expectations the unusually low post-offering returns disappear. Thus, one interpretation of the evidence is that the 'equity issue puzzle' results from investors' naive reliance on overly optimistic long-term earnings growth forecasts made by analysts at the time of the equity offerings.[8]

The paper proceeds in five sections. The next section discusses existing research. The third section develops our empirical predictions. The fourth section describes our sample and data. The fifth section presents the results and the sixth section provides our conclusions.

II. EXISTING RESEARCH

Prior and concurrent research investigates various aspects of analysts' optimism around equity offerings. This research can be partitioned into research focusing on short-term forecasts, research investigating long-term forecasts and recommendations, research investigating analyst affiliation, and research investigating the stock market response to analysts' forecasts. Below we briefly describe the existing research and our contribution to this literature.

Existing research provides no evidence that analysts' near-term (annual) earnings forecasts are more optimistic around equity offerings, initial or seasoned. Hansen and

[8]Recent research demonstrates that managers manipulate earnings upward around new equity offerings [see Teoh, Welch and Wong (1998) and Rangan (1998)]. This research suggests that managers play a role in facilitating the markets' (and analysts') overly optimistic growth expectations around equity offerings. However, the large negative forecast errors (documented below) indicate that analysts are unable or unwilling to undo the manipulation of expectations by managers.

Sarin (1996) document that in general analysts' annual forecast errors around initial and seasoned equity offerings are not different than their forecast errors at other times [see also Ali (1996)]. They also find no difference in the near-term forecasts of affiliated and unaffiliated analysts [see also Lin and McNichols (1998a) who confirm these results].[9] Hansen and Sarin conclude that analysts are disciplined by reputation forces and consequently forecast credibly around equity offerings.

Noting that studies focusing solely on near-term earnings forecasts cannot resolve the question of whether concern for reputation is sufficient to offset pressures from investment banking relationships, Lin and McNichols (1998a) include an examination of analysts' long-term growth forecasts and stock recommendations. They document that affiliated analysts issue more optimistic long-term growth forecasts and stock recommendations than unaffiliated analysts around seasoned equity offerings. Michaely and Womack (1996) and Lin and McNichols (1998b) provide similar evidence for initial public offerings. Finally, without distinguishing between affiliated and unaffiliated analysts, Rajan and Servaes (1997) also document over optimism in analysts' long-term growth forecasts around initial public offerings (IPOs) and find that the firms with the highest projected growth experience the greatest post-IPO under performance. However, Rajan and Servaes do not attempt to explain the post-IPO under performance with the over optimism in analysts' growth forecasts.

Existing evidence on the effects of analysts' forecasts on the pricing of equities is indirect and mixed. Several papers document that stock prices react to the release of analysts' forecasts and stock recommendations, including Lin and McNichols and Michaely and Womack, who find a significant difference in the stock price reaction to affiliated versus unaffiliated analysts' recommendations around equity offerings. On the other hand, when

[9]Only Dugar and Nathan (1995) provide evidence that investment-banking affiliation affects the level of optimism in analysts' annual earnings forecasts. However, Dugar and Nathan's examination is not conditioned on an equity offering.

the examination is not conditioned on an equity offering, Dugar and Nathan (1995) find no significant difference in the stock price reactions to investment banking and non-investment banking analysts' stock recommendations. However, Dugar and Nathan present evidence consistent with the hypothesis that investors rely less on investment banking analysts' forecasts in forming their annual earnings expectations. In particular, they find that the strength of the relation between analysts' forecast errors and abnormal returns cumulated from the release of analysts' research reports to the next earnings announcement is stronger for non-investment banking analysts.

Overall the existing evidence is mixed and indirect regarding the extent to which investors rely on analysts' forecasts in forming the earnings expectations reflected in stock prices. None of the existing research directly links the over-optimism in analysts' forecasts around equity offerings to the post-offering under performance. Our contribution is providing a direct link. In addition, we also provide evidence that the over-optimism in analysts' long-term growth forecasts and corresponding overpricing of equity offerings is greatest for high growth firms covered by affiliated analysts. Finally, we are the first (to our knowledge) to document a systematic, positive relation between the magnitudes of affiliated analysts' growth forecasts and the underwriting fees paid to their employers.

III. HYPOTHESIS DEVELOPMENT

Below, we first discuss our predictions concerning analysts' earnings growth forecast errors and the biases in these forecasts. We then develop hypotheses concerning the possible ways in which the stock market incorporates information about these biases into stock prices.

Analysts' Forecast Errors

Previous research indicates that analysts tend to be overly optimistic in their forecasts of firms' earnings prospects (Abarbanell 1991; Brown, Foster, and Noreen 1985). The financial press suggests that the objectivity and independence of the analyst community steadily eroded during the 1980s because analysts abandoned primary research as a result of declining commission fees to pursue investment banking fees. The pursuit of investment banking fees gives analysts incentives to provide overly optimistic forecasts for firms with whom they have or wish to have underwriting relationships.

> When commissions on stock trading fell, investment research (which generated trading) no longer paid the freight. Today, analysts are supported partly by their corporate finance departments. And much of what they do -- marketing and preparing IPOs, for instance -- has little to do with pure research, and much to do with investment banking. In the U.S. in particular, investment banks have persuaded clients to hire underwriters on the basis of their analysts' selling power. ... In turn, the analyst's worth is increasingly dependent on his or her ability to bring in deals.[10]
>
> Of course, some money managers grumble that big emphasis on new-issue fees taints research results if the analysts try to avoid saying anything negative about their underwriting clients. [11]

In this paper we hypothesize that sell-side analysts, in general, provide overly optimistic forecasts of issuing firms' long-term earnings growth in order to attract and retain underwriting business. In other words, we hypothesize that α_0 is less than zero in the following equation:

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1} \quad (1)$$

The dependent variable, FE_{t+1}, is the analysts' forecast error, measured as realized long-term growth in earnings minus the analysts' forecast of long-term growth in earnings. Further, we hypothesize that analysts employed by the investment bank acting as the lead underwriter of the offering have even stronger incentives to make overly optimistic forecasts to lowering the offering firm's cost of capital. Alternatively, managers of the

[10] "Today's analyst often wears two hats," by R Lowenstein, *Wall Street Journal*, C1, May 2, 1996.

[11] "Some analysts enter land of big bucks," by M. Baker, *Wall Street Journal*, C1, July 2, 1996..

issuing firms may systematically select as their lead underwriter the investment bank employing the most optimistic analysts. Either way, we expect analysts employed by the lead underwriter to have the most optimistic forecasts. We refer to such analysts as affiliated and predict that α_0 will be more negative for these analysts.

Prior empirical evidence demonstrates that the optimism in analysts' long-term growth forecasts is increasing in the level of forecast growth [see Dechow and Sloan (1997), La Porta (1996), and Rajan and Servaes (1997)]. Firms receiving the highest long-term earnings growth forecasts, on average, also have larger forecast errors. Thus, the upward bias in analysts' forecasts appears to be driven primarily by the high growth forecasts given to the so-called 'glamour' stocks.[12] Following Dechow and Sloan, we model this phenomenon using a simple linear form:

$$FE_{t+1} = \alpha_0 + \alpha_1 Growth_{t+1} + \varepsilon_{t+1} \qquad (2)$$

where $Growth_{t+1}$ is the analysts' forecasts of long-term earnings growth, and empirically, $1 < \alpha_1 < 0$.[13]

Use of this more detailed model of analysts' forecast errors, enables us to capture more of the predictable variation in the forecast errors. This, in turn, allows us to conduct more powerful tests of our stock price hypotheses, developed below. Equation (2) can also be used to investigate the nature of the incremental bias in affiliated analysts' long-term earnings growth forecasts. If the bias in affiliated analysts' long-term growth forecasts is unrelated to the level of forecast growth, then α_0 will be more negative for the affiliated analysts than for the unaffiliated analysts, and α_1 will be the same for the two groups.

---

[12]Labeling these firms 'glamour' stocks, Lakonishok, Shleifer and Vishny (1994) argue that investors over-estimate the future profitability of high growth potential firms.

[13]This regression is identical to regressing realized growth on forecast growth. We use the specification in equation (2) to focus attention on analysts' forecast errors, which we use as our measure of unexpected earnings growth in the stock price tests developed below.

However, if the incremental bias in the affiliated analysts' forecasts is related to the level of forecast growth, then α_1 will be more negative for the affiliated analysts than for the unaffiliated analysts.

Finally, if analysts' overly optimistic forecasts are motivated by their desire to generate underwriting business, then we expect their forecasts of long-term earnings growth to be positively related to the fees paid to their employers, the lead managers underwriting the equity offerings. Thus, we hypothesize that after controlling for realized growth in earnings, the level of affiliated analysts' growth forecasts is higher the greater the fee basis paid to their employers. We also expect analysts' over optimism to be positively related to the fees paid to their employers.

Stock Prices

We develop predictions concerning stock price behavior under two competing hypotheses: 1) the efficient market hypothesis and 2) a naïve expectations hypothesis. Under both hypotheses, investors use information in analysts' long-term earnings growth forecasts to form expectations of future dividends. The competing hypotheses differ with respect to *how* investors use information in analysts' forecasts to form their expectations of future dividends. Under the efficient market hypothesis, investors fully anticipate, and therefore stock prices fully reflect, the predictable bias in analysts' long-term earnings growth forecasts. Under the second hypothesis, investors naively rely on analysts' long-term growth forecasts, neglecting to adjust for the predictable bias in these forecasts when forming their expectations of future dividends. Thus, under the second hypothesis, stock prices fail to reflect the predictable bias in analysts' long-term growth forecasts.

Following Collins, Kothari, Shanken and Sloan (1994), a simple model for testing these competing hypotheses is obtained within the framework of Campbell (1991). Campbell shows that using the traditional dividend discounting valuation model, abnormal stock

returns can be approximated as a linear function of the unexpected growth in current dividends and the change in the expected growth of future dividends. By further invoking the common assumption that revisions in dividend expectations are correlated with revisions in earnings expectations, we can express abnormal returns as a linear function of unexpected growth in earnings:[14]

$$AR_{t+1} = \beta_1(\varepsilon_{t+1}^{*}) + \upsilon_{t+1} \quad (3)$$

The dependent variable, AR_{t+1}, measures the abnormal stock return in the five years following the equity offering. ε_{t+1}^{*} represents the market's assessment of the unexpected earnings growth in the five years following the equity offering. Finally, β_1 represents the valuation multiplier the market applies to unexpected earnings growth.[15]

Substituting the unexpected earnings growth implied by the model of analysts' forecast errors in equation (1) for ε_t^{*} in equation (3) gives:

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^{*}] + \upsilon_{t+1} \quad (4)$$

In this equation, α_0^{*} represents the market's assessment of the average bias in analysts' long-term growth forecasts. The efficient market hypothesis predicts that α_0^{*} will correspond to its counterpart in the equation (1), α_0. In other words, investors'

---

[14] Note that our empirical tests do not involve specific predictions about the magnitude of the response coefficient, β_1. Instead, our tests simply require that abnormal returns are positively associated with unexpected earnings growth. Given this positive relation, we test whether the abnormal stock returns following an equity offering: (1) rationally respond to the unpredictable portion of the deviation between realized growth and analysts' growth forecast, $FE_{t+1} - \alpha_0$ or (2) naively respond to the total deviation between realized growth and analysts' growth forecasts, FE_{t+1}.

[15] In Campbell's model, the theoretical value of β_1 is one. Because we regress five-year returns on annualized growth rates, the theoretical value of β_1 in our specification is five. However, we expect β_1 to deviate from its theoretical value for two reasons. First, we use earnings growth rates in place of dividend growth rates. Second, our specification omits changes in growth expectations beyond the five-year forecast period (since they are not available). However, as indicated in footnote 14, our empirical tests are not based on predictions about the value of β_1. Rather, our tests simply require the relation between stock returns and unexpected earnings growth to be positive.

expectations of future earnings growth rationally anticipate the average bias in analysts' long-term growth forecasts. Thus, stock prices respond only to the unpredictable portion of the analysts' forecast error, ε_{t+1}, which is equal to $FE_{t+1} - \alpha_0$. The naïve expectations hypothesis predicts that α_0^* in equation (4) will equal zero, since investors naively believe that analysts' long-term growth forecasts are unbiased. Under this hypothesis, investors' expectations of future earnings growth equal the analysts' growth forecast. Thus, stock prices respond to the entire forecast error, FE_{t+1}.

The regression specification in equation (4) is non-linear in the regression coefficients β_1 and α_0^*. Hence, we conduct our statistical analysis using non-linear least squares. Specifically, we jointly estimate the following two equations using non-linear weighted least squares (see Mishkin 1983):

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^*] + \upsilon_{t+1} \qquad (5)$$

The market efficiency hypothesis is then evaluated by testing the cross-equation restriction that $\alpha_0^* = \alpha_0$, while the naïve expectations hypothesis is evaluated by testing the restriction that $\alpha_0^* = 0$.

While non-linear least squares is the appropriate statistical technique for our tests, we also provide parallel tests using ordinary least squares (OLS) to illustrate the intuition behind our tests for readers who feel more comfortable with OLS. Our OLS tests are conducted by estimating the two equations in (5) using OLS.

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_0 + \beta_1 FE_{t+1} + \upsilon_{t+1} \qquad (5\text{-OLS})$$

Comparing the abnormal return regression in equation (5-OLS) to the model in equation (4), we see that $\beta_0 = -\alpha_0^* \beta_1$. Hence, the market efficiency hypothesis implies that $\beta_0 = -\alpha_0 \beta_1$ (i.e., abnormal returns only respond to the unpredictable portion of the forecast error), while the naïve reliance hypothesis implies that $\beta_0 = 0$ (i.e., abnormal returns respond to the entire forecast error). Note that we cannot test the market efficiency restriction using OLS, because it is a non-linear cross-equation restriction (hence our original use of non-linear least squares). However, we can report the magnitudes of the OLS coefficients to illustrate the intuition behind the non-linear testing procedure.

Our second set of stock price tests examines the extent to which prices reflect information in the level of forecast growth about future forecast errors. Equation (2) above and the associated discussion indicate that forecast errors tend to be greater for firms with higher forecast growth. Substituting the forecast error prediction model in equation (2) for ε_t^* in equation (3) gives:

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^* - \alpha_1^* Growth_{t+1}] + \upsilon_{t+1} \quad (6)$$

In this equation ($\alpha_0^* + \alpha_1^* Growth_{t+1}$) represents the market's assessment of the average bias in analysts' long-term growth forecasts. The efficient market hypothesis predicts that α_0^* and α_1^* will correspond to their counterparts in the forecasting equation, α_0 and α_1 in equation (2). In other words, investors' expectations of future earnings growth, while based on analysts' forecast of future growth, rationally anticipate the average bias in analysts' long-term growth forecasts. Thus, stock prices respond only to the unpredictable portion of the analysts' forecast error, ε_{t+1}, which is equal to ($FE_{t+1} - \alpha_0 - \alpha_1 Growth_{t+1}$). The naïve reliance hypothesis predicts that α_0^* and α_1^* in equation (6) equal zero since investors believe that analysts' long-term growth forecasts are without bias. Under this hypothesis, investors' expectation of future earnings growth is equal to analysts' growth forecast. Thus, stock prices respond to the entire forecast error, FE_{t+1}.

We again conduct our statistical tests by estimating equations (2) and (6) simultaneously using non-linear least squares.

$$FE_{t+1} = \alpha_0 + \alpha_1 Growth_{t+1} + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^* - \alpha_1^* Growth_{t+1}] + \upsilon_{t+1} \quad (7)$$

The market efficiency hypothesis is then evaluated by testing the cross-equation restrictions that $\alpha_0^* = \alpha_0$ and $\alpha_1^* = \alpha_1$, while the naïve expectations hypothesis is evaluated by testing the restrictions that $\alpha_0^* = 0$ and $\alpha_1^* = 0$. We also report results using OLS by estimating the two equations in (7) using OLS.

$$FE_{t+1} = \alpha_0 + \alpha_1 Growth_{t+1} + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_0 + \beta_1 FE_{t+1} + \beta_2 Growth_{t+1} + \upsilon_{t+1} \quad (7\text{-OLS})$$

Comparing the abnormal return regression in equation (7-OLS) to the model in equation (6), we see that $\beta_0 = -\alpha_0^* \beta_1$ and $\beta_2 = -\alpha_1^* \beta_1$. Hence, the market efficiency hypothesis implies that $\beta_0 = -\alpha_0 \beta_1$ and $\beta_2 = -\alpha_1 \beta_1$ (i.e., abnormal returns only respond to the unpredictable portion of the forecast error), while the naïve reliance hypothesis implies that $\beta_0 = 0$ and $\beta_2 = 0$ (i.e., abnormal returns respond to the entire forecast error). Note again that the market efficiency restrictions cannot be tested using OLS, because they are non-linear cross-equation restrictions. However, we report the magnitudes of the OLS regression coefficients to highlight the intuition behind our non-linear tests.

IV. SAMPLE FORMATION AND VARIABLE MEASUREMENT

We require the following information to test our predictions: data on common stock offerings including the names of the lead managers of the offerings; analysts' long-term

forecasts of earnings growth and the names of the firms for whom the analysts work; realized earnings growth; and stock returns. Details concerning the common stock offerings are obtained from the Securities Data Company, Inc. (SDC). Analysts' long-term forecasts of earnings growth and the names of their employers are obtained from Institutional-Broker-Estimates-System (I/B/E/S). Realized earnings growth rates are calculated using earnings data from Compustat. Monthly stock returns are obtained from the Center for Research in Security Prices (CRSP).

Table 1 summarizes our sample formation. We extract from SDC a total of 7,636 common stock underwritten offerings made between 1981-1990. This sample period is chosen for two reasons. First, 1981 is the first year in which I/B/E/S consistently provides analysts' estimates of long-term earnings growth forecasts. Second, to calculate analysts' forecast errors, we require five years of future realized growth in earnings. Thus, the final year in the sample is 1990.

We require firms to be covered on CRSP, Compustat and I/B/E/S and to have sufficient stock return and earnings data to examine their post-offering performance. We also require at least one long-term forecast within the 12 month window (-9 to +3) surrounding the issue date of the equity offering. As detailed in table 1, we lose 1,723 firm-offerings because the issuing firm is not covered on CRSP or Compustat. An additional 218 observations are lost because the issuing firm is not covered by I/B/E/S. These observations tend to be initial public offerings by small market capitalization firms not listed on major exchanges (stocks trading on pink sheets). An additional 3,165 firm-offerings are lost because of insufficient stock return or earnings data on CRSP and Compustat. Exclusion of these observations is likely to create a survivorship bias, which may explain the less dramatic post-offering under performance for our sample compared to the under performance documented in prior research. Finally, long-term growth forecasts are unavailable within our window for 1,351 firm-offerings. These restrictions

result in a final sample of 1,179 firm-offerings made by 1,006 firms, only one-fifth of the total number of equity offerings made in the sample period 1981-1990.[16] However, the offerings we examine account for 30 percent of the total dollar value of all equity issued during this time period. Further, for each calendar year the median asset value of firms in our sample falls in the top two to four size deciles on Compustat. Thus, the sample examined is of economic significance.

For our final sample of 1,179 firm-offerings, we have 7,169 analysts' long-term earnings growth forecasts within the 12 months (-9 to +3) surrounding the issue dates. Using the names of lead managers obtained from SDC and the names of analysts' employers obtained from I/B/E/S, we categorize individual analysts as either *affiliated* or *unaffiliated* with a particular firm offering. If the analyst is employed by the investment bank acting as the lead manager for the offering (or if the analysts is employed by a subsidiary or the parent of the investment bank), then the analyst is classified as affiliated. We classify 622 analysts' forecasts as affiliated and 6,547 as unaffiliated.

SDC also provides information on the fee paid to the underwriters of each equity offering. The underwriting fee is shared by the lead manager, the co-managers, and the syndicate or selling group of the offering. Since we define affiliated analysts as those analysts employed by the lead manager, we examine the portion of the underwriting fee that is paid to the lead manager. The fee basis (Fee) is calculated as the fee paid to the lead underwriter divided by the total dollar value of the equity offering.

We measure post-offering stock price performance using five-year market-adjusted buy-hold stock returns. To ensure that all analysts' forecasts are known prior to the stock return cumulation period, we begin the cumulation period three months after the equity offering. The existence of negative abnormal stock returns following equity offerings has

[16] These constraints eliminate all but 86 initial public offerings from the final sample. The tenor of the results is unchanged if the 86 IPOs are excluded from the analysis.

been shown to be robust with respect to a wide variety of CAPM-based models for measuring abnormal returns (see for example Loughran and Ritter, 1995). We therefore expect to learn little from repeating our analysis for a variety of abnormal return measures. We do note, however, that we explicitly avoid using empirically motivated pricing models, such as the three-factor model suggested in Fama and French (1993). We avoid such models because their ability to predict future stock returns may be attributable to naive expectations about future profitability. In other words, while the 'size' and 'market-to-book' factors may be systematically associated with stock returns following equity offerings, we seek to determine whether the lower stock returns can be explained by naive earnings expectations.[17] Since these factors are empirically motivated, they do not, in and of itself, provide a satisfactory explanation for the size and market-to-book effects in stock prices.

We follow the I/B/E/S procedure for computing five-year annualized growth rates in earnings. This consists of fitting a least squares growth line to the logarithms of six annual earnings observations, beginning with the earnings observation immediately preceding the equity offering. We chose not to use a discrete annualized geometric growth rates because these rates can be extremely volatile when the base year is close to zero or when the base year or final year in the series contains significant nonrecurring items. Fitting a least squares regression line avoids placing excessive weight on the first and last observations in the growth period, resulting in less volatile growth estimates especially when these years include substantial nonrecurring items.[18] Negative earnings

[17] Brav and Gompers (1997) question whether the long-run under performance of initial public offerings is a unique anomaly or simply another manifestation of the Fama and French (1992, 1993) market-to-book, size anomaly. They document that the IPO anomaly is most pronounced for small firms with high market-to-book ratios. In this paper, we attempt to provide empirical evidence concerning why the anomaly exists. It is useful to note, however, that small firms with high-market-to-book ratios have the highest long-term growth forecasts and the largest analyst forecast errors.

[18] We use Compustat data item 18, earnings before extraordinary items, to minimize the effect of nonrecurring items. The results of this paper were also replicated using (i) operating income before special items after taxes (compustat data items #178 - #15 – #16 + #17) and (ii) I/B/E/S historical EPS growth reported in the fifth year following the equity offerings. The tenor of the results does not change using

values are set to missing, and if earnings are missing for either the first or last year of the six-year series, then we set the growth measure to missing.

V. RESULTS

Descriptive Statistics

Tables 2 and 3 provide descriptive details of our sample and an overview of our results. Formal statistical tests of our hypotheses are provided in tables 4 through 8. Panel A of table 2 provides means of analysts' forecasts and realized performance for our full sample of 7,169 analysts' long-term earnings growth forecasts. The mean abnormal stock return for the entire sample is -12.7 percent for the five years following the offering. This is a substantially less negative post-offering return than the -41.6 percent and -32.9 percent reported by Loughran and Ritter (1995) for initial public offerings and seasoned equity offerings, respectively.[19] One reason for this difference is the survivorship bias introduced by requiring our sample firms to have five years of earnings and stock return data following the equity offerings. Additionally, only firms followed by analysts are in our final sample and firms followed by multiple analysts are represented multiple times in the computation of the means.[20] Analyst following tends to be positively correlated with firm size (Bhushan, 1989) and smaller firms have the lowest post-offering abnormal stock price performance (Spiess and Affleck-Graves, 1995). Nevertheless, the long-run under performance of stock prices following equity offerings is clearly present in our sample.

---

these alternative measures of realized growth. Thus, our results are not driven by analysts' failure to anticipate nonrecurring, special items.

[19] Loughran and Ritter (1995) note that the measurement of the long-run under performance of issuing firms is sensitive to the benchmark employed. If the NASDAQ value-weighted index is used instead of the CRSP NYSE-AMEX value-weighted index, they report post-offerings returns of -29.0% and -19.5% for initial public offerings and seasoned equity offerings, respectively.

[20] The total number of offerings represented in the sample is 1,179. If each offering receives equal weighting in the mean, the mean abnormal return declines to –18 percent.

The mean realized growth in earnings for the full sample over the five years following the offering is 5.7 percent. The corresponding mean forecast growth in earnings at the time of the offering is 16.2 percent. On average, the forecast error in the five-year earnings growth forecasts is -10.6 percent. Analysts tend to over-estimate earnings growth by greater than 10 percent per year in the five years following equity offerings.[21] The negative abnormal returns in the five years following the offering are consistent with investors having overly optimistic expectations of earnings growth. Later in the paper, we demonstrate that the magnitudes of the earnings growth expectations implicit in stock prices are similar to the growth forecasts issued by analysts.

Panel B of table 2 stratifies the sample by analyst affiliation. All analyst forecasts fall into one of four categories:

(i) Affiliated Analysts - Pure Deals, the forecast is made by an analyst who is affiliated with the lead underwriter of the offering and there are no long-term forecasts made by unaffiliated analysts;

(ii) Affiliated Analysts - Mixed Deals, the forecast is made by an analyst who is affiliated with the lead underwriter of the offering and there are also long-term forecasts made by unaffiliated analysts;

(iii) Unaffiliated Analysts - Mixed Deals, the forecast is made by an analyst who is unaffiliated with the lead underwriter of the offering and there are also long-term forecasts made by affiliated analysts; and

---

[21] To assess whether a systematic bias exists in analysts' long-term growth forecasts during our sample period that is not associated with new issues, we collect all long-term growth forecasts found on I/B/E/S between the years 1981-1990. Comparing offer and non-offer years, the mean forecast growth is significantly higher for offering years, while the realized five-year earnings growth is significantly lower. Thus, while in general analysts over estimate growth rates for all firm-years on I/B/E/S during the period 1981-1990, analysts are significantly more overly optimistic in years in which firms issue equity. It is interesting to note, however, that pooling across offer and non-offer years, analysts' optimism does not differ significantly for issuing versus non-issuing firms.

(iii) Unaffiliated Analysts - Pure Deals, the forecast is made by an analyst who is unaffiliated with the lead underwriter of the offering and there are no long-term forecasts made by affiliated analysts.

The first category of Affiliated Analysts - Pure Deals consists of only 131 forecasts. The mean abnormal return for this sample is -32.3 percent, which is much more negative than the average returns for the entire sample, -12.7 percent. The forecast errors are also larger for this sample. The mean forecast error for Affiliated Analyst - Pure Deals is -14.8 percent, while the forecast error for the entire sample is -10.6 percent. These results are consistent with the affiliated analysts issuing more overly optimistic earnings growth forecasts and with investors sharing these overly optimistic earnings expectations. The statistics show a similar pattern for the 491 forecasts in the Affiliated Analysts - Mixed Deals category. The mean abnormal return is -21.3 percent, which is more negative than the average for the entire sample, and the mean forecast error is -14.3 percent, which is also more negative than the average for the entire sample.

The deals followed by unaffiliated analysts have the least negative abnormal returns and the least biased forecasts. For the 2,938 forecasts in the Unaffiliated Analysts - Mixed Deals category, the mean abnormal return is -12.3 percent and the mean forecast error is -10.5 percent.[22] For the 3,609 deals in the Unaffiliated Analysts - Pure Deals category, the mean abnormal return is -11.3 percent and the mean forecast error is -10.0 percent. This is consistent with the unaffiliated analysts issuing relatively less overly optimistic earnings growth forecasts and with investors sharing these less overly optimistic earnings expectations.

[22] The Affiliated Analysts-Mixed Deals and Unaffiliated Analysts-Mixed Deals represent the same underlying set of deals. The reason stock returns are more negative for the affiliated analysts is that the ratio of affiliated to unaffiliated analysts tends to be larger for the deals with more negative abnormal stock returns.

Table 3 reports the number of observations, mean abnormal returns, and mean forecast errors for the sample stratified by both analyst affiliation and forecast growth. Forecast errors tend to be larger for firms with higher forecast growth. Stratifying the sample by forecast growth therefore provides a further opportunity to examine the relation between variation in forecast errors and variation in abnormal returns.

Growth portfolios are formed by ranking all analysts' long-term growth forecasts and assigning observations in equal numbers to three portfolios (low, medium, and high) based on these rankings. If long-term growth forecasts are correlated with analyst affiliation, then the number of observations in each forecast growth portfolio will not necessarily be equally proportioned across sub-samples. This is illustrated in panel A of table 3. The affiliated analysts tend to be concentrated in the high forecast growth portfolio, with between 47 to 60 percent of observations being in this portfolio. The unaffiliated analysts tend to be more evenly distributed across the three forecast growth portfolios with between 31 to 33 percent being in the high growth portfolio.[23]

Panel B of table 3 reports the mean forecast errors for the affiliation and forecast growth sub-samples. Within analyst affiliation categories, the forecast errors are consistently more negative in the high forecast growth portfolio. Within the high forecast growth portfolios, the forecast errors are also consistently more negative for the affiliated analysts than for the unaffiliated analysts. Thus, analysts' over-optimism is most pronounced for the high growth portfolios, and within the high growth portfolio, affiliated analysts make the most overly optimistic forecasts. These regularities are mirrored in the mean abnormal returns reported in panel C of table 3. Firms in the high forecast growth portfolios experience the greatest long-run under performance, and within the high growth portfolios, the abnormal stock returns are consistently more negative for

[23] A 2x3 chi-square test comparing the distribution of affiliated analysts to the distribution of unaffiliated analysts across the forecast growth portfolios rejects the null that portfolio assignment is unrelated to analyst affiliation at the 0.0001 level.

affiliated analysts deals than for the unaffiliated analysts deals. Thus, firms' long-term stock price under performance is greatest when affiliated analysts project high earnings growth.

Overall, the descriptive evidence presented in table 3 indicates that analysts' long-term growth forecasts are the most overly optimistic when they are high and when they are made by affiliated analysts. The earnings expectations embedded in stock prices incorporate a similar pattern of forecast errors. We provide more formal statistical tests of these propositions later in the paper.

Tests of Bias in Analysts' Long-Term Earnings Growth Forecasts

Table 4 provides statistical tests of the differences in the forecast errors for the affiliated and unaffiliated analysts. We have no specific predictions concerning differential biases for the pure and mixed deals. We therefore combine forecasts for pure and mixed deals for both the affiliated and unaffiliated categories to increase the power of our statistical tests. Panel A of table 4 presents the distribution of forecast errors. Recall from table 2 that the mean forecast error for the entire sample is -10.6 percent. Panel A reveals that the forecast errors for affiliated analysts are consistently more negative than for the unaffiliated analysts. The mean forecast error for the affiliated analysts is -14.4 percent, while the mean forecast error for the unaffiliated analysts is -10.3 percent. A t-test for difference in means rejects the null of equality (p-value = 0.003), confirming our prediction that affiliated analysts tend to issue more optimistic long-term earnings growth forecasts. Panel A also reveals that the larger negative mean forecast error for affiliated (versus unaffiliated) analysts is driven by their over-optimistic forecasts of growth (p-value of 0.000) and not by lower growth realizations for firms they follow (p-value of 0.956).

To examine the sensitivity of the forecast errors to the growth expectation, in panel B of table 4 we estimate the regression of forecast errors on forecast growth in earnings. For the entire sample the regression results are similar to those reported by Dechow and Sloan (1997). The intercept is close to zero and the coefficient on forecast growth in earnings is -0.678. These coefficients indicate that realized growth in earnings is only about one-third of forecast growth in earnings. This, in turn, indicates that analysts' over-optimism is greater for firms with greater growth prospects. The results for the unaffiliated analysts are similar to the results for the entire sample. However, the results for the affiliated analysts indicate that while the intercept remains indistinguishable from zero, the coefficient on forecast growth in earnings falls to -0.832. This coefficient indicates that realized growth in earnings is only about one-sixth of forecast growth in earnings for forecasts issued by affiliated analysts. A Chow-test rejects the null hypothesis that the coefficient on forecast earnings growth is the same in the affiliated and unaffiliated regressions (p-value = 0.048). Thus, the over-optimism in affiliated analysts' growth forecasts, relative to unaffiliated analysts' growth forecasts, is more severe for 'glamour stocks' with high growth prospects.[24]

In table 5 we investigate whether the level of the affiliated analysts' growth forecasts, as well as the optimistic bias in their forecasts, is positively related to the fees paid to their employers (the lead underwriters of the equity offerings). Panel A documents a positive relation between the affiliated analysts' growth forecasts and the fee basis paid to their employers. Recall that the fee basis is the percentage of the dollar value of the offering paid to the lead manager. For each 100 basis points paid to the lead manager, analysts' growth forecasts increase by 650 basis points (6.5 percentage points).[25] Including

[24]To control for firm size, we also included the log of total assets as an additional explanatory variable in the regressions presented in tables 4 as well as the regressions presented below in tables 6 and 7. The tenor of the results remains unchanged.

[25]Although we do not report these results, it is interesting to note that there is a significantly higher fee basis paid for the affiliated versus the unaffiliated deals. In particular, when an analyst working for the lead manager provides a forecast of long-term earnings growth, the average fee basis paid to the lead

realized growth as an additional explanatory variable demonstrates that affiliated analysts' growth forecasts are unrelated to the level of the realized growth in earnings, while their forecasts remain positively related to the fees basis paid to their employers.

Panel B of table 5 examines whether the optimistic bias in affiliated analysts' growth forecasts is significantly related to the fee basis paid to their employers. The first regression shows that analysts' forecast errors are a function of the fee basis - affiliated analysts are more optimistic in their growth forecasts, the higher the fee basis. For each 100 basis points paid to the lead manager, affiliated analysts' over-estimate earnings growth by 470 basis points (4.7 percentage points). However, the fee basis explains very little of the cross-sectional variation in analysts' forecast errors (the adjusted R^2 is only 0.4 percent). Further, the coefficient on the fee basis falls to less than 100 basis points and becomes insignificant after controlling for the level of analysts' growth forecasts, as indicated in regression 2 in panel B of table 5. Comparing the R^2s reported in the B panels of tables 4 and 5, we see that the fee basis variable adds little to our understanding of analysts' forecast errors. In fact, the adjusted R^2 falls from 10.52 in table 4 to 10.38 in table 5 when Fee is included as an additional explanatory variable. Thus, in our stock price tests, presented in the next section, we do not consider the predictive power of the fee basis in explaining stock returns.

Tests of the Pricing of Bias in Analysts' Long-Term Earnings Growth Forecasts

In this section, we investigate whether the systematic bias in analysts' forecasts of earnings growth is reflected in stock prices. We first present our non-linear weighted least squares regressions, since these regressions allow us to conduct statistical tests of

---

manager is one percent of the total dollar-value of the offering. However, when only unaffiliated analysts provide growth forecasts, the average fee basis paid to the lead underwriter is 0.71 percent. The mean fee bases are significantly different at the 0.001 level.

the non-linear restrictions implied by our hypotheses. We then present the corresponding OLS regression results.

Since multiple analysts' forecasts can relate to a single equity offering, we conduct our pricing analysis using a single 'consensus' observation for each offering, in order to avoid cross-sectional dependence.[26] The forecast of growth in earnings used for each observation is the mean of the forecasts relating to the offer. We conduct the pricing tests for three samples. The first sample consists of all firm-offerings represented by the entire sample of analysts' forecasts. This sample provides a check for consistency between our results and the results in Dechow and Sloan (1997) and also provides a benchmark for our subsequent samples. The second sample includes all firm-offerings for which we have an affiliated analyst forecast, and includes both Affiliated Analysts - Pure Deals and Affiliated Analysts - Mixed Deals from table 2. In computing the mean forecast for the mixed deals, we exclude forecasts made by unaffiliated analysts. This sample allows us to examine whether affiliated analysts' forecasts are priced, irrespective of the availability of unaffiliated forecasts. The third sample includes all firm-offerings for which we have unaffiliated forecasts, and includes both Unaffiliated Analysts - Pure Deals and Unaffiliated Analysts - Mixed Deals. The computation of mean forecasts for the mixed deals excludes forecasts made by affiliated analysts. This sample allows us to examine whether unaffiliated analysts' forecasts are priced, irrespective of the availability of affiliated forecasts.[27]

Table 6 investigates the pricing of the consensus forecast errors by estimating the system of equations developed in section three:

[26]In addition, cross-sectional dependence may arise if some firms make more than one offering within five years. To address this concern, we re-estimated our results using only the first offering made by each firm. The tenor of the results is unchanged.

[27] Ideally, we would like to be able to take the sample of mixed deals and test whether the affiliated or the unaffiliated analysts' forecasts are priced. Unfortunately, because of the relatively small differences between the affiliated and unaffiliated forecasts on the mixed deals, we cannot statistically discriminate between these two alternatives.

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^*] + \upsilon_{t+1} \quad (5)$$

Recall that α_0 represents the mean forecast error in analysts' forecasts of long-term earnings growth issued around the equity offerings. If investors rationally anticipate the bias in analysts' forecasts, then the earnings expectation embedded in stock prices will result in $\alpha_0^* = \alpha_0$. Alternatively, if investors naively rely on analysts' forecasts of long-term growth in earnings, then the earnings expectations embedded in stock prices will result in α_0^* being equal to zero. The system of equations is estimated jointly using nonlinear weighted-least-squares and the cross-equation restrictions implied by the competing hypotheses are tested using a likelihood ratio test.[28]

The nonlinear weighted least squares parameter estimates for the system of equations in (5) are reported in panel A of table 6. The estimate of the mean forecast error for all deals, α_0, is -12.1 percent. This figure differs slightly from the corresponding figure in table 2 of -10.6 percent. The reason for the difference is that observations are weighted at the individual analyst level in table 2 and at the individual issuer level (using consensus analyst forecasts) in table 6. The implied estimate of the mean forecast error in the stock price equation, α_0^*, is -2.9 percent.[29] This estimate is significantly different from the

---

[28] This joint estimation procedure has several advantages over a two-step procedure. First, it produces more efficient estimates of parameters because each equation uses information in the other in the estimation process. Second, the joint estimation procedure generates valid test statistics because it accounts for the uncertainty in estimates of the error terms. That is, the joint estimation procedure uses the ε that is *expected* to minimize the mean-square errors in the first equation to form expectations in the second equation, whereas the two-step procedure uses the actual ε that minimized the mean-square errors. Thus, in finite samples, the two-step procedure makes an overly strong assumption about expectation formation. Conceptually, the two-step procedure forms expectations with information from the future as well as from the past, which clearly goes beyond the rational expectations principle. The joint estimation procedure does not suffer from this problem. Details of the joint estimation procedure are described in Mishkin (1983).

[29] Verifying that the asymptotic equivalence of α_0^* and $(-\beta_0/\beta_1)$ holds for the three finite samples examined, we note that all estimates of α_0^* reported in table 6 are equivalent to the ratios of the OLS estimated coefficients $(-\beta_0/\beta_1)$ reported in table 7.

rational value of -12.1 percent (p-value = 0.001), rejecting market efficiency, but is not significantly different from the naive value of zero (p-value = 0.511). Thus, we are unable to reject the hypothesis that investors rely on analysts' forecasts of long-term growth in earnings as if the forecasts are unbiased. Another way of stating this result is that we are unable to reject the hypothesis that investors' naive reliance on analysts' forecasts potentially explains the under performance of stock prices following equity offerings.

The mean forecast errors for the affiliated and unaffiliated deals also differ slightly at the issuer level versus the analyst level. However, we continue to find the affiliated analysts are more overly optimistic than the unaffiliated analysts, with forecast errors of -14.3 percent and -11.8 percent, respectively. Despite the differences in the actual forecast errors, the implied estimates of the forecast errors in stock prices are quite similar. The forecast error implicit in stock prices for the affiliated deals is -2.7 percent, while for the unaffiliated deals it is -2.2 percent. In both cases, market efficiency is rejected, but in neither case is the hypothesis that investors naively rely on analysts' forecasts rejected. Thus, despite the difference in the magnitude of the forecast errors for affiliated and unaffiliated analysts' forecasts, we are unable to reject the hypothesis that they are both incorporated into stock prices.

We present the results of corresponding OLS regressions in order to illustrate the intuition behind the non-linear regression results. Recall from the discussion in section three that the corresponding OLS regressions for the system in panel A are:

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_0 + \beta_1 FE_{t+1} + \upsilon_{t+1} \qquad \text{(5-OLS)}$$

Panel B of table 6 presents the results for the stock return regressions only. The forecasting regressions involves no non-linearities, and so the OLS results are identical to those reported using non-linear least squares in panel A. The first thing to note from the OLS stock return regressions in panel B is that β_1, the earnings response coefficient in the stock return regressions, is significantly positive and takes on the same value as its counterpart in the non-linear regressions. This equality again arises because this term involves no non-linearities. The positive coefficient reflects the well-documented positive response of stock returns to earnings surprises.

Non-linearities enter the equation with the coefficients that relate to our competing hypotheses. Recall that market efficiency predicts that stock returns will only respond to the unpredictable component of the forecast error ($FE_{t+1} - \alpha_0$). Thus, the intercept in the OLS regression, β_0, will load up to remove the predictable component of the forecast error, (α_0), so that $\beta_0 = -\alpha_0 \beta_1$. Concentrating on the *All Deals* column, market efficiency generates the prediction that $\beta_0 = -\alpha_0 \beta_1 = -(-0.121) \times (1.171) = 0.142$. On the other hand, the naïve reliance hypothesis implies that the market responds to the entire forecast error (FE_{t+1}), so that $\beta_0 = 0$. The estimated value of β_0 is an insignificant 0.034, which is much closer to the naïve reliance hypothesis prediction of zero, than to the market efficiency hypothesis prediction of 0.142. At an intuitive level, the statistical tests in our non-linear regressions indicate that we can reject the market efficiency hypothesis that $\beta_0 = 0.142$, but we cannot reject the naïve reliance hypothesis that $\beta_0 = 0$. Similarly, we see that β_0 is also insignificantly different from zero in the remaining two columns in panel B of table 6, indicating that the naïve reliance hypothesis is not rejected for either the affiliated or unaffiliated sub-groups.

Table 7 investigates the pricing of analysts' forecast errors after conditioning on the level of forecast growth by estimating the following system of equations developed above in section three:

$$FE_{t+1} = \alpha_0 + \alpha_1 Growth_{t+1} + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_1 [FE_{t+1} - \alpha_0^* - \alpha_1^* Growth_{t+1}] + \upsilon_{t+1} \quad (7)$$

The nonlinear weighted least squares parameter estimates for this system of equations are reported in panel A of table 7. Recall from the analyst level results in table 4 that the forecast errors tend to be more optimistic for 'glamour stocks' with high levels of forecast growth. While the magnitude of the coefficients is somewhat different for the issuer-level results, we find the same general relations in table 7. For all deals, the coefficient on forecast growth in earnings, α_1, is -0.329. This indicates that realized growth is only about two-thirds as large as forecast growth. As with the results, in table 4, α_1 is more negative for the affiliated analysts, indicating that affiliated analysts tend to be even more overly optimistic than their unaffiliated counterparts for high growth stocks. If investors rationally anticipate this bias in analysts' forecasts, then the earnings expectation embedded in stock prices will result in $\alpha_1^* = \alpha_1$. Alternatively, if investors naively rely on analysts' forecasts of long-term growth in earnings, then the earnings expectations embedded in stock prices will result in $\alpha_1^* = 0$. The system of equations is again estimated jointly using nonlinear weighted-least-squares and the cross-equation restrictions implied by the competing hypotheses are tested using a likelihood ratio test.

The results indicate that the earnings expectations embedded in stock prices correspond much more closely with the naive reliance hypothesis than with the market efficiency hypothesis. The estimated values of α_1^* are 0.138, -0.032 and 0.380 for *all deals*, *affiliated deals* and *unaffiliated deals*, respectively. These compare to the predicted values of –0.329, -0.621 and –0.325, respectively, under the market efficiency hypothesis and predictions of zero in all three cases for the naïve reliance hypothesis. While the market efficiency hypothesis is rejected in all three cases, the naïve reliance hypothesis cannot be rejected in any of the three cases. It is of interest that the point estimates of α_1^*

are fairly large and positive for the *all deals* and *unaffiliated deals* categories. Under market efficiency, these coefficients are predicted to be negative, while under naive reliance, they are predicted to be zero. One explanation for why these coefficients are positive is that investors are pricing affiliated analysts' forecasts, and this induces a positive bias in the coefficients on the unaffiliated analysts' forecasts when both types of analyst forecasts are present. In other words, investors are pricing the affiliated analysts more overly optimistic forecasts, and because stock prices are responding to the greater optimism in affiliated analysts' forecasts, stock prices reflect more optimistic expectations than those implied by the unaffiliated analysts' forecasts.[30] Overall, the results in table 7 suggest that the poor stock price performance in the years following equity offerings arises because investors naively price affiliated analysts' extreme over-optimism for 'glamour stocks' with strong growth prospects.

The OLS results in panel B of table 7 serve to illustrate the intuition behind the non-linear regression results presented in panel A. Again, panel B presents the OLS regression results for the stock return regressions only, since OLS results for the forecasting regressions are identical to those presented in panel A. Recall that market efficiency predicts that stock returns will only respond to the unpredictable component of the forecast error, $(FE_{t+1} - \alpha_0 - \alpha_1 Growth_{t+1})$. Thus, β_2, the coefficient on forecast growth in the OLS regression will load up to remove the portion of the forecast error that can be predicted by forecast growth ($\alpha_1 Growth_{t+1}$), so that $\beta_2 = -\alpha_1 \beta_1$. Concentrating on the *All Deals* column, market efficiency generates the prediction that $\beta_2 = -\alpha_1 \beta_1 = -(-0.329)$ x (1.163) = 0.383. On the other hand, the naïve reliance hypothesis implies that the market responds to the entire forecast error, (FE_{t+1}), so that $\beta_2 = 0$. The estimated value of β_2 is –0.161, which is insignificantly different from the naïve reliance hypothesis

[30] Replicating the pricing tests for the deals with only unaffiliated analysts provides evidence consistent with this conjecture. The value of α_1^* falls from 0.380 reported in table 8 for the full sample to 0.134.

prediction of zero, but significantly different from the market efficiency hypothesis prediction of 0.383.

VI. CONCLUSION

In this study, we provide evidence consistent with the hypothesis that sell-side analysts make overly optimistic long-term earnings growth forecasts for firms issuing equity. We also show that the overly optimistic forecasts are reflected in stock prices. Together these results suggest that investors' reliance on analysts' overly optimistic forecasts provides one potential explanation for the 'equity issue puzzle.'

Our evidence has potential policy implications. Our evidence suggests that the co-existence of brokerage services and underwriting services in the same institution leads sell-side analysts to compromise their responsibility to brokerage clients in order to attract underwriting business. Investment banks claim to have 'Chinese walls' to prevent such conflicts of interests. Our evidence raises questions about the reliability of these 'Chinese walls.' We document that analysts affiliated with the lead underwriter of an offering tend to issue more overly optimistic growth forecasts than unaffiliated analysts. Further, the magnitude of the affiliated analysts' growth forecasts is positively related to the fee basis paid to the lead underwriters. Finally, equity offerings covered only by affiliated analysts experience the greatest post-offering under performance, suggesting that these offerings are the most overpriced.

Our results also suggest a characterization of over-priced 'glamour stocks' (Lakonishok, Shleifer and Vishny, 1994). 'Glamour stocks' tend to have high growth opportunities and therefore these firms actively seek new equity capital. Consequently, their management has incentives to maximize stock price to lower the cost of raising external capital. Sell-

side analysts affiliated with investment banks also have incentives to assist with maximizing the issuing firm's stock price, because doing so generates higher underwriting fees. Under this scenario, the systematic over-optimism in the forecasts of unaffiliated analysts may result from their efforts to attract underwriting clients. An interesting topic for future research would be to examine whether firms' choices of investment banks for underwriting services are influenced by the optimism in the earnings forecasts issued by analysts affiliated with the investment banks.

REFERENCES

Abarbanell, J. S. 1991. Do analysts' earnings forecasts incorporate information in prior stock price changes? *Journal of Accounting and Economics* 14 (June): 147-65.

Ali, A. 1996. Bias in analysts' earnings forecasts as an explanation for the long-run underperformance of stocks following equity offerings. Working Paper. University of Arizona.

Barber, B. M., and J. D. Lyon, 1996. How can long-run abnormal stock returns be both positively and negatively biased? Working Paper. UC-Davis.

Barber, B. M., and J. D. Lyon, 1997. Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics* (March): 341-372

Bhushan, R. 1989. Firm characteristics and analysts following. *Journal of Accounting and Economics* 11(July): 255-274.

Bradshaw, M. T. 1999. Do analysts use their own forecasts? Working paper. University of Michigan.

Brav, A., and P. Gompers. 1997. Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies. *Journal of Finance* 52 (December): 1791-1821.

Brown, P., G. Foster and E. Noreen. 1985. Security analysts multi-year earnings forecasts and the capital market. *Studies in Accounting Research Number 21*. American Accounting Association.

Campbell, J. 1991. A variance decomposition of stock returns, *The Economic Journal* 101: 157-179.

Collins, D., S.P. Kothari, J. Shanken and R. Sloan. 1994. Lack of timeliness and noise as explanations for the low contemporaneous return-earnings association, *Journal of Accounting and Economics* 18: 289-324.

Dechow, P. M., and R. G. Sloan. 1997. Returns to contrarian investment: Tests of the naive expectations hypotheses, *Journal of Financial Economics* 43 (January): 3-28.

Dugar, A., and S. Nathan. 1995. The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations. *Contemporary Accounting Research* 12 (Fall 1995): 131-60.

Fama, E. F., and K. R. French. 1992. The cross-section of expected stock returns, *Journal of Finance* 47 (June): 427-65.

Fama, E. F., and K. R. French. 1993. Common risk factors in the returns to stocks and bonds, J*ournal of Financial Economics* 33 (February): 3-56.

Hansen, R. S., and A. Sarin. 1996. Is honesty the best policy? An examination of security analyst behavior around seasoned equity offerings. Working Paper. Santa Clara University.

Kothari, S. P., and J. B. Warner. 1997. Measuring long-horizon security price performance. *Journal of Financial Economics* (March): 301-339.

Lakonishok J., A. Shliefer; and R. W. Vishny. 1994. Contrarian investment, extrapolation, and risk. *Journal of Finance* 49 (December): 1541-1578.

La Porta, R. 1996. Expectations and the cross-section of stock returns. *Journal of Finance* 51 (December): 1715-1742.

Lin, H., and M. McNichols. 1998a. Underwriting relationships and analysts' forecasts and investment recommendations. *Journal of Accounting and Economics*. 25 (February): 101-127.

Lin, H., and M. McNichols. 1998b. Analyst coverage of initial public offering firms. Working Paper. Stanford University.

Loughran, T., and J. R. Ritter. 1995. The new issue puzzle. *Journal of Finance* 50 (March): 23-51.

Loughran, T., and J. R. Ritter. 1997. The operating performance of firms conducting seasoned equity offerings. *Journal of Finance* 52 (December): 1823-1850.

Mikhail, M. B., B. R. Walther, and R. H. Willis. 1999, Does forecast accuracy matter to security analysts?, *The Accounting Review* 74 (April): 185-200.

McNichols, M., and P. O'Brien. 1997. Self-selection and analyst coverage. *Journal of Accounting Research* 35 (Supplement): 167-199.

Michaely, R., and K. L. Womack. 1996. Conflict of interest and the credibility of underwriter analyst recommendations. Working Paper. Cornell University.

Mishkin, F. S. 1983. A rational expectations approach to macroeconomics, A National Bureau of Economics Research monograph. The University of Chicago Press. Chicago, Il.

Rajan, R., and H. Servaes. 1997. Analyst following of initial public offerings. *Journal of Finance* (June): 507-529.

Rangan, S. 1998. Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics* 50 (October): 101-122

Sougiannis, T., E. Oltheten, and T. Yaekura. 1996. Inferring equity values from analysts' earnings forecasts. Working Paper. University of Illinois at Urbana-Champaign.

Spiess, D. K, and J. Affleck-Graves. 1995. The long-run performance following seasoned equity offerings. *Journal of Financial Economics* 38 (July): 243-67.

Stickel, S. E. 1992. Reputation and performance among security analysts. *Journal of Finance*. 47 (December): 1811-1836.

Stickel, S. E., 1998. Analyst incentives and the financial characteristics of Wall Street darlings and dogs. Working paper. Lasalle University.

Teoh, S. H. , I Welch, and T. J. Wong. 1998. Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics* 50 (October): 63-99.

TABLE 1

Sample Formation

7,636	Common stock offerings within the time period 1981-1990 (underwritten offerings only, excludes rights offerings)
-1,723	Firm-offerings not covered on CRSP or Compustat
-218	Firm offerings not covered on I/B/E/S
-3,165	Firm-offerings with incomplete data on CRSP or Compustat
-1,351	Firm-offerings with no long-term earnings growth forecasts within the 12 months (-9 to +3) surrounding the offer date
1,179	Final sample of firm-offerings

Data on common stock offerings is obtained from the Securities Data Company, Inc.

TABLE 2

Profile of Analyst Forecasts and Post-Offering Performance

Panel A: Entire sample

	Mean Abnormal returns	*Mean Realized earnings growth*	*Mean Forecast earnings growth*	*Mean Forecast error*	*Number of observations*
All analysts	-0.127	0.057	0.162	-0.106	7,169

Panel B: Sample stratified by analyst affiliation

	Mean Abnormal returns	*Mean Realized earnings growth*	*Mean Forecast earnings growth*	*Mean Forecast error*	*Number of observations*
Affiliated analysts - Pure deals	-0.323	0.097	0.233	-0.148	131
Affiliated analysts -Mixed deals	-0.213	0.045	0.186	-0.143	491
Unaffiliated analysts -Mixed deals	-0.123	0.048	0.150	-0.105	2,938
Unaffiliated analysts -Pure deals	-0.113	0.064	0.165	-0.100	3,609

Abnormal returns = cumulative five-year buy and hold market adjusted stock returns beginning three months after the issue date. A value-weighted market index is used to adjust for market performance.

Realized earnings growth = five-year annualized growth rates calculated by fitting a least squares growth line to the logarithms of the six annual observations, beginning with the offer year and ending in the fifth year after the offer year.

Forecast earnings growth = analysts' long-term forecast of earnings growth obtained from I/B/E/S.

Forecast error = Realized earnings growth - Forecast earnings growth.

TABLE 3

Profile of Analyst Forecast Errors and Post-Offering Performance Stratified by Analyst Affiliation and Forecast Earnings Growth

Range of forecast earnings growth for each portfolio	*Firms where analysts predict LOW Growth* [-100% - 10%]	*Firms where analysts predict MEDIUM Growth* [11% - 17%]	*Firms where analysts predict HIGH growth* [18% - 100%]
Panel A: Number (percent) of analysts with forecasts			
Affiliated analysts -Pure deals Total number of analysts = 131	19 (15%)	33 (25%)	79 (60%)
Affiliated analysts - Mixed deals Total number of analysts = 491	119 (24%)	140 (29%)	232 (47%)
Unaffiliated analysts - Mixed deals Total number of analysts = 2,938	1,016 (35%)	996 (34%)	926 (31%)
Unaffiliated analysts - Pure deals Total number of analysts = 3,609	1,133 (31%)	1,298 (36%)	1,178 (33%)
All analysts (Total=7,169)	*2,287 (32%)*	*2,467 (34%)*	*2,415 (34%)*
Panel B: Mean Forecast error			
Affiliated analysts -Pure deals	-0.156	-0.108	-0.238
Affiliated analysts - Mixed deals	-0.061	-0.055	-0.239
Unaffiliated analysts - Mixed deals	-0.052	-0.058	-0.215
Unaffiliated analysts - Pure deals	-0.033	-0.091	-0.174
All analysts	*-0.042*	*-0.075*	*-0.198*
Panel C: Abnormal returns			
Affiliated analysts -Pure deals	-0.110	-0.224	-0.431
Affiliated analysts - Mixed deals	0.031	0.003	-0.501
Unaffiliated analysts - Mixed deals	0.002	-0.022	-0.398
Unaffiliated analysts - Pure deals	-0.098	-0.079	-0.166
All analysts	*-0.048*	*-0.054*	*-0.288*

Abnormal returns = cumulative five-year buy and hold market adjusted stock returns beginning three months after the issue date. A value-weighted market index is used to adjust for market performance.

Realized earnings growth = five-year annualized growth rates calculated by fitting a least squares growth line to the logarithms of the six annual observations, beginning with the offer year and ending in the fifth year after the offer year.

Forecast earnings growth = analysts' long-term forecast of earnings growth obtained from I/B/E/S.

Forecast error = Realized earnings growth - Forecast earnings growth.

TABLE 4

Tests of the Bias in Analysts' Forecasts of Long-Term Earnings Growth

Panel A: Distribution of variables for affiliated and unaffiliated analysts (p-values for tests of equal means)

		Mean	*Standard Deviation*	*Lower Quartile*	*Median*	*Upper Quartile*	*Number of Obs.*
Forecast Error	*Affiliated*	-0.144	0.340	-0.241	-0.079	0.012	622
	Unaffiliated	-0.103	0.287	-0.191	-0.059	0.024	6547
	p-value	0.003					
Forecast Earnings Growth	*Affiliated*	0.201	0.133	0.120	0.178	0.250	622
	Unaffiliated	0.159	0.114	0.090	0.130	0.200	6547
	p-value	0.000					
Realized Earnings Growth	*Affiliated*	0.056	0.322	-0.036	0.077	0.203	622
	Unaffiliated	0.057	0.280	-0.026	0.071	0.183	6547
	p-value	0.956					

Panel B: Sensitivity of forecast errors to forecast of long-term earnings growth

$$FE_{t+1} = \alpha_0 + \alpha_1 \, Growth_t + \varepsilon_{t+1}$$

	α_0	α_1	*p-value for equal* α_1	*Adjusted* R^2 *(%)*	*Number of observations*
Entire sample - All analysts	0.004	-0.678**		7.33	7,169
Total affiliated analysts	0.023	-0.832**		10.52	622
			0.048		
Total unaffiliated analysts	0.002	-0.654**		6.79	6,547

** significant at the one percent level.

Realized earnings growth = five-year annualized growth rates calculated by fitting a least squares growth line to the logarithms of the six annual observations, beginning with the offer year and ending in the fifth year after the offer year.

Forecast earnings growth ($Growth_{t+1}$) = analysts' long-term forecast of earnings growth obtained from I/B/E/S.

Forecast error (FE_{t+1}) = Realized earnings growth - Forecast earnings growth.

TABLE 5

Tests of the Relation Between Affiliated Analysts' Forecasts of Long-Term Earnings Growth and the Underwriting Fee Paid to Their Employers

Panel A: Sensitivity of affiliated analysts' forecast of long-term earnings growth to the fee paid to the lead manager and realized earnings growth

$$Growth_t = \gamma_0 + \gamma_1 Fee_t + \gamma_2 R\_Growth_{t+1} + \mu_t$$

	γ_0	γ_1	γ_2	*Adjusted* R^2 *(%)*	*Number of observations*
Regression 1	0.134**	0.065**		6.80	622
Regression 2	0.134**	0.064**	0.026	7.01	622

Panel B: Sensitivity of affiliated analysts' forecast errors to the fee paid to the lead manager and the forecast of long-term earnings growth

$$FE_{t+1} = \alpha_0 + \alpha_1 Growth_t + \alpha_2 Fee_t + \varepsilon_{t+1}$$

	α_0	α_1	α_2	*Adjusted* R^2 *(%)*	*Number of observations*
Regression 1	-0.096**		-0.047*	0.40	622
Regression 2	0.016	-0.840**	0.008	10.38	622

** significant at the one percent level.
* significant at the six percent level.
Realized earnings growth (R_Growth_{t+1}) = five-year annualized growth rates calculated by fitting a least squares growth line to the logarithms of the six annual observations, beginning with the offer year and ending in the fifth year after the offer year.
Forecast earnings growth ($Growth_{t+1}$) = analysts' long-term forecast of earnings growth obtained from I/B/E/S.
Forecast error (FE_{t+1}) = Realized earnings growth - Forecast earnings growth.
Fee basis (Fee_t) = Fee paid to the lead manager divided by the total dollars raised in the offering.

TABLE 6

Results of Nonlinear Weighted and Ordinary Least Squares Regressions Examining the Pricing of the Systematic Bias in Analysts' Forecasts of Long-Term Earnings Growth. Forecast Errors are Conditioned on Proximity to Equity Offerings.

Panel A: Non-linear weighted least squares

$$FE_{t+1} = \alpha_0 + \varepsilon_{t+1}$$

$$AR_{t+1} = \beta_1 [Fe_{t+1} - \alpha_0^*] + \upsilon_{t+1}$$

	All deals	*All deals with affiliated analysts*	*All deals with unaffiliated analysts*
α_0	-0.121**	-0.143**	-0.118**
α_0^*	-0.029	-0.027	-0.022
β_1	1.171**	1.254**	1.102**
Tests of the cross-equation restrictions (p-value for likelihood ratio tests)			
Market efficiency ($\alpha_0^* = \alpha_0$)	0.001	0.001	0.001
Naïve expectations ($\alpha_0^* = 0$)	0.511	0.674	0.602
Number of observations	1179	440	1070

Panel B: Ordinary least squares

$$AR_{t+1} = \beta_0 + \beta_1 FE_{t+1} + \upsilon_{t+1}$$

	All deals	*All deals with affiliated analysts*	*All deals with unaffiliated analysts*
β_0	0.034	0.034	0.024
β_1	1.171**	1.254**	1.102**
Adjusted R^2	0.070	0.089	0.066
Number of observations	1179	440	1070

** significant at the one percent level.

Abnormal returns (AR_{t+1}) = cumulative five-year buy and hold market adjusted stock returns beginning three months after the issue date. A value-weighted market index is used to adjust for market performance.

Realized earnings growth = five-year annualized growth rates calculated by fitting a least squares growth line to the logarithms of the six annual observations, beginning with the offer year and ending in the fifth year after the offer year.