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Appendix A. Expectations and Price Indices

In this Appendix, we collect several results that complement the analysis of Section 2, including the analysis of synthetic price indices (Appendix A.1) as well as that of expectational errors (Appendix A.2). We start by presenting summary statistics on measured expectations.

Table A.1: Summary Statistics for Measures of Expectations

	Date Range	N	Mean	St.D	Min	Max
STG1	1976-2021	181	19.52	11.45	0.37	88.03
Δ_4STG1	1977-2021	175	0.62	14.96	-67.25	66.54
$STG1_t - \Delta_4 e_{t+4}$	1976-2020	175	15.31	27.06	-27.52	140.84
LTG	1981-2021	161	13.28	2.20	10.25	21.87
Δ_4LTG	1981-2021	157	0.14	1.92	-5.10	9.31
$LTG_t - \Delta_{20} e_{t+20}/5$	1982-2017	141	5.66	8.46	-21.21	26.95
Expected Returns CFO	1991-2022	128	5.27	1.21	2.20	9.10
Expected Returns SPF	1991-2022	128	7.68	5.03	-2.95	22.03
Expected Returns AAII	1987-2022	142	6.70	13.09	-29.15	39.03
Expected Returns PCA	1991-2022	128	0.02	1.54	-3.30	4.98

The table shows summary statistics for key variables. LTG is aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. $LTG_t - \Delta_{20} e_{t+20}/5$ is the percentage point difference in 5 year forecasted growth in earnings and realized 5-year earnings growth. $STG1$ is aggregate market expectation for 1-year earnings per share growth, calculated by value weighting firm level forecasts. $\Delta_4 STG_t$ is the 4-quarter percentage point change in aggregate market expectation for 1year earnings per share growth, calculated by value weighting firm level forecasts. $STG1_t - \Delta_4 e_{t+4}$ is the percentage point difference in 1 year forecasted growth in earnings and realized 1 year earnings growth. Δ_4 tbill 1y is the 4-quarter percentage point change in the Federal Reserve's 1-year treasury bond (DGS1). Expected Returns CFO is the average expectation of 1-year returns on the S&P500 of major US CFOs from the Richmond Fed's CFO survey, which span Q4 2001 – Q4 2022. Missing values from Q1 1991 – Q3 2002 are backfilled by taking the fitted value from a regression of

Expected Returns CFO on the first principal component of Expected Returns SPF and Expected Returns AAII. Expected Returns SPF is the average expectation of 1-year returns on the S&P500 from the Survey of Professional Forecasters, where missing values are carried forward. Expected Returns AAII is % of bullish - % bearish investors from the American Association of Individual Investors. Expected Returns PCA is the first principal component for the three measures of expected returns.

A.1 Robustness and Further Results on Price Indices

Due to data availability, our analysis focused on expectations of earnings growth. We start by extending our analysis to expectations of dividend growth. We gather monthly data on stock market analyst forecasts for S&P500 firms from the IBES Unadjusted US Summary Statistics file, focusing on (median) annual forecasts of dividends per share (DPS). Coverage starts on 1/2002 for *DPS*. We aggregate *DPS* following the same procedure as for *EPS* forecasts described in the text, and build synthetic price dividend ratios following:

$$\tilde{p}_t^D - d_t = \frac{k-r}{1-\alpha} + \ln\left(\frac{\widetilde{\mathbb{E}}_t DPS_{t+1}}{DPS_t}\right) + \sum_{j=1}^{10} \alpha^{j-1}\, \widetilde{\mathbb{E}}_t \Delta \mathrm{d}_{t+j+1} + \frac{\alpha^{10}}{1-\alpha}\, g \qquad (A.1)$$

where we assume that expectations of long run dividend growth are also described by LTG. We start by showing in Table A.2 that this index is highly correlated with the measured price dividend ratio.

Table A.2: Correlation Among Measures of Price-Earnings and Price-Dividends

	pd_t	$\tilde{p}_t^D - d_t$	pe_t	$p_t^* - e_t$
$\tilde{p}_t^D - d_t$	0.5293***			
pe_t	0.5829***	-0.5558***		
$p_t^* - e_t$	-0.2337***	-0.6670***	0.6143***	

$\tilde{p}_t - e_t$	0.0580	-0.4578***	0.7740***	0.8687***

We present partial correlations between: (a) the (log) price-dividend ratio, pd_t, (b) the difference between the (log) price index based on dividend forecasts $\tilde{p}_t^D$ and log dividends, d_t (Equation A.1), (c) the (log) price-earnings ratio, pe_t, (d) the difference between the rational benchmark index based on earnings (p_t^*, Equation 3) and log earnings e_t, and (e) the difference between the price index based on earnings forecasts, $\tilde{p}_t$, (Equation 4) and log earnings, e_t. The sample period is 1982:12-2022:12. Superscripts: *** significant at the 1% level, *** significant at the 5% level, and *** significant at the 10% level.

Alternative definitions and excess volatility. Here we consider an alternative definition of price $\tilde{p}$ where expectations at time t of growth beyond year $t+5$ is inferred by applying the observed decay of observed cyclically adjusted earnings to LTG_t. Regressing $caeps_t - caeps_{t-5}$ on $caeps_{t-5} - caeps_{t-10}$ yields a slope coefficient of roughly 0.4. Thus, for a ten-year forecasting horizon we set:

$$\tilde{p}_t^{10} = e_t + \frac{\tilde{k} - r}{1-\alpha} + \ln\left(\frac{\widetilde{\mathbb{E}}_t\, EPS_{t+1}}{EPS_t}\right) + \sum_{j=1}^{5} \alpha^{j-1}\, \widetilde{\mathbb{E}}_t \Delta e_{t+j+1} + \sum_{j=6}^{10} \alpha^{j-1} \ln(1 + 0.4 * \widetilde{\mathbb{E}}_t \Delta e_{t+5}) + \frac{\alpha^{10}}{1-\alpha}\, g_{10}. \qquad (A.2)$$

and similarly for a 15 and 20-year forecasting horizon, as well as for an alternative dividend-based index $\tilde{p}_t^{D,10}$ (where long-term growth is assumed to be described by LTG). To explore sensitivity of results, we define $\tilde{p}_t^{D,15}$ and $\tilde{p}_t^{D,20}$ analogously. Table A.3 shows the results.

Table A.3: Volatility of Dividend-Based and Earnings-Based Price

Panel A: Dividend Based Synthetic Price

Δp_t	$\boldsymbol{\Delta}\tilde{p}_t^D$	$\Delta\tilde{p}_t^{D,10}$	$\Delta\tilde{p}_t^{D,15}$	$\Delta\tilde{p}_t^{D,20}$

σ	14.8%	19.0%	15.8%	16.7%	17.0%

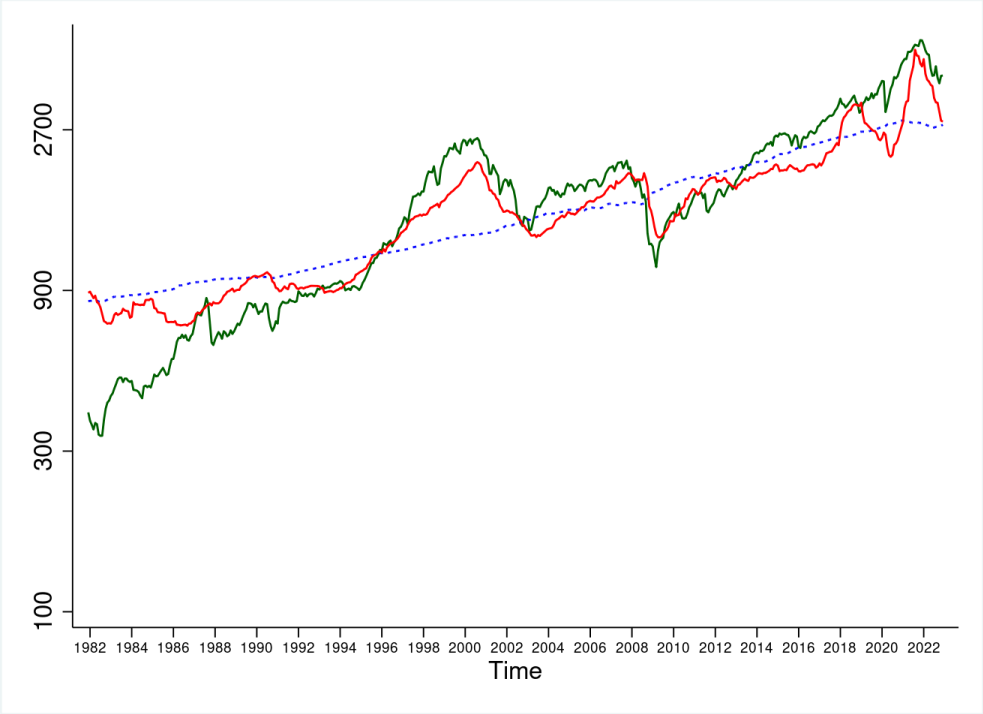
Panel B: Earnings Based Synthetic Price

	Δp_t	$\Delta\tilde{p}_t$	$\Delta\tilde{p}_t^{10}$	$\Delta\tilde{p}_t^{15}$	$\Delta\tilde{p}_t^{20}$
σ	14.8%	14.6%	12.4%	13.0%	13.2%

Panel A reports the standard deviation of one-year change in: (a) the log of the price of the S&P500 index, Δp_t, (b) the one-year change in the index based on dividend forecasts, $\Delta\tilde{p}_t^D$ (analogue of equation 4 for dividends), and (c) the one-year change in the alternative index based on dividend forecasts over 10, 15, and 20-year horizons ($\Delta\tilde{p}_t^{D,10}, \Delta\tilde{p}_t^{D,15}, \Delta\tilde{p}_t^{D,20}$, see Equation B.2). The sample period ranges from 11/2006 to 12/2020. Panel B reports the standard deviation of one-year change in: (a) the log of the price of the S&P500 index, Δp_t, (b) the one-year change in the index based on earnings forecasts, $\Delta\tilde{p}_t$ (equation 4), and (c) the one-year change in the alternative index based on earnings forecasts over 10, 15, and 20-year horizons ($\Delta\tilde{p}_t^{10}$, $\Delta\tilde{p}_t^{15}$, $\Delta\tilde{p}_t^{20}$see Equation A.2). The sample period ranges from 12/1982 to 12/2022.

We next reproduce Figure A.1, which examines the expectation-based price index (Equation 4), adjusting for inflation.

Figure A.1: Expectations-Based Price Index, Adjusted for Inflation



We plot the S&P500 index (green line), the rational benchmark index (p_t^* from equation (3), blue line) and our benchmark price index based on earnings expectations ($\tilde{p}_t$ from equation (4), red line). All values are adjusted for inflation using the CPI index.

A.2 Expectations of Earnings and Expectations of Returns

Building on BGLS (2022) we showed in Section 3 that LTG departs from rationality in the sense of overreaction: future LTG forecast errors are systematically predictable from current levels of LTG. Here, we provide further evidence on the link between LTG and expectations of returns. We start by noting that, in contrast with LTG, expectations of short-term earnings growth do not predict own future forecast errors (BGLS 2022 presents related results).

Table A.4: Predictability of Short-Term Forecast Errors with Short Term Expectations

	Time Horizon of Dependent Variable (Quarters)										
Estimates From: $STG1_{t+h} - \Delta_4 e_{t+h+4} = B_h \Delta_4 STG1_t + \varepsilon_{t+h}$											
	0	1	2	3	4	5	6	7	8	9	10
$\Delta_4 STG1_t$	2.99	1.39	-0.28	-1.21	-1.21	-0.93	-0.76	-0.93	-1.	-1.56	-1.85
	[2.90]	[2.18]	[1.68]	[1.40]	[1.25]	[1.12]	[0.98]	[0.91]	[0.91]	[1.08]	[1.24]

The estimates measure the impact of a 1 standard deviation change in revisions to short-term earnings growth expectations, $\Delta_4 STG1_t$ on forecast errors for expected short term growth. $\Delta_4 STG1_t$ is the 4-quarter percentage point change in aggregate market expectation for 1-year earnings per share growth, calculated by value weighting firm level forecasts. $STG1_{t+h} - \Delta_4 e_{t+h+4}$ is the percentage point difference in one year forecasted growth in earnings and realized 1-year earnings growth. All regressions are unconditional. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. *, **, and *** indicate statistical significance at the 90%, 95%, and 99%, confidence level, respectively.

We next show that the link between LTG and CFOs' expectations of stock returns shown in Table 2 holds more broadly in other survey measures of returns expectations.

Table A.5: LTG and Expectations of Stock Returns

	Estimates from: Expected Returns$_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
	Independent Variable: $\Delta_4 LTG_t$										
	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
Dependent Variable:											
Expected Returns CFO$_{t+h}$	0.28***	0.18*	-0.13	-0.25**	-0.20*	-0.03	-0.05	-0.23**	-0.20	-0.01	0.02
	[0.09]	[0.10]	[0.11]	[0.11]	[0.11]	[0.11]	[0.11]	[0.11]	[0.15]	[0.16]	[0.15]

Expected Returns SPF_{t+h}	0.43***	0.53***	0.04	-0.38***	-0.45***	-0.31**	-0.25*	-0.07	0.30***	0.58***	0.60***
	[0.13]	[0.17]	[0.14]	[0.11]	[0.10]	[0.12]	[0.13]	[0.14]	[0.11]	[0.09]	[0.10]
Expected Returns $AAII_{t+h}$	0.32***	0.21*	0.03	-0.05	-0.10	-0.05	-0.05	-0.02	0.14	0.15	0.15
	[0.10]	[0.12]	[0.13]	[0.13]	[0.15]	[0.14]	[0.14]	[0.14]	[0.17]	[0.18]	[0.19]
Expected Returns PCA_{t+h}	0.26***	0.24**	-0.07	-0.39***	-0.43***	-0.23**	-0.07	-0.08	0.12	0.27*	0.31**
[0.09]	[0.10]	[0.10]	[0.11]	[0.11]	[0.11]	[0.11]	[0.13]	[0.16]	[0.15]	[0.13]	

The estimates measure the impact of a 1 standard deviation change in revisions to long-term earnings growth expectations, $\Delta_4 LTG_t$, on different measures of expected stock returns. $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Expected Returns CFO is the average expectation of 1-year returns on the SP500 of major US CFOs from the Richmond Fed's CFO survey, which span Q4 2001 – Q4 2022. Missing values from Q1 1991 – Q3 2002 are backfilled by taking the fitted value from a regression of Expected Returns CFO on the first principal component of Expected Returns SPF and Expected Returns AAII. Expected Returns SPF is the average expectation of 1-year returns on the SP500 from the Survey of Professional Forecasters, where missing values are carried forward. Expected Returns AAII is % of bullish - % bearish investors from the American Association of Individual Investors. Expected Returns PCA is the first principal component for the three measures of expected returns. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. All dependent variables have been standardized for comparability. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. *, **, and *** indicate statistical significance at the 90%, 95%, and 99%, confidence level, respectively.

Finally, we report a Granger causality analysis on the link between LTG and expectations of returns. We estimate VAR systems that include i) One of four measures of expected returns from table A.5, ii) LTG, iii) the policy interest rate, iv) cpi inflation, and v) yearly returns on the S&P500. Table A.6 shows p-values for Granger Causality tests, where the row indicates the specific measure of expected returns used, and the column name indicates the number of lags in the system. The table

shows that LTG strongly predict expected returns (L ⇒ ER), but the inverse (ER ⇒ L) is only true in higher lag specifications.

Table A.6: Granger Causality Tests, Expected Returns and LTG

VAR system: [Expected Returns, LTG, Controls]

$$ER_t = \sum_1^h A_h\, ER_{t-h} + \sum_1^h B_h\, LTG_{t-h} + \sum_1^h C_h\, X_{t-h} + \varepsilon_t$$

$$LTG_t = \sum_1^h A_h\, ER_{t-h} + \sum_1^h B_h\, LTG_{t-h} + \sum_1^h C_h\, X_{t-h} + \varepsilon_t$$

	Lags (h) = 2		Lags (h) = 4		Lags (h) = 8	
Returns Expectation	ER ⇒ L	L ⇒ ER	ER ⇒ L	L ⇒ ER	ER ⇒ L	L ⇒ ER
(1) Expected Returns CFO	0.73	**0.06**	0.19	**0.01**	**0.04**	**0.00**
(2) Expected Returns SPF	0.83	**0.06**	0.25	**0.00**	**0.02**	**0.00**
(3) Expected Returns AAII	0.71	**0.01**	0.57	**0.01**	0.20	**0.04**
(4) Expected Returns PCA	0.91	0.15	0.20	**0.01**	**0.08**	**0.00**

The table shows p-values from simple Granger causality tests comparing LTG to different measures of expected returns. Each system contains LTG, the comparison measure of expected return, and a vector of controls X which include the policy interest rate, the yearly SP500 return, and yearly cpi inflation. C_h is a vector of coefficients for control variables. ER ⇒ L represents p-values where the null hypotheses is that the indicated measure of expected returns does not Granger cause LTG. L ⇒ ER represents p-values where the null hypotheses is that LTG does not Granger cause the indicated measure of expected returns. LTG is aggregate market expectation for 1-year earnings per share growth, calculated by value weighting firm level forecasts. Expected Returns CFO is the average expectation of 1-year returns on the SP500 of major US CFOs from the Richmond Fed's CFO survey, which span Q4 2001 – Q4 2022. Missing values from Q1 1991 – Q3 2002 are backfilled by taking the fitted value from a regression of Expected Returns CFO on the first principal component of Expected Returns SPF and Expected Returns AAII. Expected Returns SPF is the average expectation of 1-year returns on the SP500 from the Survey of Professional Forecasters, where missing values are carried forward. Expected Returns AAII is % of bullish - % bearish investors from the American Association of Individual Investors. Expected Returns PCA is the first principal component for the three measures of expected returns.

Appendix B. LTG and the Business Cycle

In this Appendix, we provide several results that complement the analysis of Section IV on the link between LTG and the business cycle. Table B1 shows descriptive statistics of the macro economic variables we examine.

Table B.1: Summary Statistics for Macroeconomic Variables

	Date Range	N	Mean	St.D	Min	Max
$\Delta_4$tbill 1Y	1963-2022	239	-0.01	1.71	-6.54	6.60
$\Delta_4$tbill 10Y	1963-2022	239	-0.02	1.23	-4.29	3.97
$\Delta_4$baa credit spread 10Y	1963-2022	239	0.02	0.78	-3.49	3.39
$\Delta_4$gdp	1948-2022	300	0.03	0.03	-0.09	0.13
$\Delta_4$consumption	1960-2022	252	0.03	0.03	-0.17	0.22
$\Delta_4$investment-to-capital	1948-2022	300	-0.00	0.07	-0.26	0.23
$\Delta_4$unemployment rate	1949-2022	296	0.00	1.55	-8.60	11.10
$\Delta_4$employment	1949-2022	296	0.01	0.02	-0.16	0.13
$\Delta_4$total wages	1960-2022	252	0.03	0.03	-0.07	0.10
inflation 1y	1948-2022	300	3.53	2.95	-2.87	14.59
$\Delta_4$sp500	1976-2021	184	0.08	0.15	-0.51	0.42
$\Delta_4$federal funds rate	1955-2022	270	0.00	2.08	-6.82	10.01

The table shows summary statistics for key macroeconomic variables. Δ_4 tbill 1y is the 4-quarter percentage point change in the Federal Reserve's 1-year treasury bond (DGS1). Δ_4 tbill 10y is the 4-quarter percentage point change in the Federal Reserve's 10-year treasury bond (DGS10). Δ_4 baa credit spread 10y is the 4-quarter percentage point change in the yield spread between Moody's 10y BAA bond (BAA) and the US 10-year Treasury Bond (DGS10). Δ_4 gdp is the 4-quarter log change in real gdp (GDP / GDPDEF). Δ_4 consumption is the 4-quarter log change in real consumption (PCE / GDPDEF). Δ_4 investment-to-capital is the 4-quarter log

change in the ratio of non-residential investment (PNFI) to the previous year's cost of capital (K1NTOTL1ES000). Δ_4 unemployment rate is the 4-quarter percentage point change in the unemployment rate (UNRATE). Δ_4 employment is the 4-quarter log change in total employment (CE16OV). Δ_4 total wages is the 4-quarter log change in total real wage disbursements (A576RC1 / GDPDEF). inflation 1y is the 4-quarter percentage point change in annual cpi inflation (CPIAUCSL). $\Delta_4$sp500 is the 4-quarter log return on the SP50. Δ_4 federal funds rate is the 4-quarter percentage point change in the policy interest rate (FEDFUNDS).

We next present the quarterly local projections (Jorda 2005) of these variables that underlie Figure 6. These use as independent "shock" the yearly LTG_t change and as outcomes the year-on-year changes in the variables above. As in Table 4, we start from the contemporaneous correlation between the shock and each outcome, h = 0, and then predict the outcome variable for future quarters h = 1, ….10.

Table B.2: LTG and $\Delta_4$gdp

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Panel A: Estimates From $\Delta_4 \text{gdp}_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	0.48*	0.76**	0.91**	0.83**	0.04	-0.59	-1.16***	-1.33***	-1.05***	-0.71***	-0.22
	[0.25]	[0.39]	[0.39]	[0.37]	[0.39]	[0.41]	[0.39]	[0.35]	[0.25]	[0.25]	[0.27]
AR^2	0.79	0.57	0.43	0.25	0.03	0.02	0.09	0.15	0.06	-0.04	-0.06
N	151	151	151	151	151	151	151	151	151	151	151

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on Δ_4 gdp$_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. Δ_4 gdp is the 4-quarter log change in real gdp (GDP / GDPDEF). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Table B.3: LTG and Δ_4 consumption

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Panel A: Estimates From $\Delta_4 \text{consumption}_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	0.95	1.31**	1.42**	1.42***	-0.10	-0.97	-1.71**	-1.97***	-1.26***	-0.69*	0.19
	[0.63]	[0.66]	[0.58]	[0.50]	[0.74]	[0.71]	[0.72]	[0.66]	[0.41]	[0.38]	[0.50]
AR^2	0.42	0.39	0.37	0.34	-0.07	-0.04	0.08	0.13	-0.02	-0.09	-0.09
N	151	151	151	151	151	151	151	151	151	151	151

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on $\Delta_4 \text{consumption}_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. Δ_4 consumption is the 4-quarter log change in real consumption (PCE / GDPDEF). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Table B.4: LTG and Δ_4 employment

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Panel A: Estimates From $\Delta_4 \text{employment}_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	-0.02	0.83	1.29**	1.47***	1.21***	-0.10	-1.32**	-2.09***	-1.97***	-1.62***	-0.77*
	[0.06]	[0.64]	[0.65]	[0.57]	[0.39]	[0.56]	[0.61]	[0.53]	[0.37]	[0.30]	[0.43]
AR^2	0.89	0.30	0.28	0.28	0.16	-0.00	0.07	0.24	0.19	0.07	-0.03
N	150	150	150	150	150	150	150	150	150	150	150

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on Δ_4 employment$_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. Δ_4 employment is the 4-quarter log change in total employment (CE16OV). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Table B.5: LTG and Δ_4 unemployment rate

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Panel A: Estimates From Δ_4 unemployment rate$_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	0.01	-0.49	-0.82**	-0.98***	-0.76***	0.04	0.84**	1.41***	1.37***	1.16***	0.64**
	[0.03]	[0.33]	[0.38]	[0.35]	[0.23]	[0.31]	[0.38]	[0.35]	[0.29]	[0.25]	[0.30]
AR^2	0.93	0.43	0.34	0.31	0.150.03	0.09	0.29		0.25	0.09	0.03
N	150	150	150	150	150150	150	150		150	150	150

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on Δ_4 unemployment rate$_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. Δ_4 unemployment rate is the 4-quarter percentage point change in the unemployment rate (UNRATE). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Table B.6: LTG and Δ_4 total wages

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10

	Panel A: Estimates From Δ_4 total wages$_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	0.09	0.66**	0.88***	0.86***	0.63***	-0.09	-0.66*	-0.96***	-0.88***	-0.74***	-0.37
	[0.11]	[0.28]	[0.26]	[0.28]	[0.23]	[0.34]	[0.38]	[0.35]	[0.27]	[0.24]	[0.28]
AR^2	0.86	0.71	0.64	0.49	0.29	0.14	0.08	0.05	0.02	-0.07	-0.13
N	150	150	150	150	150	150	150	150	150	150	150

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on Δ_4 total wages$_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. Δ_4 total wages is the 4-quarter log change in total real wage disbursements (A576RC1 / GDPDEF). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Table B.7: LTG and Δ_4 inflation

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Panel A: Estimates From Δ_4 inflation 1y$_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{X}_t + \varepsilon_{t+h}$										
$\Delta_4 LTG_t$	0.11	0.29***	0.38***	0.43***	0.33***	-0.01	-0.36**	-0.63***	-0.85***	-0.89***	-0.85***
	[0.07]	[0.11]	[0.12]	[0.14]	[0.12]	[0.15]	[0.18]	[0.18]	[0.22]	[0.26]	[0.31]
AR^2	0.77	0.51	0.39	0.27	0.25	0.22	0.21	0.20	0.17	0.10	0.03
N	150	150	150	150	150	150	150	150	150	150	150

The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ and $\widehat{FE}_t$ on inflation 1y$_{t+h}$. The set of controls include 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. inflation 1y is the 4-quarter percentage point change in annual cpi inflation (CPIAUCSL). $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are

computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

We next report the point estimates corresponding to Figure 5, which shows that systematic optimism today predicts investment growth that is cumulatively lower after 5 years. The estimates are shown in Table B.8.

Table B.8: LTG and Cumulative Changes in investment-to-capital

	Time Horizon of Dependent Variable (Quarters)										
	0	2	4	6	8	10	12	14	16	18	20
	Estimates From: Δ_h investment-to-capital$_{t+h} = B_h \Delta_4 LTG_t + \boldsymbol{\delta}_h \widehat{FE}_t + \boldsymbol{X}_t + \varepsilon_{t+h}$ First Stage: $LTG_t - \Delta_{20} e_{t+20}/5 = \Phi LTG_t + \varepsilon_t \rightarrow \widehat{FE}_t$										
$\widehat{FE}_t$	0.13	0.25	-0.31	-1.45***	-2.29***	-3.06***	-3.78***	-4.37***	-4.87***	-5.26***	-5.55***
	[0.30]	[0.42]	[0.58]	[0.67]	[0.71]	[0.67]	[0.68]	[0.68]	[0.76]	[0.84]	[0.89]
AR^2	0.03	0.46	0.39	0.28	0.26	0.30	0.32	0.32	0.33	0.28	0.21
N	138	138	138	138	138	138	138	138	138	138	138

The estimates measure the impact of a 1 standard deviation change in $\widehat{FE}_t$ on Δ_h investment-to-capital$_{t+h}$. The set of controls include $\Delta_4 LTG_t$, 12 lags of changes in the dependent variable, 12 lags of changes in the policy interest rate, 12 lags of yearly cpi inflation, and 12 lags of the yearly SP500 return. is the 4-quarter percentage point change in annual cpi inflation (CPIAUCSL). LTG_t is the aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. FE_t is defined as the difference between (a) aggregate market expectation for 5-year earnings per share growth, LTG_t, and (b) the average annual growth in earnings per share between quarter t and t+20, $\Delta_{20} e_{t+20}/5$. $\widehat{FE}_t$ are fitted values from the regression of FE_t on LTG_t. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.

Next, we report a Granger causality analysis on the link between LTG and macro-economic variables. We estimate VAR systems that include i) LTG and ii) one of six real variables explored in Figure 5. Table B.9 shows p-values from Granger Causality tests where the null hypothesis for L ⇒

R is that LTG does not predict the indicated real variable, and R ⇒ L are p-values where the null hypothesis is that the indicated real variable does not predict LTG. The table shows that LTG strongly predicts all real variables.

Table B.9: Granger Causality Tests, Real Economy and LTG

VAR system: [Real Variable, LTG]

$$y_t = \sum_{1}^{h} A_h\, y_{t-h} + \sum_{1}^{h} B_h\, LTG_{t-h} + \varepsilon_t$$

$$LTG_t = \sum_{1}^{h} A_h\, y_{t-h} + \sum_{1}^{h} B_h\, LTG_{t-h} + \varepsilon_t$$

	Lags (h) = 2		Lags (h) = 4		Lags (h) = 8	
Real Variable	R ⇒ L	L ⇒ R	R ⇒ L	L ⇒ R	R ⇒ L	L ⇒ R
(1) gdp	0.67	**0.00**	0.93	**0.00**	**0.07**	**0.00**
(2) investment-to-capital	0.74	**0.00**	0.46	**0.00**	0.28	**0.04**
(3) consumption	0.43	**0.01**	0.82	**0.00**	**0.01**	**0.00**
(4) employment	0.11	**0.01**	0.16	**0.00**	**0.00**	**0.00**
(4) unemployment rate	0.18	**0.00**	0.33	**0.00**	**0.00**	**0.00**
(5) total wages	0.13	**0.00**	0.18	**0.00**	**0.00**	**0.01**
(6) inflation 1y	**0.09**	**0.01**	0.29	**0.01**	0.61	**0.0(**

The table shows p-values from simple Granger causality tests comparing LTG to real economy variables. Each system contains only the comparison real economy variable and expectations for long-term earning growth. R ⇒ L represents p-values where the null hypotheses is that the real variable does not Granger cause LTG. L ⇒ R represents p-values where the null hypotheses is that LTG does not Granger cause the real variable. LTG is aggregate market expectation for 1-year earnings per share growth, calculated by value weighting firm level forecasts. gdp is log real gdp (GDP / GDPDEF). investment-to-capital is the ratio of non-residential

investment (PNFI) to the previous year's cost of capital (K1NTOTL1ES000). consumption is log real consumption (PCE / GDPDEF). unemployment rate is the unemployment rate (UNRATE). employment is the log of total employment in the economy (CE16OV). total wages is log total real wage disbursements (A576RC1 / GDPDEF). inflation 1y is the 4-quarter percentage point change in annual cpi inflation (CPIAUCSL).

Finally, in table B.10 we investigate the relationship between LTG revisions and news about "risk shocks" faced by entrepreneurs from Cristiano et. al (2014). The table shows that on impact, revisions to LTG predict positive news shocks contemporaneously and in the immediate short run (rows 0-2), but in the long run predict negative news shocks (rows 5-8). This is consistent with the notion that positive news shocks capture the short run momentum of LTG which turns into predictable reversals when expectations eventually disappoint in the medium and long run.

Table B.10: LTG and Risk Shocks

	Time Horizon of Dependent Variable (Quarters)										
	0	1	2	3	4	5	6	7	8	9	10
	Estimates From: $Shock_{t+h} = B_h \Delta_4 LTG_t + \varepsilon_{t+h}$										
Dependent Variable (Shock)											
[0] $\xi_{0,t+h}$	0.18	0.31**	0.33**	0.35***	0.40***	0.37***	0.34***	0.32***	0.27**	0.20	0.16
	[0.19]	[0.14]	[0.13]	[0.11]	[0.13]	[0.12]	[0.12]	[0.12]	[0.11]	[0.13]	[0.11]
[1] $\xi_{1,t+h}$	0.17	0.34**	0.35***	0.40***	0.41***	0.32***	0.35***	0.31**	0.26**	0.24**	0.16*
	[0.18]	[0.14]	[0.13]	[0.12]	[0.10]	[0.12]	[0.13]	[0.13]	[0.13]	[0.11]	[0.10]
[2] $\xi_{2,t+h}$	0.09	0.24*	0.27*	0.28**	0.20*	0.16	0.22*	0.19	0.22*	0.19**	0.12*
	[0.14]	[0.13]	[0.14]	[0.12]	[0.11]	[0.15]	[0.13]	[0.15]	[0.12]	[0.09]	[0.07]
[3] $\xi_{3,t+h}$	-0.03	0.14	0.12	0.05	0.02	-0.00	0.08	0.12	0.15*	0.14	0.09
	[0.14]	[0.13]	[0.14]	[0.15]	[0.15]	[0.12]	[0.11]	[0.11]	[0.09]	[0.09]	[0.08]
[4] $\xi_{4,t+h}$	-0.13	-0.03	-0.13	-0.14	-0.15	-0.15	0.01	0.04	0.09	0.10	0.09
	[0.15]	[0.16]	[0.15]	[0.16]	[0.13]	[0.11]	[0.12]	[0.13]	[0.11]	[0.11]	[0.10]
[5] $\xi_{5,t+h}$	-0.28*	-0.27*	-0.30**	-0.28**	-0.27**	-0.18*	-0.06	-0.01	0.05	0.09	0.09

	[0.16]	[0.15]	[0.13]	[0.13]	[0.11]	[0.10]	[0.11]	[0.12]	[0.12]	[0.13]	[0.11]
[6] $\xi_{6,t+h}$	-0.45***	-0.39***	-0.39***	-0.35***	-0.27**	-0.20*	-0.09	-0.03	0.04	0.08	0.07
	[0.11]	[0.11]	[0.11]	[0.10]	[0.12]	[0.11]	[0.13]	[0.13]	[0.13]	[0.13]	[0.12]
[7] $\xi_{7,t+h}$	-0.50***	-0.44***	-0.41***	-0.32***	-0.25**	-0.18	-0.09	-0.02	0.05	0.06	0.08
	[0.09]	[0.11]	[0.10]	[0.12]	[0.12]	[0.13]	[0.12]	[0.12]	[0.12]	[0.13]	[0.12]
[8] $\xi_{8,t+h}$	-0.54***	-0.47***	-0.37***	-0.30**	-0.23*	-0.17	-0.07	-0.01	0.04	0.07	0.10
	[0.10]	[0.11]	[0.12]	[0.13]	[0.14]	[0.13]	[0.13]	[0.13]	[0.13]	[0.13]	[0.12]

Note: The estimates measure the impact of a 1 standard deviation change in $\Delta_4 LTG_t$ on unanticipated ($\xi_{0,t+h}$) and anticipated ($\xi_{3,t+h}, \xi_{2,t+h,\ldots}\ \xi_{8,t+h}$) innovations to risk shocks from Christiano et. al (2014), where risk is defined as the cross-sectional variance in the idiosyncratic productivity shock experienced by entrepreneurs. $\xi_{0,t+h}$ is period t news about the period t risk shock, while $\xi_{i,t+h}$ is news about the period t risk shock that arrives in quarter t-i. $\Delta_4 LTG_t$ is the 4-quarter percentage point change in aggregate market expectation for 5-year earnings per share growth, calculated by value weighting firm level forecasts. FE_t is defined as the difference between (a) aggregate market expectation for 5-year earnings per share growth, LTG_t, and (b) the average annual growth in earnings per share between quarter t and t+20, $\Delta_{20} e_{t+20}/5$. All dependent variables are standardized for comparability. Heteroskedasticity-consistent asymptotic standard errors reported in parentheses are computed according to Huber-White. Superscripts: *** significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.