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A String of Earnings Increases, Future Earnings Uncertainty, and Firm Fundamentals

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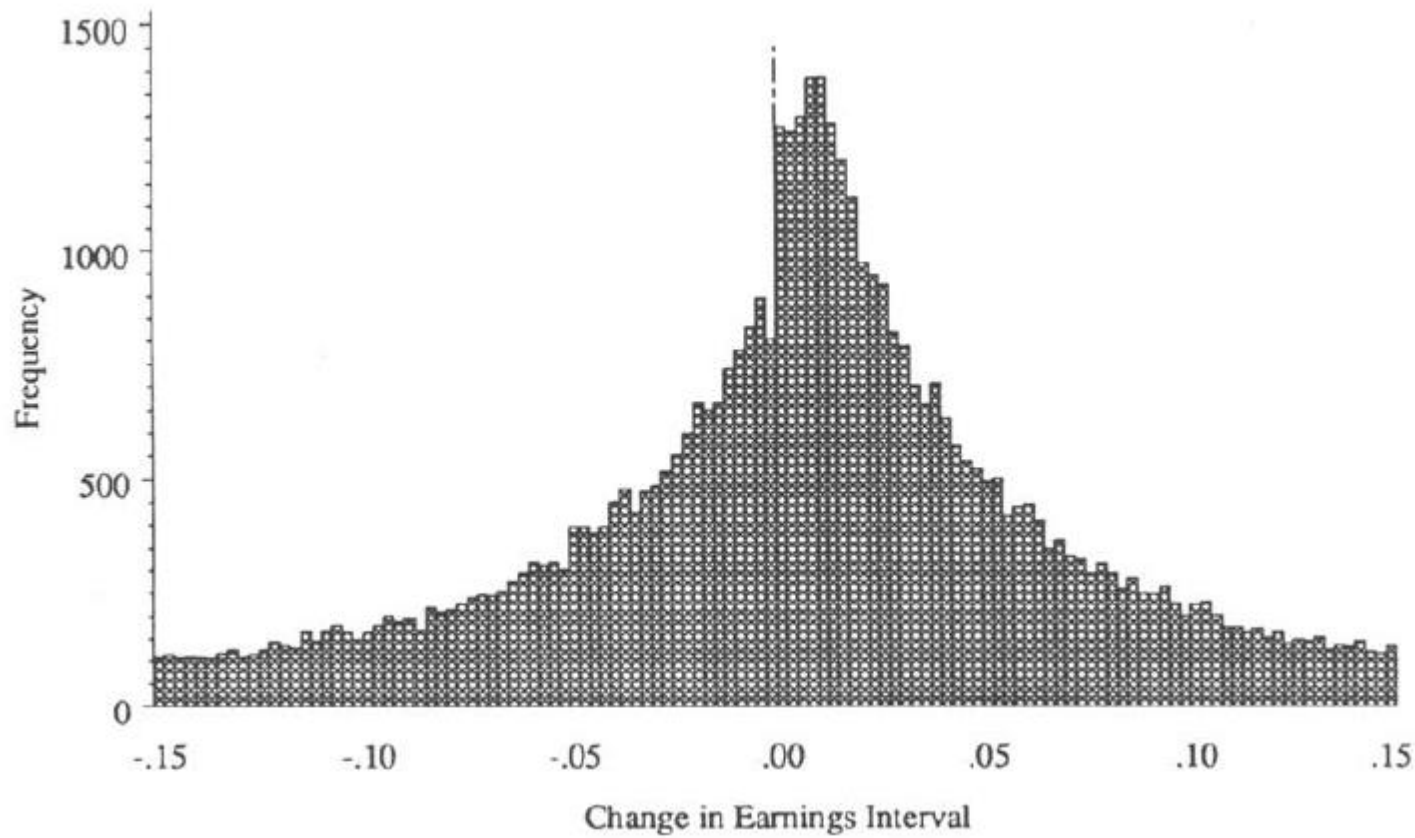
SEC Working Papers Forum
19th August 2015

Why is it interesting?

- There is anecdotal evidence that a number of managers likely focus on creating consistent earnings growth.
- In addition, scientific evidence shows that there exists a discontinuity in reported earnings distribution around three earnings benchmarks, i.e. zero earnings, previous period's earnings, and analyst consensus earnings forecasts.
- In other words, firms prefer reporting small profits to reporting losses, showing increasing earnings over previous periods' earnings, and announcing positive earnings surprises relative to analysts' earnings expectations.

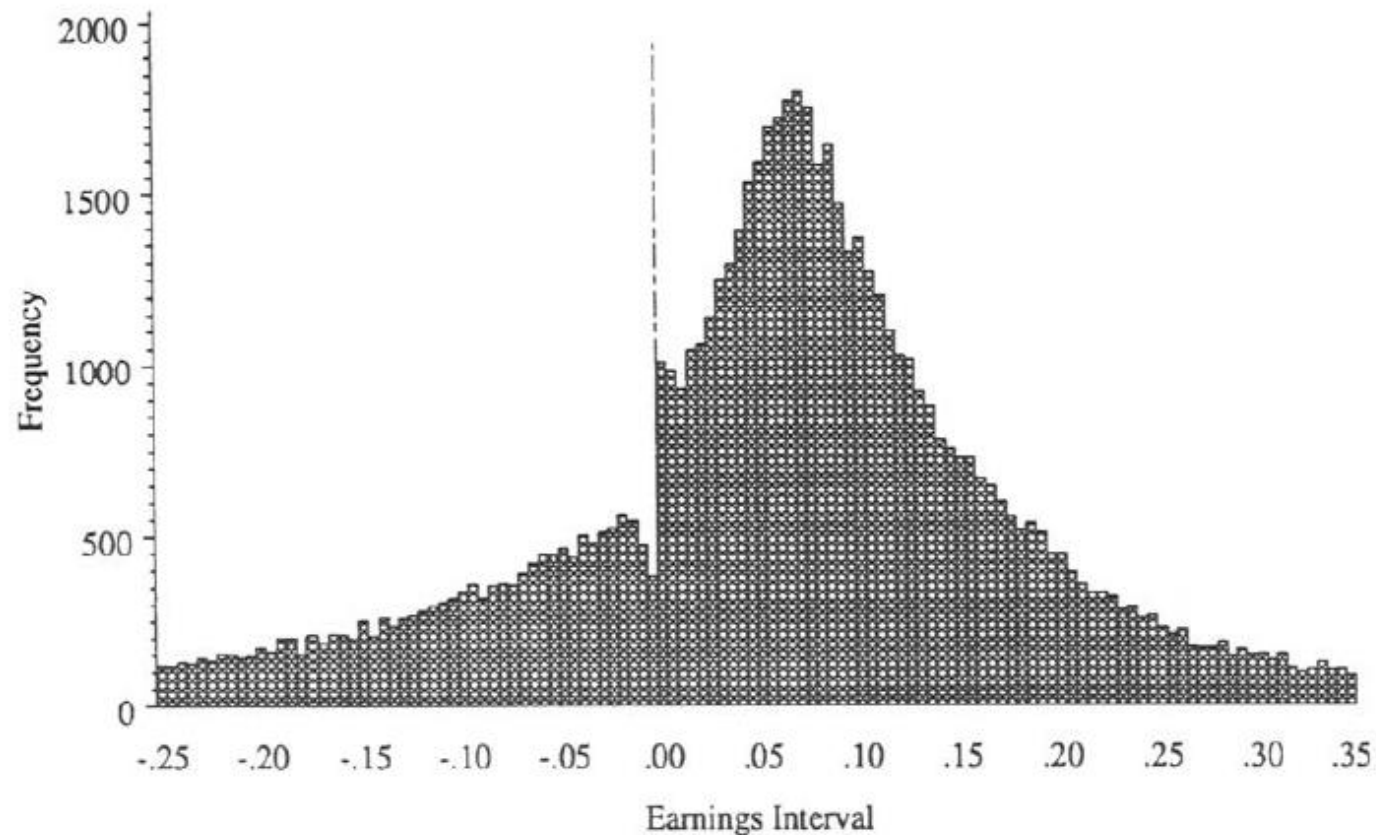
Earnings Distributions (1)

- Earnings Increases (Burgstahler and Dichev, 1997)



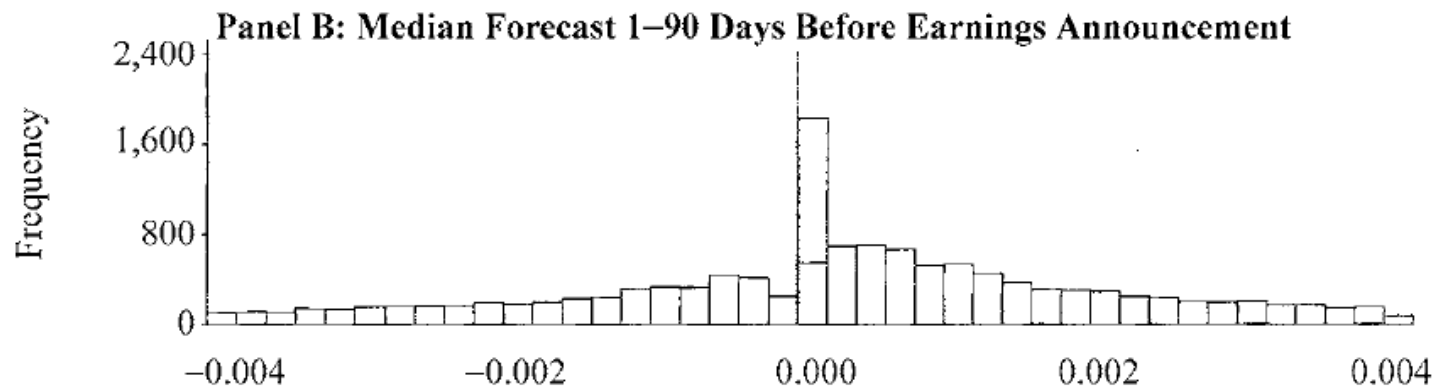
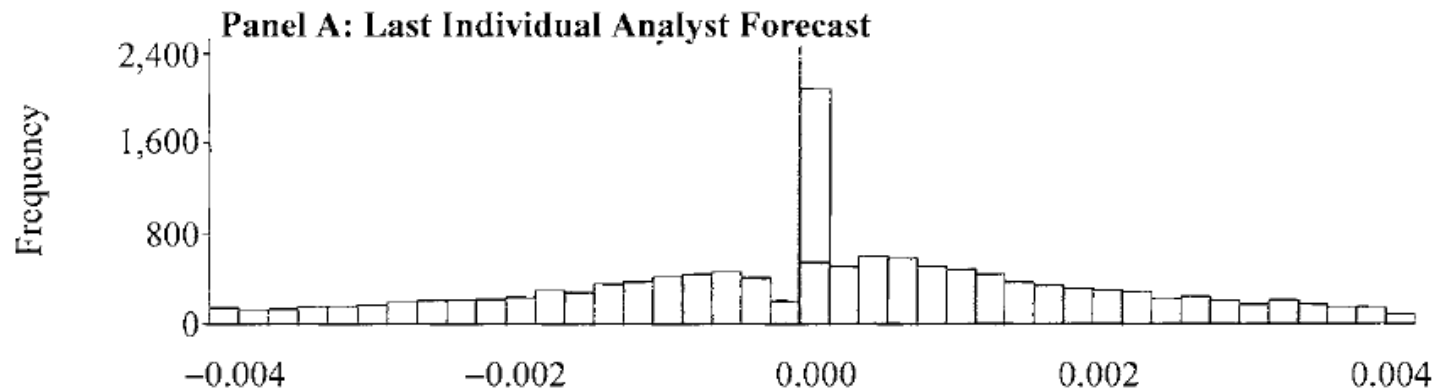
Earnings Distributions (2)

- Positive Earnings (Burgstahler and Dichev, 1997)



Earnings Distributions (3)

- Earnings Forecasts (Burgstahler and Eames, 2006)



- Markets assign rewards (penalties) for firms with meeting or beating (missing) these three benchmarks (e.g. Kasznik and McNichols, 2002; Francis et al., 2003; Skinner and Sloan, 2002; Shanthikumar, 2012; Liu, 2013).
- Economic-related rewards given to such firms are in the forms of
 - Higher price-earnings multiples (Barth et al., 1999)
 - Positive abnormal returns (Bartov et al., 2002)
 - Lower cost of debt (Jiang, 2008)
- One can simply ask a following question: what really drives this phenomenon?

Main Explanations

Growth-based Explanation	Risk-based Explanation
<p>MBEB conveys positive information about future earnings (Bartov et al., 2002)</p>	<p>Market rewards possibly are attributed to investors' perceptions that these firms are less risky (Kasznik and McNichols, 2002).</p>
<p>MBEB firms report a higher series of future earnings (Kasznik and McNichols, 2002).</p>	<p>Terminating a string of earning increases is associated with higher expected rate of returns – implying higher risk – and downwardly revised expectations of future cash flows (Xie, 2011).</p>
<p>Consistent earnings patterns convey information about both better future performance and higher management's credibility (Koonce and Lipe, 2010).</p>	<p>Information asymmetry is reduced after beating earnings expectations because MBEB attracts investors' attention and increase a firm's investment visibility (Brown et al., 2009).</p>

- Although growth and risk seem as two distinct inputs, recent research suggests they are inter-related.
 - Penman and Yehuda (2015) argue that, in addition to cash-flow news, accounting measures convey discount rate news. They posit that deferral of earnings continues until uncertainty is resolved implying higher risk. In contrast, earnings realization implies a decrease in expected rate of return due to resolution of uncertainty.
 - Nekrasov and Shroff (2009) propose a model in which expected earnings are modified for risk and no further adjustment to the discount rate should be used beyond risk-adjusted expected earnings. Their model specifies that risk residing in economic fundamentals, i.e. earnings, affects firm value.
- Combining two papers, it suggests that earnings growth is related to lower risk.

Other Explanation

- It is commonly known that firm fundamentals determine both earnings and firm value (e.g. Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997; Tomy, 2012; Yao, 2014).
- If fundamental information is manifested in earnings persistence or reflects earnings growth, it seems logical that a firm with stronger fundamentals would exhibit either higher persistence of earnings or larger subsequent earnings growth or both, and in turn higher prices.
- Theoretically, I find that sufficiently high earnings persistence drives a string of earnings in the absence of a strong time trend in earnings.

1st Question

- To the extent that investors employ past earnings patterns to predict future performance reflected in prices, they also predict future risk.
- I therefore ask if market rewards to increasing earnings patterns are related to predicted variability in future earnings.
- More specifically, I investigate if variability in future earnings (my proxy for investors' estimate of future risk) provides incremental explanatory power over the variability in past earnings.

2nd Question

- while prior research suggests that increasing earnings patterns are associated with earnings growth, a firm cannot grow forever.
- Hence, it is unlikely that market rewards to longer patterns of increasing earnings are associated with better future growth opportunities. Instead, market rewards may be related to past strong fundamentals.
- I therefore examine if longer patterns are positively related to past fundamentals but unrelated to future growth.

3rd Question

- Having a relative short string of earnings increases may be related in equal measures to growth and reduced future risk. Yet, because firms cannot continue to grow in perpetuity, the predictive balance of an earnings string may shift in the direction of risk rather than growth as the string has prolonged.
- Because longer patterns of earnings increases are less likely to predict future growth, then longer patterns should be better predictors of lower future risk than shorter patterns.
- I therefore explore if the association between future risk and the pattern of increasing earnings is moderated by the length of the pattern, conditional on firm fundamentals.

The Definition of A String

- A firm with a string of earnings increases is defined as a firm that reports at least twenty consecutive quarters of increases in seasonally adjusted earnings per share (EPS).
- An EPS increase is defined compared with earnings per share (EPS) from the same quarter of the prior year.
- The four quarters lagged earnings benchmark is informed by Graham et al.'s (2005) findings.
- Note that, By construction, the definition of firms with a string in this study is more restricted than other papers using annual earnings.

- Accounting and market data are collected from both COMPUSTAT and CRSP databases.
- The dataset covers all available US listed firms during the period of 1971 – 2014.
- Since I require at least five years of earnings history, the sample is substantially reduced to 440,105 firm-quarter observations. To calculate future earnings variability, the final sample is 215,532 firm-quarter observations between 1976 and 2009.
- While it is impossible to overcome this problem, to mitigate this concern, I delete all firms that do not report at least twenty quarters of earnings history. This implies that survivorship rate is similar for both string and non-string firms.

Sample Formation

Data	Firm-Quarter Observations	Firms
Data set from matched Compustat/CRSP database for the period 1971 – 2014	975,526	23,393
Less missing CUSIP and duplicate observations	(34,410)	(825)
Quarterly Data without missing CUSIP and duplicates for the period 1971 – 2014	941,116	22,568
Less observations without five years of earnings history	(501,011)	(10,865)
Sample with at least five years of earnings history for the period 1976 – 2014	440,105	11,703
Less observations without five years of future earnings	(224,573)	(5,420)
Final Sample with required earnings data for the period 1976 – 2009	215,532	6,283

Descriptive Statistics

Variable	Observ.	Mean	Median	S.D.	Max	Min	Differences in Means			Differences in Median		
							String ^a	Non-String	p-value	String ^a	Non-String	p-value
<i>PRICE</i>	439,018	20.709	15.670	18.875	87.920	0.187	44.644***	20.623	0.000	39.085***	15.625	0.000
<i>EPS</i>	440,105	0.281	0.210	0.615	2.290	-2.060	1.043***	0.278	0.000	0.890***	0.210	0.000
<i>STRING</i>	440,105	0.004	0.000	0.060	1.000	0.000	1.000	0.000	N/A	1.000	0.000	N/A
<i>ASSET</i>	436,334	57.833	10.987	161.516	1,398.8	0.148	30.149***	57.934	0.000	10.846***	10.988	0.003
<i>LIABILITY</i>	435,623	42.018	5.345	131.422	1,127.1	0.021	21.474***	42.092	0.000	5.019***	5.346	0.001
<i>BVE</i>	433,143	12.538	9.441	11.721	56.129	-1.805	21.799***	12.505	0.000	19.316***	9.407	0.000
<i>STGROWTH</i>	429,987	0.041	0.041	0.511	3.618	-1.709	0.175***	0.041	0.000	0.140***	0.041	0.000
<i>LTGROWTH</i>	411,407	0.021	0.019	0.151	0.639	-0.403	0.154***	0.020	0.000	0.132***	0.019	0.000
<i>EVAR</i>	364,106	33.451	2.362	120.467	939.649	0.013	0.719***	33.593	0.000	0.014***	2.395	0.000
<i>FEVAR</i>	215,532	34.329	2.336	122.906	940.049	0.013	6.277***	34.489	0.000	0.096***	2.376	0.000
<i>DE</i>	404,534	0.901	0.480	1.829	12.423	-4.766	0.741***	0.901	0.001	0.361***	0.480	0.000
<i>FSCORE</i>	439,964	0.500	0.498	0.068	0.658	0.000	0.511***	0.500	0.000	0.510***	0.498	0.000
<i>BMRATIO</i>	432,076	0.789	0.632	0.680	4.116	-0.525	0.547***	0.790	0.000	0.470***	0.633	0.000
<i>RD</i>	136,839	0.194	0.024	0.603	4.964	0.000	0.034***	0.195	0.000	0.009***	0.024	0.000
<i>CAPEX</i>	421,885	0.033	0.002	1.135	6.588	-7.046	0.161***	0.032	0.000	0.032***	0.002	0.000
<i>SALES</i>	437,598	10.814	2.013	31.417	283.206	0.000	7.319***	10.826	0.000	2.435**	2.012	0.041
<i>SALESGROWTH</i>	435,705	0.126	0.070	0.471	4.100	-0.867	0.170***	0.126	0.000	0.135***	0.070	0.000
<i>SALESVAR</i>	436,227	367.170	0.616	2,390.7	24,170.1	0.000	96.652***	368.155	0.000	0.532***	0.617	0.000
<i>AGE</i>	438,612	18.186	15.000	10.723	49.000	5.000	17.584**	18.188	0.025	15.000	15.000	0.982

Empirical Test – Q1

- **Estimating Pricing Effects of Future Earnings Uncertainty**

$$\begin{aligned} PRICE_{it} = & \beta_0 + \beta_1 EPS_{it} + \beta_2 STRING_{it} + \beta_3 U\&B_{it} + \beta_4 LTGROWTH_{it} + \beta_5 EVAR_{it} \\ & + \beta_6 FEVAR_{it} + \beta_7 DE_{it} + \beta_8 (EPS_{it} \times STRING_{it}) + \beta_9 (EPS_{it} \times U\&B_{it}) \\ & + \beta_{10} (EPS_{it} \times LTGROWTH_{it}) + \beta_{11} (EPS_{it} \times EVAR_{it}) \\ & + \beta_{12} (EPS_{it} \times FEVAR_{it}) + \beta_{13} (EPS_{it} \times STRING_{it} \times EVAR_{it}) \\ & + \beta_{14} (EPS_{it} \times STRING_{it} \times FEVAR_{it}) + \beta_{15} (EPS_{it} \times DE_{it}) \\ & + \beta_{16} AGE_{it} + \beta_{17} BVE_{it} + \varepsilon_{it} \end{aligned}$$

Empirical Test – Q1

- I empirically construct a simplified measure of risk in future earnings using quarterly earnings per share realization.
- Specifically, variability in future earnings is defined as variance of (ex post) future twenty quarters' (five years) percentage changes in quarterly earnings per share.
- Technically, this equation attempts to rescue inferences from econometric problems as follows:
 - an omitted correlated variable problem
 - an exclusion of fixed effects
 - clustering standard errors

Empirical Results – Q1

Variable	<i>PRICE</i>	<i>EPS</i>	<i>STRING</i>	<i>U&B</i>	<i>LT GROWTH</i>	<i>EVAR</i>	<i>FEVAR</i>
<i>PRICE</i>		0.635*** (0.000)	0.062*** (0.000)	0.091*** (0.000)	0.096*** (0.000)	-0.307*** (0.000)	-0.258*** (0.000)
<i>EPS</i>	0.541*** (0.000)		0.079*** (0.000)	0.174*** (0.000)	0.132*** (0.000)	-0.324*** (0.000)	-0.338*** (0.000)
<i>STRING</i>	0.076*** (0.000)	0.075*** (0.000)		-0.011*** (0.000)	0.096*** (0.000)	-0.108*** (0.000)	-0.076*** (0.000)
<i>U&B</i>	0.104*** (0.000)	0.154*** (0.000)	-0.005*** (0.002)		-0.094*** (0.000)	-0.231*** (0.000)	-0.169*** (0.000)
<i>LTGROWTH</i>	0.149*** (0.000)	0.134*** (0.000)	0.053*** (0.000)	-0.044*** (0.000)		-0.053*** (0.000)	0.007*** (0.008)
<i>EVAR</i>	-0.085*** (0.000)	-0.115*** (0.000)	-0.018*** (0.000)	-0.052*** (0.000)	-0.076*** (0.000)		0.435*** (0.000)
<i>FEVAR</i>	-0.052*** (0.000)	-0.090*** (0.000)	-0.017*** (0.000)	-0.052*** (0.000)	0.020*** (0.000)	0.088*** (0.000)	
<i>DE</i>	0.001 (0.384)	-0.004*** (0.000)	-0.005*** (0.000)	0.145*** (0.000)	-0.225*** (0.000)	0.037*** (0.000)	0.050*** (0.000)
<i>BVE</i>	0.639*** (0.000)	0.542*** (0.000)	0.047*** (0.000)	0.270*** (0.000)	0.167*** (0.000)	-0.048*** (0.000)	0.002 (0.148)
<i>AGE</i>	0.335*** (0.000)	0.215*** (0.000)	-0.003** (0.025)	0.032*** (0.000)	-0.072*** (0.000)	-0.009*** (0.000)	-0.009*** (0.000)

Empirical Results – Q1

Length of Earnings Strings	<i>EVAR</i>	<i>FEVAR</i>
Non String	33.451	34.329
1 Quarter	33.403	29.493
2 Quarters	32.309	26.585
3 Quarters	31.076	24.358
4 Quarters	29.524	22.486
5 Quarters	26.530	20.023
6 Quarters	23.877	17.824
7 Quarters	21.578	15.437
8 Quarters	19.258	13.731
9 Quarters	16.830	12.477
10 Quarters	14.329	10.921
11 Quarters	12.177	9.936
12 Quarters	10.212	9.343
13 Quarters	8.991	9.111
14 Quarters	7.661	8.707
15 Quarters	6.399	8.683
16 Quarters	5.365	8.951
17 Quarters	4.067	8.314
18 Quarters	2.965	7.241
19 Quarters	1.533	6.528
20 Quarters	0.719	6.277

Empirical Results – Q1

Variable	Result
Dependent Variable: PRICE	
<i>INTERCEPT</i>	6.697*** (0.000)
<i>EPS</i>	8.216*** (0.000)
<i>STRING</i>	4.389** (0.030)
<i>U&B</i>	-0.665 (0.582)
<i>LTGROWTH</i>	-0.043 (0.980)
<i>EVAR</i>	-0.003*** (0.005)
<i>FEVAR</i>	-0.006*** (0.000)
<i>DE</i>	0.207* (0.080)
<i>EPS x STRING</i>	5.231*** (0.006)
<i>EPS x U&B</i>	-4.962*** (0.000)
<i>EPS x LTGROWTH</i>	-3.226* (0.096)
<i>EPS x EVAR</i>	-0.010*** (0.000)
<i>EPS x EVAR x STRING</i>	0.394 (0.138)
<i>EPS x FEVAR</i>	-0.008*** (0.000)
<i>EPS x FEVAR x STRING</i>	0.010*** (0.002)

- **The Valuation Role of Fundamentals**

$$\begin{aligned} \text{STRING}_{it} = & \delta_0 + \delta_1 \text{FSCORE}_{it} + \delta_2 \text{BMRATIO}_{it} + \delta_3 \text{CAPEX}_{it} + \delta_4 \text{STGROWTH}_{it} \\ & + \delta_5 \text{SALESGROWTH}_{it} + \delta_6 \text{DE}_{it} + \delta_7 \text{AGE}_{it} + \varepsilon_{it} \end{aligned}$$

- This equation is estimated using the Probit Maximum Likelihood Estimation method.

Empirical Test – Q2

- The next main objective is to test whether rewards to firms reporting consistent earnings trend is related to stronger fundamentals.
- I construct a standardized aggregate fundamental score following Lev and Thiagarajan (1993).
- This score is based on 12 underlying fundamental signals including inventories, accounts receivable, capital expenditures, research and development expenses, gross margin, selling and administrative expenses, provision for doubtful receivables, effective tax rate, order backlog, labor force, LIFO earnings, and audit qualification.

Empirical Test – Q2

- Each fundamental signal is binary variable. I assign one if an individual signal is a positive signal or good news, zero otherwise. Firms with a larger number of strong fundamentals obtain a higher score.
- To obtain an average standardized aggregate fundamental score, I calculate an average value of standardized aggregate score, by averaging standardized aggregate fundamental scores from period $t-20$ to period $t-1$.
- The rationale for using lag information is that fundamental scores are a signal by construction. Twenty periods average value is consistent with the definition of an earnings string.

Empirical Results – Q2

Variable	Results	
	(1)	(2)
<i>Dependent Variable: STRING</i>		
<i>INTERCEPT</i>	-3.372*** (0.000)	-3.268*** (0.000)
<i>FSCORE</i>	1.266*** (0.000)	1.333*** (0.001)
<i>BMRATIO</i>		-0.655** (0.000)
<i>CAPEX</i>		0.028*** (0.000)
<i>STGROWTH</i>		0.155*** (0.000)
<i>SALESGROWTH</i>		0.018 (0.360)
<i>DE</i>		-0.004 (0.633)
<i>AGE</i>		0.003 (0.242)

Empirical Tests – Q3

- There are **TWO** main specifications for investigating shifting from growth to risk signalling.
- Although investors may predict better future financial performance when they observe strings of earnings increases, firms cannot sustain growth in perpetuity.
- I expect that longer earnings strings are more weakly related to earnings growth and more strongly to future risk.
- That is, the predictive balance of an earnings string may shift in the direction of risk rather than growth as the string has prolonged.

- **Test of Future Profitability**

$$FSTRING_{it} = \delta_0 + \delta_1 PSTRING_{it} + \delta_2 FSCORE_{it} + \delta_3 BMRATIO_{it} + \delta_4 CAPEX_{it} \\ + \delta_5 STGROWTH_{it} + \delta_6 SALES GROWTH_{it} + \delta_7 DE_{it} + \delta_8 AGE_{it} + \varepsilon_{it}$$

- **Test of Future Earnings Risk**

$$FEVAR_{it} = \gamma_0 + \gamma_1 PSTRING_{it} + \gamma_2 FSCORE_{it} + \gamma_3 RD_{it} + \gamma_4 CAPEX_{it} + \gamma_5 ASSET_{it} \\ + \gamma_6 DE_{it} + \gamma_7 AGE_{it} + \gamma_8 SALES_{it} + \gamma_9 SALESVAR_{it} + \varepsilon_{it}$$

Empirical Results – Q3

Variable	Lengths of Future Earnings Strings (FSTRING)				
	4Q Ahead	8Q Ahead	12Q Ahead	16Q Ahead	20Q Ahead
Dependent Variable: FSTRING					
<i>A Past Increasing Earnings String of Consecutive Four Quarters</i>					
<i>PSTRING</i>	0.303*** (0.000)	0.337*** (0.000)	0.301*** (0.000)	0.304*** (0.000)	0.306*** (0.000)
Pseudo R ²	0.030	0.049	0.060	0.072	0.090
Observ.	345,081	308,705	276,203	247,131	207,550
String Observ.	69,694	63,351	56,709	50,930	47,099
<i>A Past Increasing Earnings String of Consecutive Eight Quarters</i>					
<i>PSTRING</i>	0.421*** (0.000)	0.416*** (0.000)	0.376*** (0.000)	0.354*** (0.000)	0.306*** (0.000)
Pseudo R ²	0.028	0.045	0.057	0.068	0.085
Observ.	345,081	308,705	276,203	247,131	207,550
String Observ.	20,104	18,278	16,607	15,533	14,551
<i>A Past Increasing Earnings String of Consecutive Twelve Quarters</i>					
<i>PSTRING</i>	0.465*** (0.000)	0.470*** (0.000)	0.436*** (0.000)	0.390*** (0.000)	0.232 (0.119)
Pseudo R ²	0.025	0.042	0.054	0.065	0.080
Observ.	345,081	308,705	276,203	247,131	207,550
String Observ.	7,144	6,581	6,166	5,810	5,453

Empirical Results – Q3

Variable	Lengths of Future Earnings Strings (FSTRING)				
	4Q Ahead	8Q Ahead	12Q Ahead	16Q Ahead	20Q Ahead
<i>Dependent Variable: FSTRING</i>					
<i>A Past Increasing Earnings String of Consecutive Sixteen Quarters</i>					
<i>PSTRING</i>	0.514*** (0.000)	0.546*** (0.000)	0.485*** (0.000)	0.309** (0.020)	0.080 (0.741)
Pseudo R ²	0.024	0.040	0.052	0.061	0.078
Observ.	345,081	308,705	276,203	247,131	207,550
String Observ.	2,836	2,664	2,481	2,349	2,245
<i>A Past Increasing Earnings String of Consecutive Twenty Quarters</i>					
<i>PSTRING</i>	0.577*** (0.000)	0.558*** (0.000)	0.423*** (0.002)	0.207 (0.270)	-0.063 (0.877)
Pseudo R ²	0.024	0.039	0.051	0.061	0.078
Observ.	345,081	308,705	276,203	247,131	207,550
String Observ.	1,255	1,184	1,112	1,063	1,026

Empirical Results – Q3

Variable	Lengths of Past Earnings Strings (<i>PSTRING</i>)				
	4Q	8Q	12Q	16Q	20Q
<i>Dependent Variable: FEVAR</i>					
<i>INTERCEPT</i>	30.015** (0.016)	30.157** (0.016)	30.624** (0.014)	31.165** (0.012)	31.516** (0.011)
<i>PSTRING</i>	-12.483*** (0.000)	-17.726*** (0.000)	-19.016*** (0.000)	-20.803*** (0.000)	-31.585*** (0.000)
<i>FSCORE</i>	-25.760 (0.333)	-27.112 (0.312)	-29.660 (0.269)	-30.747 (0.250)	-31.016 (0.246)
<i>RD</i>	3.659 (0.300)	3.677 (0.297)	3.809 (0.279)	3.867 (0.272)	3.876 (0.271)
<i>CAPEX</i>	0.315 (0.893)	0.265 (0.910)	0.212 (0.927)	0.216 (0.926)	0.213 (0.927)
<i>ASSET</i>	0.094** (0.032)	0.095** (0.030)	0.096** (0.031)	0.096** (0.031)	0.096** (0.031)
<i>DE</i>	4.151*** (0.006)	4.162*** (0.006)	4.161*** (0.006)	4.160*** (0.006)	4.159*** (0.006)
<i>AGE</i>	-0.280* (0.077)	-0.282* (0.077)	-0.280* (0.079)	-0.278* (0.081)	-0.278* (0.082)
<i>SALES</i>	-0.151* (0.086)	-0.151* (0.088)	-0.148* (0.094)	-0.145* (0.099)	-0.145 (0.101)
<i>SALESVAR</i>	-0.001** (0.011)	-0.001*** (0.009)	-0.002*** (0.008)	-0.002*** (0.008)	-0.002*** (0.008)

Summary

- This paper estimates the association between market rewards associated with a string of earnings increases, future earnings uncertainty, and firm fundamentals.
- All findings unfold the economic meaning of an earnings series. Other than growth opportunities, a string of consistently earnings growth contains information about fundamentals and uncertainty of subsequent earnings which, in turn, leads to higher market outcomes.

Overriding Conclusions

- Investors are able to infer future risk from earnings patterns and positively react to such patterns reflecting lower future risk. It supports the notion that not only the first moment but also the second moment of future earnings distribution affects prices.
- Firms with earnings strings likely exhibit past stronger underlying economic performance but are not possible to sustain growth as the length of patterns increases.
- Moreover, growth opportunities are less pronounced for longer earnings patterns than shorter patterns. This evidence plays down the growth signalling explanation, and instead highlights the importance of past fundamentals in driving the MBEB phenomenon.

Overriding Conclusions

- From the perspective of fundamentals, it may be true that fundamentals, not growth per se, underpin the empirical relation between patterns of increasing earnings and market rewards.
- This study provides an important insight into how patterns of earnings increases convey information about future risk. Specifically, longer earnings patterns signal lower future risk than shorter patterns.
- It also confirms the objective of financial statements indicating that accounting provides information about uncertainty of future economic benefits.

