Do Analysts' Earnings Per Share Forecasts Contain Valuable Information Beyond One Quarter? The Case of Publicly Traded Agribusiness Firms

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Introduction

Analysts form estimates of publicly traded companies' earnings per share (EPS) to guide investors, create wealth, understand businesses, and outperform markets. Market participants seek to invest in these companies listed on the exchanges with the expectation of owning shares to create wealth. This is accomplished through the companies' earnings per share (EPS) and stock price. Publicly traded companies report EPS on a quarterly and yearly basis with the SEC. These reports influence the stock price and volatility of companies. Professional analysts form and create forecast estimates of where they believe EPS will be with relation to the realized value that is reported. Through their time, expertise, and research these expectations provide a source of forward looking information in relation to the financial performance of publicly traded companies. Analysts' forecast accuracy of EPS is an important factor for researchers and investors alike, as this acts as a proxy for the capital markets (Manfredo, Sanders and Scott, 2011).

Literature

Studies have suggested that analysts' estimation of EPS tend to be more accurate than alternative measures such as mechanical time series forecasts (Barefield & Comiskey, 1975; Brown and Rozeff, 1978; Hopwood, Mckeown, and Newbold, 1982). Analysts' predictions are created from the available information; however, these estimates are not always formed in a rational and efficient manner (Affleck-Graves, Davis, and Mendenhall, 1990; Capstaff, Paudyal, & Rees, 1995; Das, Levine, & Sivaramakrishnan, 1998; Ho, 1996; Keane & Runkle, 1998; Manfredo et al., 2011). This research investigates these issues by applying the mean absolute scaled error (MASE) test developed by Hyndman and Koehler, 2006 and a direct test derived from Vuchelen and Gutierrez, 2005. The models used determine the incremental information content at multiple quarter time horizons, efficiency, scaling, bias, forecast performance and forecast composition of analysts' EPS forecasts.

Objective

The objective of this research is to examine analysts' forecast performance of EPS expectations of publicly traded companies in the agribusiness sector. EPS forecasts of the one, two and three quarter ahead time periods are examined in a set of comprehensive tests. The tests used in this study are designed to examine the effect of different time horizons on the rationality, efficiency, scaling, bias, accuracy, performance and information content of the forecasts.

Data

Table 1. Companies Analyzed Information

Company	Ticker	Market Cap Billions of $s	Employees	Industry
ConAgra Foods	cag	10.29	24,400	processed and packaged goods
Campbell Soup	cpb	11.24	18,400	processed and packaged goods
General Mills	gis	25.43	33,000	processed and packaged goods
H J Heinz	hnz	17.01	29,600	processed and packaged goods
Hershey Co	hsy	12.84	11,300	confectioners
Kellogg	k	20.76	30,645	processed and packaged goods
Pepsi	pep	112.46	294,000	beverages-soft drinks
Sara Lee	sle	11.33	33,400	processed and packaged goods
Supervalu	svu	2.27	142,000	grocery stores
Safe Way	swy	9.19	180,000	grocery stores
Whole Foods	wfm	10.8	61,000	grocery stores

Notes: Source Yahoo Finance, retrieved 5/17/2011

- These companies were chosen based on their impact, market capitalization and overall representation of the downstream agribusiness sector
- EPS and analysts' forecasts were retrieved through the Institutional Brokers Estimate System
- The range of analysts surveyed for the consensus expectations was 1-27 analysts per quarter

Model

- First test: comparing the analysts' expected value vs. the actual value of the EPS by testing the mean absolute scaled error (MASE), developed by Hyndman and Koehler, 2006
- The MASE test scales the forecast error by the in-sample mean absolute error obtained using the naive forecast. The test is developed through the following equations:

$$q_t = \frac{e_t}{\frac{1}{n-1}\sum_{i=2}^{n}|Y_i - Y_{i-1}|} \qquad MASE = \frac{1}{n}\sum_{t=1}^{n}|q_t|$$

Table 2. Companies Observation Period and Mean Absolute Scaled Error

Company	Obs	Time Period Analyzed		Mean Absolute Scaled Error		
		Start	End	1 Quarter	2 Quarter	3 Quarter
ConAgra Foods	96	02/20/1986	11/19/2009	0.2405	0.3165	0.3833
Campbell Soup	92	07/16/1987	04/15/2010	0.2590	0.3176	0.3433
General Mills	96	02/20/1986	11/19/2009	0.2788	0.3689	0.4072
H J Heinz	98	01/16/1986	04/15/2010	0.8103	1.0974	1.2675
Hershey Co	89	12/17/1987	12/17/2009	0.1266	0.2223	0.2846
Kellogg	96	03/20/1986	12/17/2009	0.2502	0.3427	0.3893
Pepsi	97	03/20/1986	03/18/2010	0.2262	0.2854	0.3378
Sara Lee	95	06/19/1986	12/17/2009	0.1930	0.2620	0.3809
Supervalu	95	05/15/1986	11/19/2009	0.3678	0.5507	0.6582
Safe Way	65	12/16/1993	12/17/2009	0.1882	0.3587	0.4705
Whole Foods	49	12/18/1997	12/17/2009	0.4841	0.7450	1.0162

Notes: 1 quarter ahead reflects 3 months out, 2 quarters ahead reflects 6 months out, 3 quarters ahead reflects 9 months out. A MASE < 1 reflects performance better than the naïve forecast.

- Direct Test: focus forecast rationality and information content of the analysts' expectations
- A rational or optimal forecast is one which is both unbiased and efficient
- The more distant quarter estimations may simply be just a random adjustment to the shorter forecast horizon implying a limit to the usefulness of distant forecasts
- The direct test developed by Vuchelen and Gutierrez (2005) is ideal for determining information content and rationality properties at multiple horizons
- The traditional regression analysis to evaluate forecasts is:

$$A_{t+1} = \alpha + \beta F_t^{t+1} + u_{t+1}$$

- Where u_{t+1} is a disturbance term, A_{t+1} is the realized value at time t+1, F_t^{t+1} is the forecast for time t+1 made at time t (Mincer and Zarnowitz, 1969; Sanders et al., 2009)
- Following Brown and Maital, 1981 and Hansen and Hodrick, 1980 to create a framework for manipulating the direct test when forecast horizons overlap in multiple period ahead forecasts all three quarters can be examined
- Through manipulation the direct test for the k ahead forecasts then becomes:

$$A_{t+k} = \beta_1 + \beta_2 F_t^{t+k-1} + \beta_3 (F_t^{t+k} - F_t^{t+k-1}) + u_{t+k}$$

Table 3. Summary and Description of Hypothesis Tests

Hypothesis	Description
$\beta_2=\beta_3=1$, $\beta_1=0$	Null hypothesis is that the k ahead forecasts are rational.
$\beta_2=\beta_3$	Null hypothesis is that the weight on the k-1 ahead forecasts (β_2-β_3) is zero in the implied composite forecast.
$\beta_3=0$	Null hypothesis is that there is no information contained in the incremental k ahead forecast horizon.
$\beta_3=1$	Null hypothesis is that the k ahead forecast is properly scaled.

Example of Forecasts Taken for Pepsi

Date	Actual	Forecast 1 Quarter	K=1 2 Quarter	K=2 3 Quarter	K=3	
3/15/2009	N/A	$1.75	$1.50	$2.25		Analysts' Estimate
3/30/2009	$1.90					Estimation Period 1
6/30/2009	$2.10					Estimation Period 2
9/30/2009	$2.25					Estimation Period 3
Difference to be tested:		$0.15	$0.60	$0.00		

Table 4. ConAgra Foods (CAG)

	Coefficient Estimates			Hypothesis Tests			
Horizon	β_1	β_2	β_3	$\beta_2=\beta_3=1, \beta_1=0$	$\beta_2=\beta_3$	$\beta_3=0$	$\beta_3=1$
K=1	0.0030	1.1270	1.0200	0.2454[b]	0.1006	0.0000[c]	0.4084
	(0.0045)[a]	(0.0971)	(0.0863)				
K=2	-0.0070	1.0541	1.0968	0.5871	0.7163	2.3e-011	0.2561
	(0.0078)	(0.1686)	(0.1472)				
K=3	-0.0038	0.6553	0.9265	0.2201	0.1089	.348e-007	0.6659
	(0.0105)	(0.2343)	(0.1710)				

Table 5. Campbell Soup (CPB)

K=1	-0.0028	0.7848	0.5196	2.81e-013[b]	0.0005	6.20e-012	1
	(0.0057)[a]	(0.0851)	(0.0667)				
K=2	-0.0053	0.5360	0.5753	3.20e-006	0.7022	0.0001	0.9993
	(0.0104)	(0.1251)	(0.1278)				
K=3	-0.0129	0.5983	0.7920	0.0013	0.1555	1.67e-011	0.9750
	(0.0140)	(0.1638)	(0.1047)				

Table 6 General Mills (GIS)

K=1	0.0042	1.0075	1.0109	0.6234[b]	0.9565	0	0.4447
	(0.0036)[a]	(0.0826)	(0.0783)				
K=2	0.0025	0.9222	0.8344	0.2218	0.3841	4.03e-012	0.9379
	(0.0057)	(0.1418)	(0.1067)				
K=3	0.0027	0.7632	0.8445	0.4344	0.4637	2.50e-010	0.8979
	(0.0065)	(0.1517)	(0.1216)				

Table 7. H J Heinz (HNZ)

K=1	0.0027	0.7081	0.4745	2.58e-013[b]	0.0039	4.49e-010	1
	(0.0052)[a]	(0.0940)	(0.0696)				
K=2	0.0042	0.3128	0.4478	5.786e-011	0.1938	0.0001	0.9999
	(0.0094)	(0.1236)	(0.1191)				
K=3	0.0091	0.2127	0.3579	.5937e-011	0.2304	0.0016	0.9999
	(0.0124)	(0.1482)	(0.1184)				

Table 8. Hershey Co (HSY)

K=1	0.0001	1.1397	1.0832	0.0738[b]	0.3673	0[c]	0.1472
	(0.0025)[a]	(0.0607)	(0.0788)				
K=2	-0.0083	1.2981	0.9932	0.0921	0.0561	0.0001	0.5113
	(0.0080)	(0.2229)	(0.2407)				
K=3	0.0071	0.5985	0.2239	0.0299	0.2048	0.2125	0.9966
	(0.0140)	(0.3806)	(0.2794)				

Table 9. Kellogg (K)

K=1	0.0234	0.1804	0.3791	1.11e-015[b]	0.3104	0.0006[c]	0.9999
	(0.0089)[a]	(0.1457)	(0.1146)				
K=2	-0.0037	1.0275	0.9540	0.6448	0.5170	8.71e-011	0.6347
	(0.0077)	(0.1464)	(0.1330)				
K=3	-0.0113	0.8937	1.0374	0.2436	0.3481	6.83e-008	0.4188
	(0.0112)	(0.1964)	(0.1818)				

Table 10. Pepsi (PEP)

K=1	0.0004	0.9745	0.7832	0.0217[b]	0.0072	5.55e-016	0.9955
	(0.0037)[a]	(0.0765)	(0.0811)				
K=2	0.0033	0.7183	0.7134	0.0021	0.9647	1.61e-009	0.9949
	(0.0069)	(0.1294)	(0.1091)				
K=3	0.0075	0.5935	0.6392	0.0008	0.6783	1.49e-007	0.9987
	(0.0092)	(0.1521)	(0.1158)				

[a] Standard errors are in parenthesis. [b] P-value for the Chi-squared test on the stated restriction. [c] p-value from the two-tailed t-test on the stated restriction.

Conclusions

- Tests were applied to the data that can provide benchmarks to gauge analysts' performance against the one, two and three quarter EPS forecast horizons
- Overall it was shown through the MASE that analysts outperform a naïve forecast
- All of the MASE results on a company by company basis over all three time horizons show that analyst performance declines as the horizon increases; reinforcing the previous literature
- The direct test results determined that analysts do provide and use unique incremental information in the formation of their expectations to various degrees
- Analysts have marginal performance in using this information to form an efficient and rational estimate of the quarterly EPS at all time horizons
- The use of the k-1 period ahead forecast was present in just over a third of the one quarter out forecasts. This is an interesting result because the k-1 forecast is the realized EPS of the previous quarter; therefore, either analysts are relying on the past results or quarters are directly linked to the performance of the previous quarter
- The direct test, just as the MASE, reinforced the assumption that analyst performance deteriorates as the time horizon increases from one to three quarters out
- Overall the analysts' performance is better than a naïve forecast, at times rational and efficient
- However, the inconsistencies and randomness of where their performance is superior creates a situation where reliance on EPS expectations is marginal
- Future research could test semi-strong form market efficiency through trading rules based on analysts' estimates of EPS at all three quarter horizons