Seeing is Believing: Annual Report "Graphicity" and Stock Returns Predictability

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Working Paper

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1.Introduction

Background

- There should not exist material differences between the standard Edgar 10-K filings and the financial reports.
- Over half of the public firms in the S&P 1500 index are still making print based financial reports.
- Why public firms are still "wasting" money on those fancy looking financial reports in addition to the standard financial filings required by SEC?

1.Introduction

Research motivation

- Recent studies, using content analysis, have found evidence that the firms' annual reports/10-Ks' text contains information about the firms' future performances.
- Most of recent studies only focus on the text of the financial reports rather than any other components of financial media such as the design of the reports or the graphs in the documents.
- Obaid and Pukthuanthong (2019) study the predictability of news photos in general media.

1.Introduction

Questions

- Whether the graphic annual reports added to 10-Ks generate any extra value in financial markets or not?
- Whether the positive future performance is driven by other causes?
- Whether the new graphic reports contain new additional soft information or harden information in 10-K?
- What's the possible sources of these wealth effects?

1.Introduction

Contributions

- Filled in a void of analyzing an important graphic source and channel of financial information.
- recent studies (e.g., Loughran and McDonald, 2017) find the lack of 10-Ks requests on EDGAR from investors, which supports our conjecture on the managerial incentive to add new graphic information to the traditional financial report.
- Quantified the wealth effects of public firms' communication with shareholders when using multimedia.
- Documented finding in stock returns serves as a new anomaly to the secondary market.

2.Data

Firm-year data

- Hand-collected firms in the SP1500 index from the 2007 fiscal year to the 2012 fiscal year to cover representative small, mid, and large firms.
- Because we rely on firm adding graphic designed annual reports to reveal the "soft" information, and we filtered the sample to make sure they have full five years of data to avoid biased results.
- We further require the firms in our sample to have the control variables available; our final sample is 5,861 firm-years.

2.Data

Split method

- the firms who do not add a graphic report compared with the previous fiscal year;
- the firms who add a nicely drafted graphic annual report to pure plain 10-K
- the firms who remove the graphic annual report to pure plain 10-Ks.

2.Data

Splited results

Total number of firms	1,232
Firm-year observations	5,861
# of firm-years using graphic reports in addition to 10-Ks	4,193
# of firm-years using 10-Ks as annual reports	1,668
# of firm-years changing reporting format by adding graphic reports	92
# of firm-years changing reporting format by removing graphic reports	125
# of firm-years changing reporting format by adding graphic reports (excluding financial and utility firms)	64

2.Data

Returns and Control Variables

- monthly returns and market returns from CRSP for the period of 2007-2013.
- Fama-French Three Factors (FF3), Fama-French-Carhart Four Factors (FF3 plus up and down factor), and Fama-French Five Factors (FF5) from the Fama-French factors database.
- annual firm-level accounting variables and short interests data from Compustat short interest file.
- institutional holdings data from Thomson's CDA/Spectrum database (form 13F).
- analyst coverage data from Institutional Brokers Estimate Systems (I/B/E/S)
- readability fog index from SEC Analytic database.

2.Resarch Design

- Split our hand-collected sample dataset into three categories and examine their abnormal performance around their report-release dates.
- consider whether the positive future performance is driven by other causes and add ex-anti market and firm characteristics into our tests.
- To further confirm that the new graphic reports contain new additional soft information, we conduct a short term event study around the earnings announcement day.
- Finally employing the Differences-in-Differences approach with the matched sample to study the possible sources of these wealth effects.

3.Empirical Results

Table 2:Firm Characteristics before Reporting Format Changes

	Firms Adding Prints				Matched Firms with no Changes				Test for Differences	
Variable	N	Mean	Median	SD	N	Mean	Median	SD	Mean (t-stats)	Median (chi-sq)
Total Assets	64	3,050	630.2	8,571	61	5,318	729.9	25,374	-0.67	0.96
ROA	54	12.63	12.44	9.89	54	11.35	10.56	10.78	0.64	0.44
ROE	54	23.03	22.08	22.13	54	21.62	20.08	26.10	0.30	0.44
Sales Growth	54	10.89	14.49	21.25	52	11.25	10.60	25.14	-0.08	0.69
Asset Growth	54	7.716	5.556	19.10	54	11.60	6.089	28.24	-0.83	0.00
CAPX	55	4.124	2.801	3.911	56	4.320	2.628	4.508	-0.24	0.44
CAPX&RD	34	8.639	7.698	6.907	37	9.091	6.48	8.204	-0.25	1.13
Leverage	54	18.87	5.47	22.33	54	20.20	17.13	22.57	-0.30	0.59
Readability	36	18.16	17.91	3.238	22	18.02	18.12	2.692	0.17	0.29

3.Empirical Results

Table 3: Firm Characteristics and the Addition of Prints

	(1) Prints	(2) Prints	(3) Prints	(4) Prints	(5) Prints	(6) Prints
CAPX	-0.014					-0.033
	(-0.50)					(-0.78)
Accruals		-0.310**				-0.469*
		(-2.25)				(-1.69)
Q			-0.079			-0.113
			(-0.74)			(-0.52)
Size				0.381***		0.335*
				(3.34)		(1.80)
Readability-Index					0.048*	0.107**
					(1.71)	(2.19)
Leverage						-0.004
						(-0.34)
Past Profitability						0.024
						(1.15)
N	602	519	600	613	279	196
pseudo R-sq	0.001	0.010	0.001	0.035	0.003	0.056

3.Empirical Results

Table 4: Abnormal Performance around Annual Earning Announcement Dates

	Firms that add Prints to 10-Ks				Firms that remove Prints			
	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha
[-3, 0 mo]	0.001	-0.005	-0.004	-0.002	0.003	-0.015	-0.004	-0.003
p-value	*0.75*	*0.43*	*0.56*	*0.77*	*0.97*	*0.80*	*0.72*	*0.65*
[0, 3 mo]	0.007	-0.036	-0.036	-0.036	0.001	0.009	0.010	0.010
p-value	*0.45*	*0.34*	*0.34*	*0.35*	*0.95*	*0.78*	*0.74*	*0.75*
[0, 6 mo]	0.018*	0.047***	0.027***	0.025***	-0.001	-0.010	-0.010	-0.011
p-value	*0.06*	*0.01*	*0.00*	*0.00*	*0.88*	*0.31*	*0.52*	*0.54*
[0, 9 mo]	0.013*	0.025**	0.019**	0.018**	-0.001	-0.011	-0.011	-0.011
p-value	*0.09*	*0.05*	*0.02*	*0.03*	*0.84*	*0.24*	*0.28*	*0.32*
[0, 12 mo]	0.014	0.025**	0.020**	0.020**	0.000	-0.012	-0.010	-0.010
p-value	*0.14*	*0.04*	*0.02*	*0.03*	*0.97*	*0.21*	*0.32*	*0.37*

3.Empirical Results

Table 5: Abnormal Performance around Annual Earning Announcement Dates: Matched Sample

	Firms that add Prints to 10-Ks				Matched Firms with no Format Changes			
	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha
[-3, 0 mo]	0.001	-0.005	-0.004	-0.002	0.004	-0.016	-0.004	-0.006
p-value	*0.75*	*0.43*	*0.56*	*0.77*	*0.95*	*0.80*	*0.70*	*0.71*
[0, 3 mo]	0.007	-0.036	-0.036	-0.036	0.001	0.009	0.012	0.012
p-value	*0.45*	*0.34*	*0.34*	*0.35*	*0.94*	*0.78*	*0.77*	*0.68*
[0, 6 mo]	0.018*	0.047***	0.027***	0.025***	-0.002	-0.011	-0.011	-0.013
p-value	*0.06*	*0.01*	*0.00*	*0.00*	*0.86*	*0.37*	*0.58*	*0.52*
[0, 9 mo]	0.013*	0.025**	0.019**	0.018**	-0.001	-0.01	-0.012	-0.013
p-value	*0.09*	*0.05*	*0.02*	*0.03*	*0.74*	*0.25*	*0.28*	*0.32*
[0, 12 mo]	0.014	0.025**	0.020**	0.020**	0.002	-0.013	-0.015	-0.014
p-value	*0.14*	*0.04*	*0.02*	*0.03*	*0.95*	*0.41*	*0.39*	*0.41*

3.Empirical Results

Table 6: Abnormal Performance around Annual Earning Announcement Dates, Grouped by Institutional Ownership

	Firms with Higher Institutional Ownership				Firms with Lower Institutional Ownership			
	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha
[-3, 0 mo]	0.002	0.004	0.001	0.002	0.004	-0.016	-0.004	-0.006
p-value	*0.70*	*0.41*	*0.32*	*0.83*	*0.95*	*0.80*	*0.70*	*0.71*
[0, 3 mo]	0.028*	-0.023	-0.023	-0.021	0.031	-0.023	-0.023	0.011
p-value	*0.06*	*0.67*	*0.67*	*0.35*	*0.21*	*0.61*	*0.61*	*0.70*
[0, 6 mo]	0.020*	0.023*	0.034*	0.029***	0.020*	0.037*	0.064**	0.051***
p-value	*0.06*	*0.06*	*0.06*	*0.00*	*0.08*	*0.06*	*0.02*	*0.00*
[0, 9 mo]	0.015	0.016*	0.018*	0.017**	0.015	0.027*	0.035*	0.030**
p-value	*0.13*	*0.10*	*0.10*	*0.03*	*0.41*	*0.09*	*0.08*	*0.04*
[0, 12 mo]	0.017*	0.017*	0.018	0.020**	0.016	0.026*	0.035*	0.030**
p-value	*0.09*	*0.09*	*0.13*	*0.03*	*0.37*	*0.09*	*0.07*	*0.03*

3.Empirical Results

Table 7: Abnormal Performance around Annual Earning Announcement Dates, Grouped by Analyst Coverage

	Firms with Higher Analyst Coverage				Firms with Lower Analyst Coverage			
	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha
[-3, 0 mo]	0.001	-0.007	-0.006	-0.004	0.003	-0.012	-0.001	-0.002
p-value	*0.52*	*0.35*	*0.49*	*0.81*	*0.95*	*0.80*	*0.70*	*0.71*
[0, 3 mo]	0.023*	-0.022	-0.013	-0.022	0.032	-0.019	-0.013	0.003
p-value	*0.06*	*0.67*	*0.67*	*0.35*	*0.21*	*0.58*	*0.45*	*0.87*
[0, 6 mo]	0.019*	0.021**	0.024**	0.025***	0.021*	0.038**	0.068**	0.055***
p-value	*0.06*	*0.04*	*0.05*	*0.00*	*0.08*	*0.04*	*0.02*	*0.01*
[0, 9 mo]	0.015*	0.013*	0.017*	0.015**	0.019	0.029*	0.032*	0.041**
p-value	*0.09*	*0.10*	*0.10*	*0.03*	*0.41*	*0.08*	*0.09*	*0.02*
[0, 12 mo]	0.017*	0.018	0.016	0.019	0.019*	0.036*	0.035*	0.031**
p-value	*0.09*	*0.19*	*0.13*	*0.20*	*0.10*	*0.09*	*0.06*	*0.04*

3.Empirical Results

Table 8: Abnormal Performance around Annual Earning Announcement Dates, Grouped by Short Interests

	Firms with Higher Short Interests				Firms with Lower Short Interests			
	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha	CAPM	3 Factor Alpha	4 Factor Alpha	5 Factor Alpha
[-3, 0 mo]	0.001	-0.001	-0.002	-0.001	0.004	-0.005	-0.003	-0.004
p-value	*0.45*	*0.25*	*0.36*	*0.75*	*0.55*	*0.48*	*0.35*	*0.57*
[0, 3 mo]	0.028*	-0.023	-0.023	-0.021	0.031	-0.023	-0.023	0.011
p-value	*0.07*	*0.72*	*0.57*	*0.35*	*0.21*	*0.61*	*0.61*	*0.70*
[0, 6 mo]	0.028*	0.038*	0.033**	0.035***	0.020*	0.057**	0.034**	0.031***
p-value	*0.07*	*0.06*	*0.05*	*0.00*	*0.08*	*0.04*	*0.02*	*0.00*
[0, 9 mo]	0.015	0.016*	0.018*	0.017**	0.017*	0.019**	0.025**	0.029**
p-value	*0.13*	*0.09*	*0.08*	*0.03*	*0.09*	*0.05*	*0.03*	*0.04*
[0, 12 mo]	0.016	0.019	0.018	0.016	0.017	0.020*	0.024**	0.025**
p-value	*0.09*	*0.22*	*0.19*	*0.30*	*0.11*	*0.09*	*0.05*	*0.03*

3.Empirical Results

Table 9: Short-run Abnormal Returns around Reporting Format Changes

	[-1, 0]	[0, 1]	[-1, 1]	[1, 10]	[1, 30]
CAR	0.002	0.003	0.009	0.008	-0.008
P-value	*0.45*	*0.34*	*0.48*	*0.49*	*0.48*

3.Empirical Results

Table 10: Multivariate DiD Results: Firm Performance and Corporate Investments around Reporting Format Changes

	(1) ROA	(2) CAPX	(3) PPE	(4) ROA	(5) CAPX	(6) PPE
After	2.076	-0.911	-7.617	3.013	0.223	-0.419
	(1.54)	(-0.73)	(-1.19)	(1.01)	(0.12)	(-0.05)
Treatment	-1.129	2.406*	13.09*	-0.789	1.941*	5.529*
	(-0.87)	(1.67)	(1.68)	(-0.30)	(1.69)	(1.67)
Size	0.279	-0.227	-0.823	0.861	-0.333	-4.839**
	(0.49)	(-0.63)	(-0.25)	(0.71)	(-0.73)	(-2.17)
Leverage	0.020	0.038*	0.592***	0.008	0.014	0.331**
	(0.63)	(1.95)	(3.44)	(0.12)	(0.43)	(2.11)
Readability-Index	-0.524*	-0.025	0.687	-0.682**	-0.043	0.655
	(-1.76)	(-0.24)	(0.70)	(-2.36)	(-0.55)	(1.09)
Past Profitability	0.756***	0.161***	0.782***	0.552***	0.113***	0.242
	(6.82)	(5.06)	(3.76)	(3.75)	(3.19)	(1.27)
Industry Fixed Effects	No	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	Yes	Yes	Yes
N	160	160	157	160	160	157
adj. R-sq	0.548	0.134	0.193	0.627	0.455	0.695

3.Empirical Results

Table 11: Placebo Tests

	CAPX	PPE	CAPX	PPE
Panel A: Year of Format Changes=-3				
Treatment	-1.604	10.69	0.490	0.001
	(-0.46)	(0.83)	(0.19)	(0.00)
with Controls	Yes	Yes	Yes	Yes
Year/Industry Fixed Effects	No	No	Yes	Yes
Panel B: Year of Format Changes=+3				
Treatment	0.929	-2.482	1.540	-3.746
	(0.63)	(-0.22)	(1.28)	(-0.50)
with Controls	Yes	Yes	Yes	Yes
Year/Industry Fixed Effects	No	No	Yes	Yes

4.Explaining Model

- We develop a simple trading model that can capture the key features of our empirical results.
- This model builds on the classic two-period Kyle (1985) model.
- Our model adds a new player, the firm manager, who has the correct belief about the firm's future value but cannot easily/credibly convince the market via communications or financial reports.

4.Explaining Model

Players	Prior	$t=0$	$t=1$	$t=2$	$t=3$
Firm Manager	$v \sim N(\alpha, \sigma_v^2)$	choose $s \in \{0,1\}$			observe $v = v_0 + \alpha$
Informed Trader	$v \sim N(0, \sigma_v^2)$	observe v_0 and s	trade x_1	discover α with prob μ then trade x_2	make profit Π
Noise Traders		…	trade u_1	trade u_2	…
Market Makers	$v \sim N(0, \sigma_v^2)$	set $p_0 = 0$	set p_1	set p_2	observe $v = v_0 + \alpha$

4.Explaining Model

- By evaluating expected benefits against potential costs, the manager wants to solve the following optimization problem at t = 0:

$$\max_{s\epsilon\{0,1\}} E^F[p_2 - p_0] - s * c$$

- As in the Kyle model, the objective of this risk-neutral informed trader is to maximize her expected total trading profit dynamically:

$$\pi = (v - p_1) * x_1 + (v - p_2) * x_2$$

4.Explaining Model

- Market makers adopt the linear pricing rule so that the price change in each period is proportional to the total order flow they absorb:

$$p_1 = p_0 + \lambda_1 * (x_1 + \mu_1) = p_0 + \lambda_1 * y_1$$

$$p_2 = p_1 + \lambda_2 * (x_2 + \mu_2) = p_1 + \lambda_2 * y_2$$

- As solved in Huddart et al. (2001), the equilibrium coefficients are found to be:

$$\lambda_1 = \frac{\sqrt{2\delta(2\delta-1)}}{4\delta-1} * \frac{\sigma_v}{\sigma_\mu};\ \lambda_2 = \delta\lambda_1$$

4.Explaining Model

- the equilibrium ratio $\delta = \frac{\lambda_1}{\lambda_2} \approx 0.901$ is the largest root to the cubic equation:

$$8\delta^3 - 4\delta^2 - 4\delta + 1 = 0$$

- Under the above pricing scheme, the informed trader can use backward induction to find her optional trading strategy in each period:

$$x_1 = \frac{2\delta - 1}{4\delta - 1} * \frac{v_0}{\lambda_1}; x_2 = \frac{v_0 + s\alpha * 1_\mu - p_1}{2\lambda_2}$$

4.Explaining Model

- Given the above equilibrium results, the manager's objective function becomes rather simple:

$$\max_{s\epsilon\{0,1\}} E^F[p_2 - p_0] - s * c = \max_{s\epsilon\{0,1\}} E^F[\lambda_1 y_1 + \lambda_2 y_2] - s * c$$

$$= \max_{s\epsilon\{0,1\}} \frac{1}{2} s\alpha\mu - s * c$$

- and the optimal policy is simply

$$s^* = 1 \ \ if \ \alpha > \frac{2c}{\mu}$$

$$s^* = 0 \ \ if \ \alpha \leq \frac{2c}{\mu}$$

4.Explaining Model

the cost parameter c can be positive and negative in this model. The implications are asymmetric however:

- For the case $c > 0$, the choice of $s = 1$ is costly (like graphic print addition). We can easily show that $E[p_2|s = 1] = \frac{\alpha\mu}{2} > 0$, because the decision threshold is positive $\frac{2c}{\mu} > 0$. This indicates positive abnormal returns for the group of firms that add graphs.
- For the case $c < 0$, the choice of $s = 1$ saves costs (like graphic print removal). In this situation, the sign of $E[p_2|s = 1]$ becomes ambiguous because the negative decision threshold $\frac{2c}{\mu} < 0$ allows for negative α when choosing $s = 1$.

5.Conclusion

- The study finds that those firms with newly added graphic financial reports earn a positive 2.7% abnormal returns in the following 3 to 6 months.
- Investor sophistication, financial market constraints, and information asymmetry do not seem to be plausible explanations for this return pattern.
- The short term event study results suggest that the newly added graphic reports convey new additional information rather than "hardening" the existing information.
- With the DiD tests, the study finds that firms increased CAPX and PPE in the next fiscal year or two after they add print version financial reports, which implies that these group of firms have real growth that brings in superior performance.
- The study suggests that not only numerical values and texts, but also graphics embedded in the financial reports contain material information to the public. While this is true in the US, it will be of interest to study other markets of the world to understand the differences if any.