Critical Finance Review, 2016, 5: 165–175

Another Look at Market Responses to Tangible and Intangible Information

Kent Daniel
Sheridan Titman

[1]*Columbia Business School, Columbia University, New York, NY 10027 and National Bureau of Economic Research (NBER), Cambridge, MA 02138; kd2371@columbia.edu.*
[2]*University of Texas, Austin, TX 78712 and National Bureau of Economic Research (NBER), Cambridge, MA 02138; Sheridan.Titman@mccombs.utexas.edu.*

ABSTRACT

As Gerakos and Linnainmaa (2016) point out, the Daniel and Titman (2006) decomposition of returns into tangible and intangible components can potentially be ambiguous. In particular DT's *book-return*, the adjusted growth rate in book value per-share which DT use as a tangible measure of long-term performance, can be affected by a firm's issuance and repurchase choices as well as by its profitability. This paper clarifies the relation between total book equity growth, our book-return measure, and our composite share issuance variable, and shows that our earlier conclusions are robust. We also provide out-of-sample tests.

Keywords: Asset Pricing, Stock Returns, Market Efficiency.

JEL Codes: G120, G140, G170.

We thank Juhani Linnainmaa, Joseph Gerakos and Ivo Welch for helpful comments and discussions.

ISSN 2164-5744; DOI 10.1561/104.00000031

1 Motivation

Daniel and Titman (2006, DT) was motivated by the arguments of Lakonishok *et al.* (1994) and Fama and French (1993). Lakonishok *et al.* (1994) argued that the value premium at least partially reflects investors' overreaction to accounting-based performance, such as earnings and sales growth. In contrast, Fama and French argued that the value effect might result from a premium earned by "distressed" stocks with poor past accounting performance. While the Lakonishok *et al.* (1994) argument was behavioral, and the Fama and French rational, the arguments were similar in the sense that both claimed that firms' future stock returns were inversely linked to past operating performance.

In DT we argued against both of these interpretations. Specifically, we showed that:

1. Various measures of long-term fundamental performance on a per share basis – which we label the "tangible" component of returns – are only weakly correlated with future returns, which we argue is inconsistent with the Lakonishok *et al.* (1994) and Fama and French interpretation. That is past operating performance doesn't forecast future returns.

2. The component of long-term stock returns that is orthogonal to these measures of long-term performance – the "intangible" component of returns – is negatively correlated with future returns. In other words, the component of returns that is orthogonal to per-share measures of tangible performance tends to partially reverse.

3. Net issuance of new shares is negatively correlated with future stock returns, and issuance is strongly associated with past intangible returns. Our interpretation of these two findings was that managers tend to take advantage of the expected reversal of intangible performance by issuing equity following favorable intangible performance and repurchasing shares following unfavorable intangible performance.

As Gerakos and Linnainmaa (2016, GL) argue, there is some ambiguity in the characterization of tangible and intangible returns in the DT decomposition. In particular, the adjusted growth rate in book value per-share –

which DT label "book-return" and use as a tangible measure of long-term performance – is affected by a firm's issuance and repurchase choices as well as by its profitability. For example, a firm with a market to book ratio of 3 that borrows money to repurchase shares will experience an increase in book equity per share, even though its assets do not change.

Based on this, GL argue that a better measure of tangible returns would be total-change in book assets rather than our (per-share) book-return measure. They further show that, if you measure tangible returns using total-growth in book value, there is a strong negative relationship between growth and future returns.

Why did we choose not to use the total-growth in book measure that GL propose? To understand this, consider a firm with $100 million of book value and 1 million shares at what we will call year 0, that grows its book value to $200 million in year 5. If the number of outstanding shares stayed constant, this doubling of book value would be indicative of fairly strong performance. However, if the firm issued equity to double the number of outstanding shares, the corresponding doubling of book value would, of course, not be indicative of favorable operating performance. The firm may have simply issued new shares to raise cash, creating no value for existing shareholders. A shareholder at year 0 that had a claim to $100 of book value would still have a claim to $100 of book value five years later. Indeed, this is what our book-return variable measures: assuming you bought one share five years ago, and neither put money into nor took money out of the firm, how much did your share of the firm's book value grow? Thus, for the firm in the above example, the book-return is zero.

GL correctly point out that our book-return is affected by management's choice of external financing. In the example above, the implicit assumption was that the price-to-book ratio at the time of the additional share issuance was one. If the price-to-book ratio had been greater than one, our book-return measure would have been positive. For example, if the price-to-book ratio were 2, the firm could double its book value by increasing its shares by only 50%, which would imply a book-return of 33%. What this means is that if firms tend to issue equity when the price-to-book ratio is high, our book-return measure is in some sense positively biased for equity issuers.

An obvious solution to this would have been to come up with a measure that just captures operating performance, and is never affected by management's external financing choices. This was something that we wrestled with in developing our book-return measure. Our conclusion at the time

was that, because of the strong link between a firm's financing activity and its fundamental performance, it is virtually impossible to fully disentangle the component of a firm's performance that arises from operations with that which results from external financing choices. Our conclusion was that book-return was not a perfect measure of operating performance, but it was about as good as we could do. And, as the example above illustrates, it was certainly quite a bit better than total-growth-in-book-value.

Nonetheless, because we knew our measure was not perfect in controlling for the effects of share issuance, we did some robustness tests in our 2006 paper. First, we controlled for management's external-financing choices directly by including a composite share-issuance measure in our Fama-MacBeth regressions. Second, we examined a sample that excluded large issuers. In this note we do one more robustness check: we examine out-of-sample (pre-1963) returns, in a period where issuance and repurchase activity is far smaller.

Our findings from our 2006 paper hold up well here. What we show is that once we control for share issuance there is no statistically reliable relationship between either book-return or total-growth-in-book and future returns. Moreover, as we show in this note, in the pre-1963 sample, where the magnitude of issuances and repurchases was far smaller, neither book-return nor total-growth-in book forecast future returns. Why? Remember, if the number of shares stays constant, book-return and total growth in the book are about the same. If issuance is small they are close. So what the results from this earlier subsample show is that when there is not a lot of issuance/repurchase activity you can use either total growth in book or book-return as a measure of tangible returns, and you will find no relationship between tangible returns and future stock returns.

2 Empirical Evidence

This section replicates the tests from DT on an updated sample, and in addition, provides some further tests that clarify some of the potential sources of confusion that were raised by GL.

Table 1 presents a set of Fama and MacBeth (1973) regressions that were estimated over the period 1968:07-2014:03. The regressions summarized in this table come close to replicating a subset of similar regression in Tables III, IV and VI from our 2006 paper. The dependent variable in each of these ten regressions is the monthly returns of US common stocks meeting

	Independent Variables						
	Const.	bm_{t-5}	bm_t	$r^B(t-5,t)$	$g^B(t-5,t)$	$r^I(t-5,t)$	$\iota(t-5,t)$
1	1.196	0.094		–0.056			
	(5.4)	(1.7)		(–1.0)			
2	1.271	0.042			–0.208		
	(6.1)	(0.8)			(–4.1)		
3	1.192	0.061		–0.084			–0.527
	(5.4)	(1.2)		(–1.6)			(–4.8)
4	1.192	0.061			–0.084		–0.443
	(5.4)	(1.2)			(–1.6)		(–3.6)
5	1.217	0.049		–0.090		–0.249	–0.463
	(5.5)	(1.0)		(–1.7)		(–3.4)	(–4.6)
6	1.217	0.049			–0.090	–0.249	–0.373
	(5.5)	(1.0)			(–1.7)	(–3.4)	(–3.2)
7	1.237		0.242	–0.047			
	(5.6)		(3.7)	(–1.0)			
8	1.298		0.226		–0.168		
	(6.2)		(3.5)		(–3.5)		
9	1.217		0.201	–0.064			–0.486
	(5.5)		(3.2)	(–1.4)			(–4.4)
10	1.217		0.201		–0.064		–0.423
	(5.5)		(3.2)		(–1.4)		(–3.6)

Table 1: Fama-MacBeth regressions of monthly firm returns on value, return-on-book, and total-growth-in-book measures

Description: The sample period is 1968:07-2014:03. All coefficients are ×100. Fama-MacBeth T-statistics are in parentheses.

our data requirements. The independent variables are a set of predictive variables.

There are, however, some differences between these regressions and the comparable regressions in DT. First, the sample has been updated to include data through March 2014 (the end of our sample period in DT was December 2003). Second, we use a slightly different set of independent variables.[1] Here our independent variables are the five-year lagged book to price ratio, our "return-on-book" variable and the total growth in book value variable used in GL.

[1]Table VI of DT was designed to facilitate a comparison with Lakonishok *et al.* (1994), who concentrate on cash-flow-to-price and sales-growth variables in their analysis. We therefore used these variables in Table VI of DT rather than the book-equity based variables we use here.

Regression 1 illustrates one of the main points of our original 2006 paper. The independent variables are the five-year lagged log book-to-price ratio, and the return-on-book over the previous five years. The regression shows that a firm's return-on-book over the previous five years is not reliably related to future returns.[2]

GL correctly note that we make a number of adjustments to log growth in book to come up with our book-return measure, and that these adjustments affect the relationship between the fundamental growth measure and future returns. Regression 2 illustrates their point. This regression substitutes total growth-in-book equity g^B (*i.e.*, the log ratio of the total book value (not per-share) at the end of the preceding fiscal year, to the total book value from five years before) for the per-share return on book used in DT. As regression 2 shows, in contrast to book-return, growth in book does a really good job of forecasting the future cross-section of returns.

What is the book-return (r^B) and why did we use it rather than total-growth-in-book-equity in our paper? Suppose that five years ago (at $t-5$) you had bought one dollar's worth of stock i's book value, and then had neither put money into nor taken money out of your investment.[3] Today (*i.e.*, at t) how many dollars of book-value do you own? r^B is the log of this number. Why did we elect to use this measure of fundamental performance rather than something simple like the total-log-growth in book value? As we discuss in the Introduction, the problem is that there are a number of firms that substantially change their book values by either issuing or repurchasing shares, and these corporate actions can have an independent effect on returns.

Given this, it is important to see whether the conclusion that r^B is unrelated to future returns continues to hold once you control for the issuance and repurchase of shares. As described in DT, we construct a composite issuance variable $\iota(t-5,5)$, which is the log-change in the market capitalization of the firm minus the cumulative log return over the same five-year period in which we are measuring the book-value-change variables. In other words, this variable captures how much of the growth in

[2] In DT, we showed that this was also true for similarly calculated return-on cash-flow, sales, earnings, and a "total" tangible return measure. See Tables IV and V of DT, on p 1622 and 1624.

[3] This necessarily implies that you do not participate in equity issues or repurchases, and that you reinvest any dividends back in the stock at the stock's market price.

a firm's market capitalization is attributable to issuance- or repurchase-like activity.[4]

In regressions 3 and 4 we again examine the ability of book-return (r^B) and growth in book (g^B) to forecast future returns, but in these regressions we include our composite share-issuance variable as an additional independent variable. In both regressions share-issuance is highly statistically significant. However, in regression 4 we see that the Fama-Macbeth t-statistic on the total-growth-in-book variable falls to -1.6. In other words, after controlling for our composite issuance variable, the total book value growth measure proposed by GL fails to predict future returns.

As these regressions illustrate, after controlling for share issuance neither the total growth in book or the return on book are significantly related to future returns. Interestingly, the coefficient and the t-statistic on g^B in regression 4 are identical to the coefficient and the t-statistic on r^B in regression 3. This is no surprise: the mathematics of the Fama-MacBeth regression dictate this must be the case given that $g^B = r^B + \iota$. In other words, once you control for issuance, it really does not matter whether you use total-growth or our return-on-growth measure – you see no relation between past growth and future returns.

Finally, in regressions 5 and 6, we include the intangible return $r^I(t\text{–}5, t)$ from DT. We construct this measure by projecting stock returns over the previous five years on the five-year lagged book-to-market ratio and the five-year book-return, defining the intangible-return as the residual. As regressions 5 and 6 illustrate, this intangible component of returns is reliably negatively correlated with future returns whether we include r^B or g^B in the regression. (Again, the identical FM coefficients and t-statistics on r^I in regressions 5 and 6 come straight out of the math of the FM regressions)

Regressions 7-10 in Table 1 use current rather than lagged bm as a control variable. While we do not advocate this as a specification for assessing whether the market overreacts to fundamental information, it is useful as a horse race between forecasting variables. Again we see that after controlling for issuance, growth in book – whether it is measured on a per-share or total basis – has no power to forecast future returns.

[4]Specifically, our share issuance measure is calculated as the log change in a firms market capitalization over the same $t-5$ to t, minus the cumulative log return over the same period. Note that if the firm issues no new shares in any sense, this measure will be zero.

	Independent Variables						
	Const.	bm_{t-5}	bm_t	$r^B(t-5,t)$	$g^B(t-5,t)$	$r^I(t-5,t)$	$\iota(t-5,t)$
1	1.065	–0.015		–0.165			
	(2.2)	(–0.2)		(–2.1)			
2	1.083	–0.029			–0.206		
	(2.3)	(–0.4)			(–3.8)		
3	1.072	–0.015		–0.161			–0.300
	(2.3)	(–0.2)		(–2.1)			(–2.2)
4	1.072	–0.015			–0.161		–0.139
	(2.3)	(–0.2)			(–2.1)		(–0.8)
5	1.090	–0.025		–0.182		–0.059	–0.310
	(2.3)	(–0.3)		(–2.2)		(–0.5)	(–2.3)
6	1.090	–0.025			–0.182	–0.059	–0.129
	(2.3)	(–0.3)			(–2.2)	(–0.5)	(–0.7)
7	1.062		0.047	–0.157			
	(2.1)		(0.4)	(–2.4)			
8	1.093		0.047		–0.203		
	(2.2)		(0.4)		(–4.1)		
9	1.070		0.041	–0.155			–0.328
	(2.1)		(0.4)	(–2.4)			(–2.3)
10	1.070		0.041		–0.155		–0.172
	(2.1)		(0.4)		(–2.4)		(–1.0)

Table 2: Fama-MacBeth regressions of monthly firm returns on value, return-on-book, and total-growth-in-book Measures, 2004:01-2014:03

Description: The sample period is 2004:01-2014:03. All coefficients are ×100. Fama-MacBeth t-statistics are in parentheses.

2.1 Out-of-Sample Evidence

This section considers our results in sample periods that were not examined in DT. We now have data in an earlier period, and of course, new data have been generated since we initiated the original study. The earlier period is of interest because the magnitude of issuances and repurchases was much smaller prior to 1968, making the distinction between per-share and total growth in assets much less important. The later period is of interest because the price patterns and the potential behavioral biases discussed in our 2006 paper were public information when these data were generated.

Table 2 presents the same regressions as in Table 1 for the sample period that follows the period examined in DT. The regressions reveal a couple of interesting patterns: first, the book-to-market effect was relatively weak

	Independent Variables						
	Const.	bm_{t-5}	bm_t	$r^B(t-5,t)$	$g^B(t-5,t)$	$r^I(t-5,t)$	$\iota(t-5,t)$
1	1.576	0.153		–0.055			
	(4.7)	(2.1)		(–0.6)			
2	1.597	0.156			–0.039		
	(4.9)	(2.0)			(–0.4)		
3	1.581	0.151		–0.026			0.033
	(4.7)	(2.1)		(–0.3)			(0.3)
4	1.581	0.151			–0.026		0.059
	(4.7)	(2.1)			(–0.3)		(0.5)
5	1.695	0.160		–0.080		–0.468	0.089
	(4.6)	(2.1)		(–0.8)		(–3.6)	(0.8)
6	1.695	0.160			–0.080	–0.468	0.169
	(4.6)	(2.1)			(–0.8)	(–3.6)	(1.3)
7	1.492		0.330	–0.062			
	(4.6)		(3.4)	(–0.6)			
8	1.489		0.336		–0.032		
	(4.8)		(3.4)		(–0.4)		
9	1.495		0.329	–0.035			0.073
	(4.6)		(3.4)	(–0.4)			(0.6)
10	1.495		0.329		–0.035		0.107
	(4.6)		(3.4)		(–0.4)		(0.7)

Table 3: Fama-MacBeth regressions of monthly firm returns on value, return-on-book, and total-growth-in-book measures

Description: The sample period is 1932:07-1968:06. All coefficients are ×100. Fama-MacBeth t-statistics are in parentheses.

over the 2004-2014 period. Second over this sample period the evidence of overreaction to fundamentals is stronger, and is in fact marginally statistically significant over this 10.3-year period. The observation that evidence of overreaction to fundamentals occurs in a sample period where the value spread is weak does not appear to be consistent with the idea that the value spread is generated because of overreaction to tangible information.

Table 3 presents out-of-sample evidence from the pre-1968 period, using the Davis *et al.* (2000) data now available from Ken French's data library[5] The regressions reveal that the reversal of intangible but not tangible returns, observed in DT, also holds in this earlier time period. But in contrast to the DT findings, we do not see a reliable relation between composite issuance and future returns. This is not particularly surprising, given that

[5]see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

large share-issues and repurchases were much rarer in the pre-1968 period. Finally, it should be noted that in this earlier period, where changes in the number of outstanding shares plays only a minor role, there is no relation between total growth in book value and future returns, whether or not one controls for share-issuance.

3 Conclusions

To conclude, although we appreciate the ambiguity implicit in our tangible and intangible return measures, our empirical results indicate that after controlling for the issuance and repurchase of shares neither the book-return nor total-growth measures of tangible returns in book show any power to forecast the cross-section of future returns. In contrast, the intangible component of past returns reliably forecasts future returns whether or not one controls for issuances and repurchases.

Although our regressions suggest that markets react appropriately to tangible measures of longer-term performance, measured on a per-share basis, we did not mean to imply that this is a general result. When we published DT we were certainly aware of evidence that suggested short-term underreaction to fundamental information (*e.g.*, post-earnings announcement drift is consistent with short-term underreaction to fundamental information – see Ball and Brown (1968) and Bernard and Thomas (1989)).[6] More recently, the evidence of a profitability effect in Novy-Marx (2013) can be interpreted as evidence of underreaction to tangible performance on a per-share basis at a longer horizon.

We are unaware, however, of existing studies that provide evidence of overreaction to tangible performance on a per-share basis, or after controlling for share-issuance. Hence, our evidence of overreaction to book-returns in the most recent time period is potentially of interest. Of course, this more recent sample period is short, and the evidence is relatively weak, so this evidence must be interpreted with extreme caution.

[6] In their Appendix A, Daniel *et al.* (1998) summarize the evidence consistent with short-term underreaction to fundamental information.

References

Ball, R. and P. Brown. 1968. "An Exmpirical Examination of Accounting Income Numbers". *Journal of Accounting Research*. Autumn: 159–178.

Bernard, V. L. and J. K. Thomas. 1989. "Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium?" *Journal of Accounting Research, Supplement*. 27: 1–48.

Daniel, K. D., D. Hirshleifer, and A. Subrahmanyam. 1998. "Investor Psychology and Security Market Under- and Over-reactions". *Journal of Finance*. 53(6): 1839–1886.

Daniel, K. D. and S. Titman. 2006. "Market Reactions to Tangible and Intangible Information". *Journal of Finance*. 61(4): 1605–1643.

Davis, J., E. F. Fama, and K. R. French. 2000. "Characteristics, Covariances, and Average Returns: 1929-1997". *Journal of Finance*. 55(1): 389–406.

Fama, E. F. and K. R. French. 1993. "Common risk factors in the returns on stocks and bonds". *Journal of Financial Economics*. 33: 3–56.

Fama, E. F. and J. MacBeth. 1973. "Risk, Return and Equilibrium: Empirical Tests". *Journal of Political Economy*. 81(May): 607–636.

Gerakos, J. and J. T. Linnainmaa. 2016. "Market Reactions to Tangible and Intangible Information Revisited". *Critical Finance Review*. 5(1): xxx–xxx.

Lakonishok, J., A. Shleifer, and R. W. Vishny. 1994. "Contrarian investment, extrapolation and risk". *Journal of Finance*. 49: 1541–1578.

Novy-Marx, R. 2013. "The other side of value: The gross profitability premium". *Journal of Financial Economics*. 108(1): 1–28.