Discussion of:
Global Market Inefficiencies

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Paper Outline

1. Basic idea and Methodology (Bartram and Grinblatt, 2018, JFE)
    - *Statistical Fundamental Analysis*
2. Extension of SFA analysis to 25,731 individual stocks from 36 countries:
    - Developed vs. Emerging markets analysis
    - Low vs. High transaction cost markets
3. Examination of buy-and-hold strategy
    - build portfolio each month and hold for 12 months.
4. Model of Mispricing and Transaction Costs
5. Relation between transaction costs and strategy returns.

Discussion Outline

- Statistical Fundamental Analysis — Motivation
- Naive mispricing model.
  - Is the evidence here consistent with the naive mispricing model?
- Sources of potential misspecification:
  - Response to shocks
  - Decay rates for different shock components.

Accounting vs. Finance

- $\frac{\text{ME}}{\text{BE}}$ (or $\frac{\text{BE}}{\text{ME}}$) can be viewed as a mispricing measure (DeBondt and Thaler, 1987)
  - BE_t (e.g., stockholder's equity) is what the accountants say the firm is worth.
  - ME_t is what the market says the firm is worth.
- Back when we still thought markets were efficient, we still knew that B/M ratios weren't 1.
  - We thought a firm's B/M ratio couldn't forecast the firm's future return.
  - Why are BE and ME different?
    - There is a lot of information that accountants don't have.
    - But, since markets were semi-strong form efficient, the market price (ME) reflects all publicly available information, not just accounting info.
- Then, the the 1980s, we found out that B/M forecast future returns.
  - This was a bit disturbing
  - It suggested accountants might know something that the markets didn't!

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Building a better measure of firm value

- Fama and French (2006, 2015), use the PV model combined with clean surplus accounting get:

$$M_t = \sum_{\tau=1}^{\infty} \frac{\mathbb{E}[D_{t+\tau}]}{(1+r)^{\tau}} \quad (1)$$

$$= \sum_{\tau=1}^{\infty} \frac{\mathbb{E}[Y_{t+\tau} - dB_{t+\tau}]}{(1+r)^{\tau}} \quad (2)$$

$$\frac{M_t}{B_t} = \sum_{\tau=1}^{\infty} \frac{\mathbb{E}[Y_{t+\tau} - dB_{t+\tau}]}{B_t \cdot (1+r)^{\tau}} \quad (3)$$

- Taking partial derivatives of this identity show's
  1. $\frac{\partial r}{\partial B/M} > 0$: value effect.
  2. $\frac{\partial r}{\partial Y_{t+\tau}/B_t} > 0$: profitability effect
  3. $\frac{\partial r}{\partial dB_{t+\tau}/B_t} < 0$: investment effect.

Building a better measure of firm value

- A different way of saying this is that, holding BE constant, firms are fundamentally more valuable which:
    1. will generate higher ROEs going forward, and
    2. can generate these high ROEs with the least investment investment.
- Fama and French (2015) indeed find that their RMW and CMA (profitability and investment) factors enhance the performance of their three-factor model.
- Alternatively, calculating fundamental value, you need to correct BE using profitability and investment.

The BG's mispricing measure

- What we would really like to do is to take all of the available accounting data and build the best possible estimate of fundamental value.
  - we could then compare this to market capitalization, to calculate mispricing.
  - This is a really complicated problem.
- Bartram and Grinblatt (2018, BG) and this paper develop a new way of doing this:
  - It is ad-hoc, sloppy, and atheoretical
    - but it works!

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Statistical Fundamental Analysis – Basic Idea

- Methodology taken from Bartram and Grinblatt (2018) JFE paper.
- At the end of each month, run a x-sectional regression of market-capitalization $\mathbf{V}_t$ on balance-sheet and (annualized) income-statement variables ($\mathbf{X}_t$):

$$\mathbf{V}_t = \mathbf{X}_t \boldsymbol{\beta}_t + \boldsymbol{\epsilon}_t$$

  where:
  - $\mathbf{V}_t$, $\boldsymbol{\epsilon}_t$ are $N_t \times 1$; $\boldsymbol{\beta}_t$ is $K \times 1$; $\mathbf{X}_t$ is $N_t \times K$ $(K = 22/29)$
- The vector of predicted fundamental values is then given by:

$$\hat{\mathbf{V}}_t = \mathbf{X}_t \hat{\boldsymbol{\beta}}_t$$

  where $\hat{\boldsymbol{\beta}}_t$ is OLS or (TS) coefficient vector from the cross-sectional regression at t.
- The *Mispricing measure* M_t is given by:

$$\mathbf{M}_t = \frac{\hat{\mathbf{V}}_t - \mathbf{V}_t}{\mathbf{V}_t} = \frac{-\boldsymbol{\epsilon}_t}{\mathbf{V}_t}$$

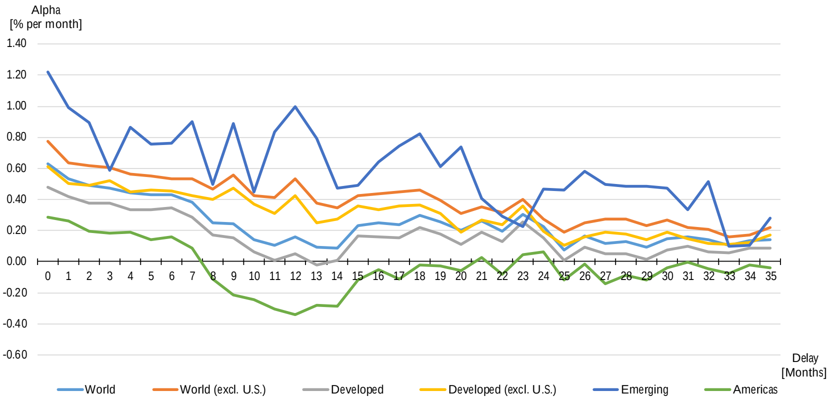
Predictive Variables ($\mathbf{X}_t$)—from BG(2018,JFE) Table 6

Variables	Industry-adjusted return		Six-factor alpha		Eight-factor alpha	
	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]
Panel A: Variable additions (sequentially added variables)						
None (just regression intercept)	−0.1172	[−0.70]	−0.1559	[−1.20]	−0.0718	[−0.54]
ATQH (total assets)	−0.0353	[−0.20]	−0.0946	[−0.70]	−0.0602	[−0.43]
SEQQH (total stockholders equity)	0.1970	[1.01]	0.1862	[1.28]	0.0993	[0.66]
ICAPTQH (total invested capital)	0.1884	[1.14]	0.1754	[1.34]	0.1702	[1.25]
PSTKRQH (redeemable preferred/preference stock)	0.1967	[1.19]	0.1901	[1.46]	0.1895	[1.40]
TEQQH (total stockholders equity)	0.1993	[1.21]	0.1957	[1.50]	0.1939	[1.43]
PPENTQH (total (net) property, plant, and equipment)	0.2045	[1.26]	0.1994	[1.50]	0.1852	[1.34]
LTQH (total liabilities)	0.1989	[1.22]	0.1929	[1.45]	0.1805	[1.30]
PSTKQH (total preferred/preference stock (capital))	0.1855	[1.12]	0.1778	[1.32]	0.1609	[1.14]
CEQQH (total common/ordinary equity)	0.1797	[1.09]	0.1744	[1.30]	0.1547	[1.11]
AOQH (total other assets)	0.2142	[1.39]	0.2341*	[1.85]	0.2252*	[1.71]
DLTTQH (total long-term debt)	0.2347	[1.62]	0.2617**	[2.12]	0.2838**	[2.21]
LOQH (total other liabilities)	0.2387*	[1.65]	0.2685**	[2.13]	0.3015**	[2.30]
ACOQH (total other current assets)	0.2664*	[1.77]	0.2920**	[2.27]	0.3313**	[2.48]
CHEQH (cash and short-term investments)	0.2622*	[1.72]	0.3386**	[2.46]	0.4658***	[3.35]
LCOQH (total other current liabilities)	0.2777*	[1.82]	0.3449**	[2.49]	0.4786***	[3.43]
APQH (accounts payable)	0.2660*	[1.74]	0.3407**	[2.51]	0.4863***	[3.59]
DVPQH (preferred/preference dividends)	0.2479	[1.62]	0.3261**	[2.40]	0.4679***	[3.46]
SALEQH (sales/turnover (net))	0.3711**	[2.51]	0.4474***	[3.49]	0.5579***	[4.27]
XIDOQH (extraordinary items and discontinued operations)	0.3427**	[2.33]	0.4293***	[3.39]	0.5294***	[4.09]
IBQH (income before extraordinary items)	0.5926***	[4.03]	0.7419***	[6.04]	0.7530***	[5.87]
IBADJQH (income before extraordinary items, adjusted for common stock equivalents)	0.6329***	[4.24]	0.7793***	[6.26]	0.7825***	[6.02]
NIQH (net income (loss))	0.6263***	[4.24]	0.7643***	[6.18]	0.7613***	[5.90]
IBCOMQH (income before extraordinary items, available for common)	0.6114***	[4.21]	0.7445***	[6.08]	0.7394***	[5.79]
PIQH (pretax income)	0.6551***	[4.49]	0.7815***	[6.43]	0.7733***	[6.10]
TXTQH (total income taxes)	0.6058***	[4.10]	0.7354***	[5.95]	0.7356***	[5.70]
NOPIQH (nonoperating income (expense))	0.6329***	[4.29]	0.7627***	[6.37]	0.7258***	[5.82]
DOQH (discontinued operations)	0.6463***	[4.44]	0.7802***	[6.55]	0.7495***	[6.04]
DVQH (cash dividends)	0.4814***	[3.19]	0.6232***	[5.11]	0.6133***	[4.83]

- *Would including first diffs (e.g., of ATQH) improve fit?*

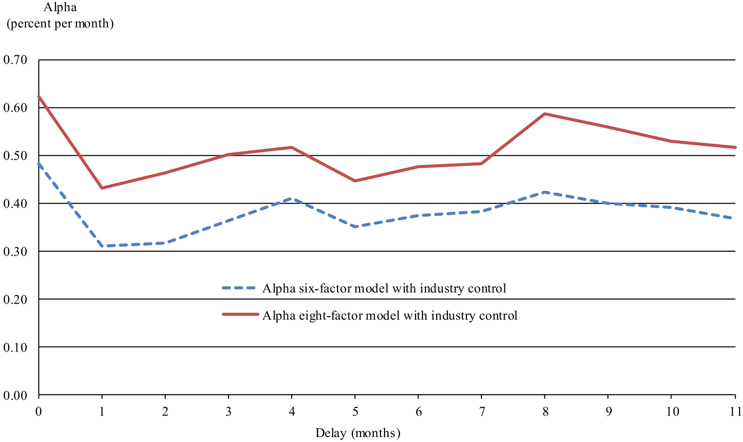
How well does it work?

The predictability is long-lived, but differs across regions:



Stability of $\hat{\beta}_t$—from BG(2018,JFE) Figure 2

The $\hat{\beta}_t$ is pretty stable across time:



† Eight factors are Fama and French (2015) five factors, plus MOM and ST- and LT-Reversal factors

FM Regressions (Table 3)

	OLS										TS	
	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5		Specification 6	
	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]	Coefficient	[*t*-statistic]
Panel A: Regressions with quintile dummies for full-sample period												
Mispricing Signal (M) (Q5)	0.4614 ***	[2.79]			0.5376 ***	[4.37]			0.3621 ***	[2.82]	0.4353 ***	[3.67]
Beta (Q5)			−0.1028	[−0.47]	−0.1274	[−0.60]	−0.0141	[−0.07]	−0.0593	[−0.30]	−0.0073	[−0.04]
Market capitalization (Q5)			−0.0248	[−0.12]	−0.0374	[−0.18]	−0.0536	[−0.27]	−0.1257	[−0.62]	−0.0173	[−0.08]
Book/market (Q5)			0.3022 *	[1.78]	0.1040	[0.62]	0.3552 **	[2.22]	0.2429	[1.45]	0.1818	[1.06]
Short-term reversal (Q5)			−1.1099 ***	[−6.24]	−1.0818 ***	[−6.14]	−1.1857 ***	[−6.84]	−1.1663 ***	[−6.79]	−1.1656 ***	[−6.74]
Momentum (Q5)			0.7910 ***	[3.75]	0.8079 ***	[3.81]	0.5447 ***	[2.67]	0.5627 ***	[2.76]	0.5746 ***	[2.82]
Long-term reversal (Q5)			−0.2791 **	[−2.46]	−0.3082 ***	[−2.75]	−0.2095 *	[−1.96]	−0.2063 *	[−1.94]	−0.2274 **	[−2.14]
Accruals (Q5)							−0.6624 ***	[−7.64]	−0.6498 ***	[−7.53]	−0.6400 ***	[−7.36]
SUE (Q5)							0.4094 ***	[4.31]	0.4043 ***	[4.25]	0.4138 ***	[4.35]
Gross profitability (Q5)							0.5516 ***	[5.00]	0.5457 ***	[4.94]	0.5265 ***	[4.76]
Earnings yield (Q5)							0.4754 ***	[4.32]	0.3732 ***	[3.22]	0.3220 ***	[2.79]
Intercept	0.2945	[0.77]	0.7835	[1.60]	0.6402	[1.27]	0.5373	[1.02]	0.5208	[0.97]	0.4131	[0.77]
Number of observations	1,349		1,349		1,349		1,349		1,349		1,349	
Adj. *R*-squared	0.041		0.073		0.074		0.078		0.080		0.079	
Industry control	Yes		Yes		Yes		Yes		Yes		Yes	

- The Mispricing Measure is robust across specifications
  - However, the predictive power of other accounting variables remains strong
    - e.g., SUE, Accruals, Gross Profitability
  - This is interesting, as these variables are part of $\hat{V}_t$

What is going on?

- The model BG are suggesting is (I think), is that $V_{i,t}$ (= ME_{it}) follows a process like:

$$(V_{i,t} - \hat{V}_{i,t}) = -\rho(V_{i,t} - \hat{V}_{i,t}) + \nu_{i,t}.$$

- In an efficient market the market capitalization $V_{i,t}$ should:
  - equal the true firm value $\hat{V}_{i,t}$ at all points in time, and

  but instead follows an AR(1) process.
- $\nu_{i,t}$ is a "noise trader" shock that pushes the price away from the fundamental value.
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Why isn't this a perfect model?

$$(V_{i,t} - \hat{V}_{i,t}) = -\rho(V_{i,t} - \hat{V}_{i,t}) + \nu_{i,t}.$$

- The linear statistical fundamental value specification is clearly ad-hoc, and leads to some crazy estimated fundamental values
  - The mean values of M_t for mispricing quintiles Q1 and Q5 are -6.06 and 13.91 respectively.
  - some data are missing from the specification.
- However, I think that the more important and interesting misspecifications might relate to:
  1. The sources of the mispricing shocks ($\nu_{i,t}$)
  2. differing half-lives associated with different components of $\nu_{i,t}$.

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What are the shocks ($\nu_{i,t}$)?

$$(V_{i,t} - \hat{V}_{i,t}) = -\rho(V_{i,t} - \hat{V}_{i,t}) + \nu_{i,t}.$$

- The literature suggests that at a short horizon (< 1 yr), the $\nu_{i,t}$ are largely driven by underreaction/inattention to fundamental information (Daniel, Hirshleifer, and Sun, 2018).
  - e.g., earnings surprises.
- At longer horizons, mispricing seems to be unrelated to innovations in fundamentals
  - See, e.g., the decomposition in Daniel and Titman (2006)
  - However, it would be good to see whether this holds up with the broader set of fundamentals considered here.
- *What information does the market get right?*

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What other data should go in here

- BG (2018) report that the average Q5/Q1 level of M_t is -2.02/+5.83.
- The observed return predictability, while high, is nowhere near high enough to be consistent with these mispricing spreads.
- It would be interesting to see how much other proxies for can be used to improve $\hat{\mathbf{V}}_t$.
  - barriers to entry, presence of growth options, etc

Statistical Fundamental Analysis

- Really cool methodology.
- Fascinating results, particularly in applying their stochastic fundamental analysis to global equity markets.
- It would be nice to see more about how the mispricing shocks vary across regions:
  1. is the importance of various shocks the same?
     - short-horizon inattention vs. longer-horizon mispricing shocks.
  2. Is the decay of the various shocks the same across regions?
- Finally, how should we think about use of economic models to refine this empirical specification?

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