What Drives Anomaly Returns?

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JF2020.03

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Biography：

Lochstoer joined the UCLA Anderson faculty as associate professor of finance from Columbia University, where he was Gantcher Associate Professor of Business. He has taught MBA- and Ph.D.-level finance courses at Haas School of Business and London Business School

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- Ph.D., finance, the University of California, Berkeley.
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The story begins here(Backgroud):

- OVER THE PAST 30 YEARS, researchers have uncovered robust patterns in stock returns that contradict classic asset pricing theories.
- To exploit such anomalies, investors can form long-short portfolios (e.g., long value and short growth) with high average returns and near-zero market risk.
- These long-short anomaly portfolios are an important part of the mean-variance efficient (MVE) portfolio and thus the stochastic discount factor (SDF).
- In the five-factor Fama and French (2015) model, nonmarket factors account for 85% of the variance in the model's implied SDF.
- In this paper, we introduce an efficient empirical technique for decomposing anomaly portfolio returns, as well as their MVE combination, into cash flow (CF) and discount rate (DR) shocks (news) as in Campbell (1991).

ABSTRACT

Novel findings:

- **First,** for all five anomalies, CF news explains most (64% to 80%) of the variation in anomaly returns.

We find that such systematic earnings shocks occur not only in size and value factor portfolios but also in profitability, investment, and momentum portfolios.

Moreover, unlike Fama and French (1995), we are able to explicitly link systematic shocks to firms' earnings to the returns of the anomaly portfolios. To evaluate implications for the SDF, we combine all five anomalies into an MVE anomaly portfolio and continue to find that CF shocks explain most (73%) of the MVE portfolio's return variance.

ABSTRACT

Novel findings:

- **Second,** the CF and DR components in anomaly returns exhibit only weak correlations with the corresponding components in market returns.

There are four correlations of interest between anomaly and market CF and DR components, all of which affect an anomaly's market beta.

The correlations between market CFs and the five anomaly CFs range from −0.22 to 0.13. We can reject the hypothesis that CF shocks to the MVE portfolio that consists of all five anomalies are positively correlated (above 0.11) with market CF shocks, indicating that the anomaly MVE portfolio and the market portfolio are exposed to distinct fundamental risks.

In addition, we estimate that the correlation between anomaly MVE DR news and market DR news is just 0.06.

ABSTRACT

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ABSTRACT

Novel findings:

- **Third finding,** for most anomalies, CF and DR shocks are negatively correlated.

That is, firms with negative news about future CFs tend to experience persistent increases in DRs.

This association contributes significantly to return variance in anomaly portfolios.

A notable caveat is that this result applies to anomaly portfolios based on stocks with market capitalization **not** in the bottom quintile of New York Stock Exchange (NYSE) stocks, which roughly corresponds to excluding stocks popularly known as microcaps.

ABSTRACT

Cast doubt:

- First, theories in which DR news is the primary source of anomaly returns, such as De Long et al. (1990), are inconsistent with evidence that CF news dominates over returns.
- Second, theories that emphasize commonality in DRs, such as theories of time-varying risk aversion (e.g., Santos and Veronesi (2010)) and theories of common investor sentiment (Baker and Wurgler (2006)), are difficult to reconcile with the low correlations between anomaly and market DR shocks.
- Third, theories in which anomaly CF news is strongly correlated with market CF news, in particular CF beta stories such as Zhang (2005), are inconsistent with empirical correlations that are close to zero.

ABSTRACT

Approach:

- Our approach builds on the log-linear approximation of stock returns in Campbell and Shiller (1988).
- We directly estimate firms' DR shocks using an unbalanced panel vector autoregression (VAR) in which we impose the present-value relation to derive CF shocks.
- we analyze the implications of our firm-level estimates for priced (anomaly) factor portfolios to investigate the fundamental drivers of these factors' returns.
- The panel VAR, as opposed to a time-series VAR for each anomaly portfolio, fully exploits information about the cross-sectional relation between shocks to characteristics and returns.
- Our panel approach that allows us to consider more return predictors substantially increases the precision of the return decomposition, and mitigates small-sample issues.

I. Theory

In this paper, we decompose returns to long-short anomaly portfolios and their MVE combination into updates in expectations of future CFs, CF news, and updates in expectations of future returns, DR news. The MVE combination of pricing factors is of interest as shocks to this portfolio's return are proportional to shocks to the SDF M_t (e.g., Cochrane (2005)).

$$M_t - E_{t-1}[M_t] = b(R_{MVE,t} - E_{t-1}[R_{MVE,t}]), \tag{1}$$

$R_{MVE,t} = \sum_{h=1}^{H} \omega_h R_{F_h,t}$ is the return to the MVE portfolio at time *t*, expressed as a linear function of *H* factor returns ,$(R_{F_h,t})$ and where b < 0.

I. Theory

- A. The Return Decomposition

$$r_{i,t+1} - E_t[r_{i,t+1}] \approx CF_{i,t+1} - DR_{i,t+1}, \quad (2)$$

$$CF_{i,t+1} = (E_{t+1} - E_t) \sum_{j=1}^{\infty} \kappa^{j-1} \Delta d_{i,t+j}, \quad (3)$$

$$DR_{i,t+1} = (E_{t+1} - E_t) \sum_{j=2}^{\infty} \kappa^{j-1} r_{i,t+j}, \quad (4)$$

$\Delta d_{i,t+j}$ ($r_{i,t+j}$) is the log dividend growth (log gross return) of firm *i* from time *t*+*j* −1 to *t*+*j*, and *k* is a log-linearization constant slightly less than one.

I. Theory

- **B. Relating the Decomposition to Anomalies**

Theories of anomalies propose that investor beliefs and firm CFs vary with firm characteristics.

- De Long et al. (1990) and Barberis, Shleifer, and Vishny (1998; hereafterare examples of **behavioral models** that can explain this anomaly.

In this model, firm CFs are constant but stock prices fluctuate because of random demand from noise traders, driving changes in firm BM ratios.

Since expectations in equation (3) are rational, there are no CF shocks in this model. By equation (2), all shocks to returns are due to DR shocks. The constant CF assumption is clearly stylized. However, if in the spirit of this model one assumes that value and growth firms have similar CF exposures, the variance of net CF shocks to the long-short portfolio would be small relative to the variance of DR shocks.

Thus, empirically finding that DR shocks explain only a small fraction of return variance to the long-short value portfolio would be inconsistent with this model.

I. Theory

- B. Relating the Decomposition to Anomalies
- Green, and Naik (1999); Zhang (2005); and Lettau and Wachter (2007) are examples of risk-based explanations.

In this model, CF and DR shocks are closely linked. Negative CF shocks cause investors to expect low future CFs. But these irrationally low expectations manifest as positive DR shocks in equations (3) and (4), which are based on rational expectations.

$$CF_{i,t+1} = (E_{t+1} - E_t)\sum_{j=1}^{\infty} \kappa^{j-1} \Delta d_{i,t+j}, \quad (3)$$

$$DR_{i,t+1} = (E_{t+1} - E_t)\sum_{j=2}^{\infty} \kappa^{j-1} r_{i,t+j}, \quad (4)$$

This theory predicts a strong negative correlation between CF and DR shocks at the firm and anomaly levels.

I. Theory

- B. Relating the Decomposition to Anomalies
- Berk, Green, and Naik (1999) and Zhang (2005) provide risk-based explanations of the value premium based on firms' dynamic investment decisions.

Similar to BSV, this model predicts a negative relation between firms' CF and DR shocks. Different from BSV, the model predicts that the value anomaly portfolio has CF shocks that are positively related to market CF shocks because value stocks are more sensitive to aggregate technology shocks than growth stocks.

I. Theory

- B. Relating the Decomposition to Anomalies
- Lettau and Wachter (2007) propose a risk-based explanation of the value premium based on the duration of firms' CFs.

In their model, relative to value firms, growth firms are more exposed to shocks to market DRs and long-run CFs, which are not priced, and less exposed to shocks to short-run market CFs, which are priced.

This model implies that long-run DR and CF shocks to the value portfolio are negatively correlated with long-run DR and CF shocks to the market, respectively.

I. Theory

- C. Relating the Decomposition to the SDF

The modern consensus is that the MVE portfolio, and thus the SDF, includes factors other than the market.By the logic above, decomposing MVE portfolio returns into CF and DR news also can inform specifications of asset pricing models.

For example, large time variation in investor risk aversion, as in the Campbell and Cochrane (1999) model, suggests a strong common component in DR shocks across the factor portfolios in the SDF.

I. Theory

C. Relating the Decomposition to the SDF

All models that feature a cross-section of stocks have implications for the return decomposition of anomaly portfolios and the MVE portfolio.

Value and growth firms have similar exposure to market productivity shocks, but growth firms have higher exposure to the investment-specific shock. These two CF shocks are the primary drivers of returns to the MVE portfolio in their economy. Since BM ratios increase with DRs, their model also implies a negative correlation between CF and DR shocks.

I. Theory

D. The Empirical Model

We assume that firm-level expected log returns are linear in observable variables (X)

$$E_t[r_{i,t+1}] = \delta_0 + \delta_1' X_{it}^{ma} + \delta_2' X_t^{agg}. \quad (5)$$

X_{it}^{ma} -a vector of market-adjusted characteristics

X_t^{agg} -a vector of aggregate characteristics

I. Theory

D. The Empirical Model

To implement the return decompositions, we estimate two separate VAR(1) systems. First, we estimate an aggregate VAR to model dynamics in expected market returns and aggregate characteristics,

$$Z_{t+1} = \mu^{agg} + A^{agg} Z_t + \varepsilon_{t+1}^{agg}, \tag{6}$$

$Z_t = [r_t^{agg};\ X_t^{agg}]$ is a $K_{agg} \times 1$ vector

ε_{t+1}^{agg} is a vector of conditionally agg mean-zero shocks

r_t^{agg} denotes the value-weighted average log return at time t

I. Theory

D. The Empirical Model

$$DR_{t+1}^{agg} = E_{t+1}\sum_{j=2}^{\infty}\kappa^{j-1}r_{t+j}^{agg} - E_t\sum_{j=2}^{\infty}\kappa^{j-1}r_{t+j}^{agg}$$

$$= e_1'\kappa A^{agg}(I_{K^{agg}} - \kappa A^{agg})^{-1}\varepsilon_{t+1}^{agg}. \quad (7)$$

Here, e_1 is a $K^{agg} \times 1$ column vector with one as its first element and zeros elsewhere, $I_{K^{agg}}$ is a $K^{agg} \times K^{agg}$ identity matrix, and $\kappa = 0.95$ as in CPV.

For the cross-section, we estimate a market-adjusted panel VAR,

I. Theory

D. The Empirical Model

$$Z_{i,t+1} = \mu^{ma} + A^{ma} Z_{i,t} + \varepsilon_{i,t+1}, \quad (8)$$

where $Z_{it} = [r_{it}^{ma};\ X_{it}^{ma}]$ is a $K^{ma} \times 1$ vector, $\varepsilon_{i,t+1}$ is a vector of conditionally mean-zero shocks, and $r_{it}^{ma} \equiv r_{it} - r_t^{agg}$. Similar to equation (7), firms' market-adjusted DR shocks are,

$$DR_{i,t+1}^{ma} = \iota_1' \kappa A^{ma} (I_{K^{ma}} - \kappa A^{ma})^{-1} \varepsilon_{i,t+1}, \quad (9)$$

where ι_1 is a $K^{ma} \times 1$ column vector with one as its first element and zeros elsewhere, and $I_{K^{ma}}$ is the $K^{ma} \times K^{ma}$ identity matrix.

I. Theory

D. The Empirical Model

We extract CF shocks from the VARs by combining the present-value equation (2) for returns and the VAR equations (7) and (9) for DR shocks,

$$\begin{aligned} CF^{agg}_{t+1} &= r^{agg}_{t+1} - E_t[r^{agg}_{t+1}] + DR^{agg}_{t+1} \\ &= e_1'\left(I_{K^{agg}} + \kappa A^{agg}(I_{K^{agg}} - \kappa A^{agg})^{-1}\right)\varepsilon^{agg}_{t+1}, \end{aligned} \quad (10)$$

$$\begin{aligned} CF^{ma}_{i,t+1} &= r^{ma}_{i,t+1} - E_t[r^{ma}_{i,t+1}] + DR^{ma}_{i,t+1} \\ &= \iota_1'\left(I_{K^{ma}} + \kappa A^{ma}(I_{K^{ma}} - \kappa A^{ma})^{-1}\right)\varepsilon_{i,t+1}. \end{aligned} \quad (11)$$

I. Theory

D. The Empirical Model

We therefore impose the present-value relation when estimating the joint dynamics of firm CFs and DRs.

We then combine the aggregate and market-adjusted return components to obtain firms' total DR and CF shocks as follows:

$$DR_{it} = DR_t^{agg} + DR_{it}^{ma}, \tag{12}$$

$$CF_{it} = CF_t^{agg} + CF_{it}^{ma}. \tag{13}$$

II. Data

publicly traded U.S. stocks from Compustat and the Center for Research on Securities Prices (CRSP) from 1926 through 2017.

obtain all accounting data from Compustat, except that we add book equity data from Davis, Fama, and French (2000).

obtain data on stock prices, returns, and shares outstanding from CRSP.

obtain one-month and one-year risk-free rate data from one-month and one-year yields of U.S. Treasury bills, respectively, which are available on Kenneth French's website and the Fama Files in CRSP.

obtain inflation data from the Consumer Price Index (CPI) series in CRSP.

Table I
Summary Statistics

Panel A: Descriptive Statistics

	Firms	Mean	St. Dev.
lnRealRet	1,399	0.030	0.293
lnROE	1,399	0.065	0.176
lnBM	1,399	−0.240	0.626
lnProf	1,399	0.197	0.143
lnInv	1,399	0.094	0.109
d5.lnME	1,399	0.389	0.693
lnMom6	1,399	0.035	0.204

Panel B: Correlations

	lnRealRet	*lnROE*	*lnBM*	*lnProf*	*lnInv*	*d5.lnME*
lnRealRet	1.00					
lnROE	0.22	1.00				
lnBM	−0.34	−0.11	1.00			
lnProf	0.14	0.56	−0.12	1.00		
lnInv	−0.05	0.11	−0.11	0.06	1.00	
d5.lnME	0.38	0.24	−0.44	0.17	0.27	1.00
lnMom6	0.69	0.11	−0.23	0.07	−0.05	0.24

III. Baseline VAR Estimation

A. Specification

Table II

Market-Adjusted Panel VAR

	Dependent Variables						
Regressors	$lnRealRet_t$	$lnBM_t$	$lnProf_t$	$lnInv_t$	$d5.lnME_t$	$lnMom6_t$	$lnROE_t$
$lnRealRet_{t-1}$	0.016	0.068*	0.034**	0.007**	0.244**	−0.012	0.095**
	(0.033)	(0.029)	(0.005)	(0.002)	(0.036)	(0.021)	(0.011)
$lnBM_{t-1}$	0.033	0.905**	−0.017**	−0.008**	−0.008	0.025*	−0.043**
	(0.017)	(0.004)	(0.003)	(0.001)	(0.020)	(0.012)	(0.019)
$lnProf_{t-1}$	0.157**	−0.029	0.584**	0.013**	0.190**	0.085**	0.269**
	(0.030)	(0.025)	(0.020)	(0.003)	(0.040)	(0.018)	(0.023)
$lnInv_{t-1}$	−0.145**	0.105**	−0.091**	0.720**	−0.048	−0.061**	−0.137**
	(0.023)	(0.022)	(0.008)	(0.007)	(0.028)	(0.019)	(0.013)
$d5.lnME_{t-1}$	−0.016**	0.032**	0.000	0.019**	0.743**	−0.017**	0.013**
	(0.006)	(0.006)	(0.001)	(0.001)	(0.013)	(0.004)	(0.002)
$lnMom6_{t-1}$	0.095**	−0.093**	0.009	−0.008**	0.071*	0.058**	−0.023
	(0.033)	(0.030)	(0.006)	(0.002)	(0.035)	(0.018)	(0.012)
R^2	0.021	0.747	0.373	0.797	0.632	0.017	0.126
N	124,535	124,535	124,535	124,535	124,535	124,535	124,535

B. Panel Regressions

Table III
Aggregate VAR

	Dependent Variables						
Regressors	$lnRealRet_t$	$lnBM_t$	$lnProf_t$	$lnInv_t$	$d5.lnME_t$	$lnMom6_t$	$lnROE_t$
$lnRealRet_{t-1}$	−0.131	0.126	0.041*	0.006	0.061	−0.085	0.013
	(0.120)	(0.132)	(0.018)	(0.012)	(0.269	(0.092)	(0.025)
$lnBM_{t-1}$	0.073	0.961**	−0.005	−0.002	−0.150	0.051	−0.073**
	(0.120)	(0.128)	(0.008)	(0.006)	(0.132)	(0.068)	(0.013)
$lnProf_{t-1}$	1.195	−1.265	0.883**	0.101*	2.961	0.789	0.698**
	(1.196)	(1.347)	(0.075)	(0.048)	(1.522)	(0.703)	(0.129)
$lnInv_{t-1}$	−0.351	0.774	0.059	0.826**	−1.621	−0.310	0.073
	(1.017)	(1.144)	(0.102)	(0.048)	(2.237)	(0.589)	(0.159)
$d5.lnME_{t-1}$	−0.128*	0.145*	−0.016*	0.007*	0.512**	−0.028	−0.018
	(0.059)	(0.062)	(0.007)	(0.003)	(0.156)	(0.035)	(0.011)
$lnMom6_{t-1}$	0.011	0.048	−0.044	−0.011	−0.043	0.025	−0.009
	(0.220)	(0.236)	(0.026)	(0.013)	(0.436)	(0.159)	(0.040)
R^2	0.173	0.686	0.793	0.916	0.470	0.115	0.599
N	89	89	89	89	89	89	89

Table IV

Firm-Level and Market Return Variance Decompositions

The table displays the variance decomposition of firm- and market-level real returns. We decompose each log return into CF and DR news based on the panel VAR in Table II and the aggregate VAR in Table III. "Firm market-adjusted return" refers to the decomposition of market-adjusted log firm returns from the panel VAR. "Market return" refers to the decomposition of log market returns from the aggregate VAR. "Firm return" refers to the decomposition of total firm returns, obtained by combining components of firm market-adjusted returns and market returns. The sample spans the period 1929 through 2017. Standard errors appear in parentheses.

	$var(DR)$	$var(CF)$	$-2cov(DR, CF)$	$corr(DR, CF)$
Firm market-adjusted return	8%	72%	20%	−0.42
	(4%)	(10%)	(4.9%)	(0.06)
Firm return	25%	55%	20%	−0.27
	(10%)	(7.6%)	(7.2%)	(0.11)
Market return	74%	15%	10%	−0.15
	(34%)	(7.6%)	(25%)	(0.38)

IV. Decomposing Returns

A. Firm Return Decomposition

Table IV reports the decomposition of log return variance into DR and CF components.
Standard errors are reported in parentheses below the point estimate of each variance component.
The standard errors account for estimation uncertainty from sampling variation and from estimating the VAR coefficients, as well as for heteroskedasticity and contemporaneous cross-correlation of residuals.

IV. Decomposing Returns

B. Anomaly Return Decompositions

	Fraction of Portfolio Return Variance			
	$var(DR)$	$var(CF)$	$-2cov(DR, CF)$	$corr(DR, CF)$
Panel A: Individual Anomalies				
Book-to-market	7%	68%	25%	−0.56
	(5%)	(19%)	(10%)	(0.10)
Profitability	14%	80%	6%	−0.10
	(8%)	(27%)	(16%)	(0.14)
Size	7%	64%	29%	−0.68
	(5%)	(17%)	(10%)	(0.09)
Momentum	7%	70%	23%	−0.55
	(4%)	(21%)	(11%)	(0.11)
Investment	14%	78%	7%	−0.10
	(9%)	(19%)	(13%)	(0.14)
Panel B: MVE Portfolios				
MVE ex market	7%	73%	20%	−0.43
	(4%)	(16%)	(10%)	(0.12)
MVE cum market	36%	69%	−5%	0.05
	(14%)	(18%)	(21%)	(0.19)

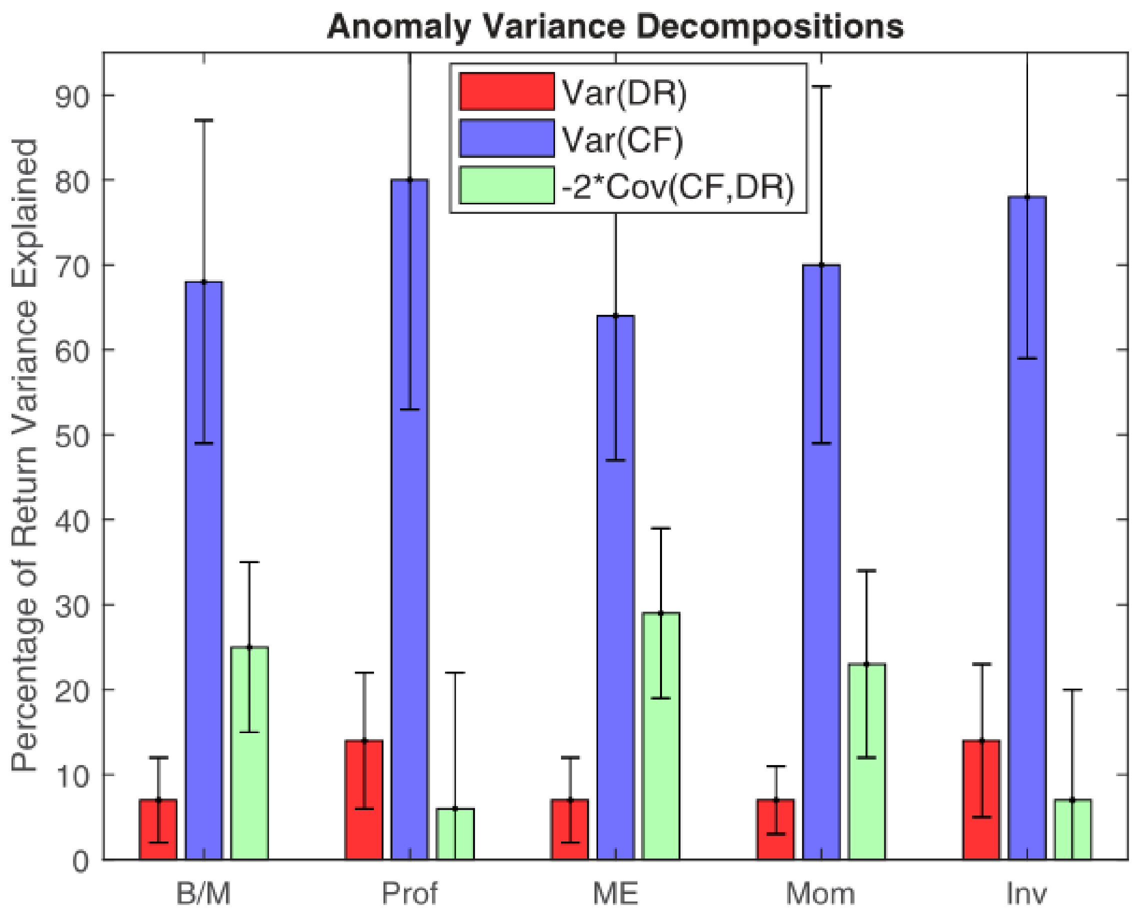


Figure 1. Anomaly return variance decompositions. This figure depicts the return variance decomposition of the five individual long-short anomaly portfolios shown in Table V. "DR" cor- responds to discount rate news, and "CF" to cash flow news.

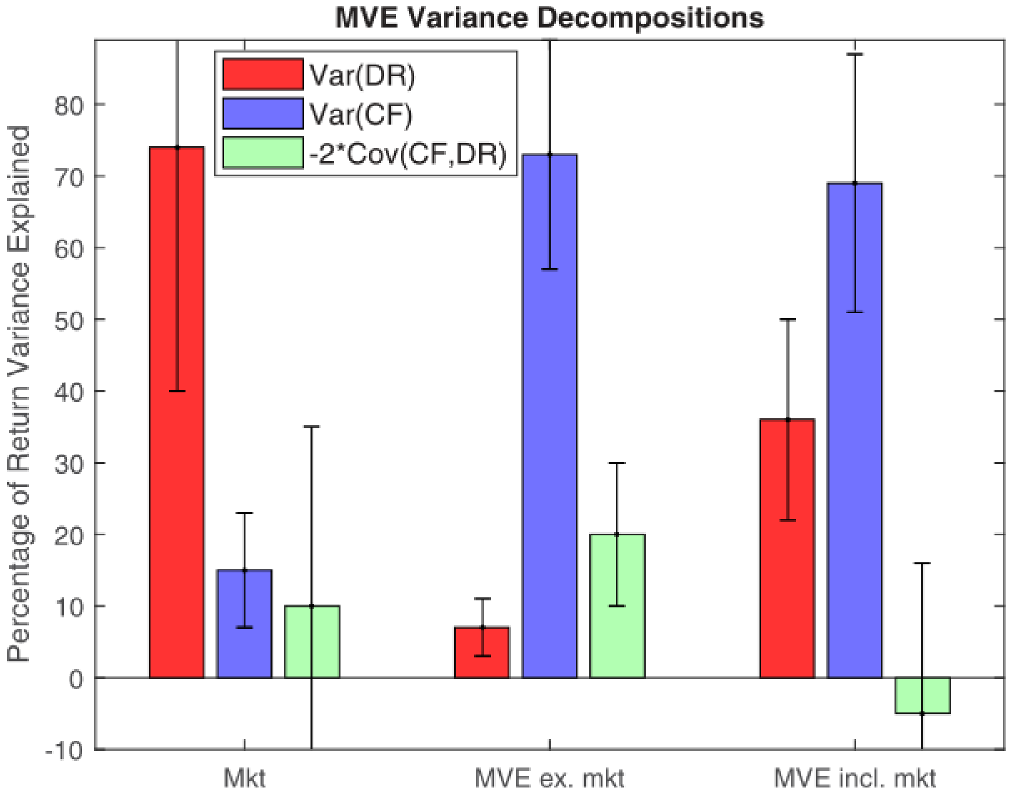


Figure 2. Market and MVE return decompositions. This figure depicts the return variance decomposition of the market portfolio and two versions of the MVE portfolio, with and without the market, as shown in Tables IV and V. "DR" corresponds to discount rate news, and "CF" to cash flow news.

Table VI
Correlations between Anomaly and Market Return Components

	Market CF		Market DR	
	Anomaly CF	Anomaly DR	Anomaly CF	Anomaly DR
Book-to-market	0.13	−0.23	−0.26	0.42**
	(0.15)	(0.17)	(0.13)	(0.12)
Profitability	−0.11	−0.03	0.02	0.04
	(0.11)	(0.13)	(0.11)	(0.12)
(−) Investment	−0.22*	−0.01	0.05	0.09
	(0.11)	(0.13)	(0.12)	(0.13)
(−) Size	0.09	−0.24	−0.29*	0.31**
	(0.17)	(0.15)	(0.13)	(0.11)
Momentum	−0.05	−0.12	0.28*	−0.21
	(0.18)	(0.16)	(0.14)	(0.12)
MVE ex market	−0.17	−0.24*	0.16	0.06
	(0.14)	(0.12)	(0.11)	(0.12)
MVE cum market	0.05	−0.20	0.23	0.90**
	(0.17)	(0.34)	(0.15)	(0.07)

C. Correlations across Portfolios

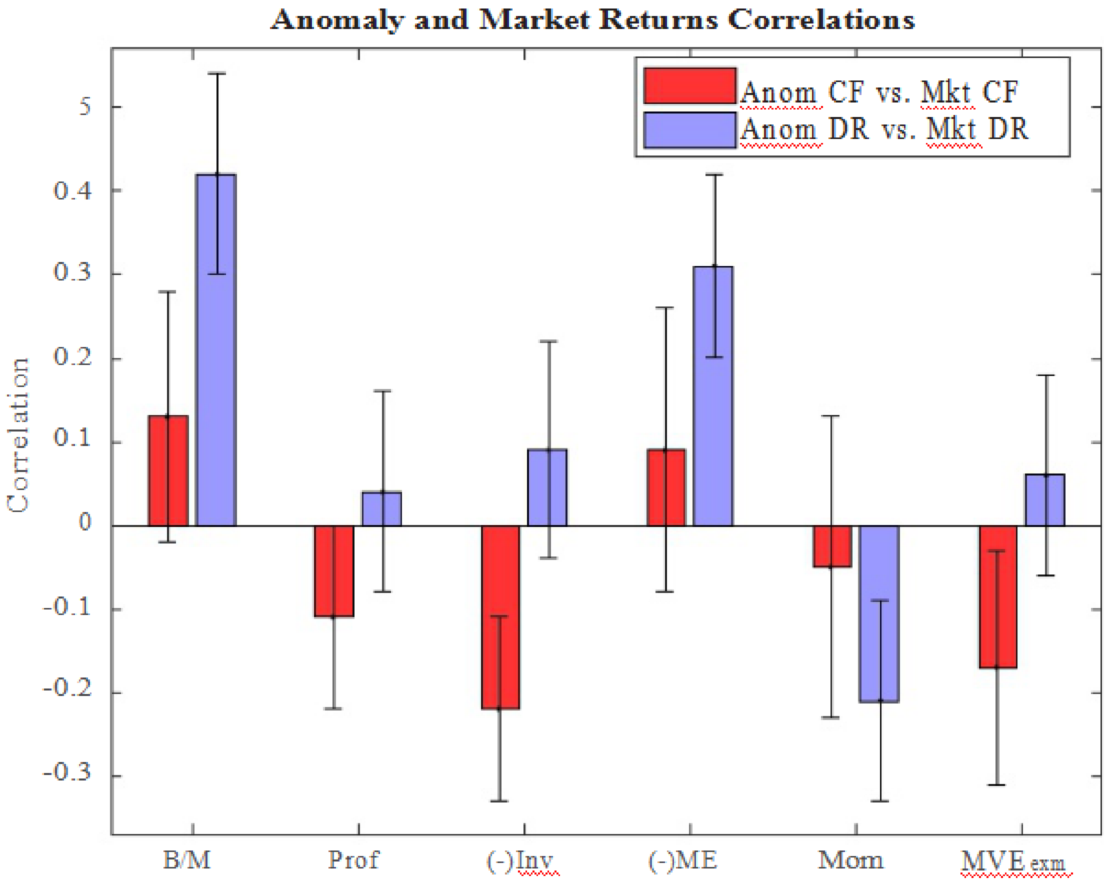
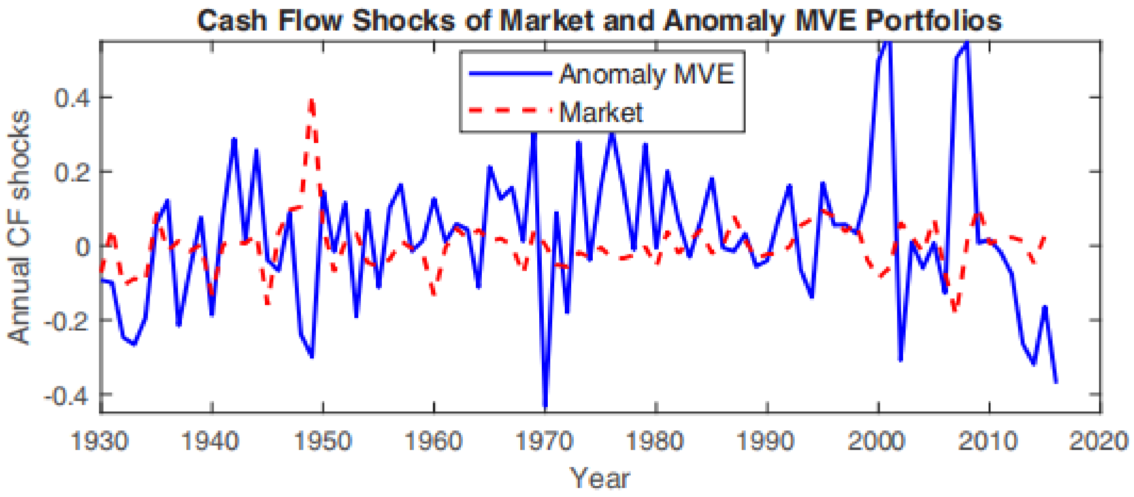


Figure 3. Anomaly versus market CF and DR correlations. This figure depicts the correlations between anomaly and market cash flow (CF) and discount rate (DR) news shown in Table VI. The sample is the period 1929 to 2017.

D. Correlations with Aggregate Shocks



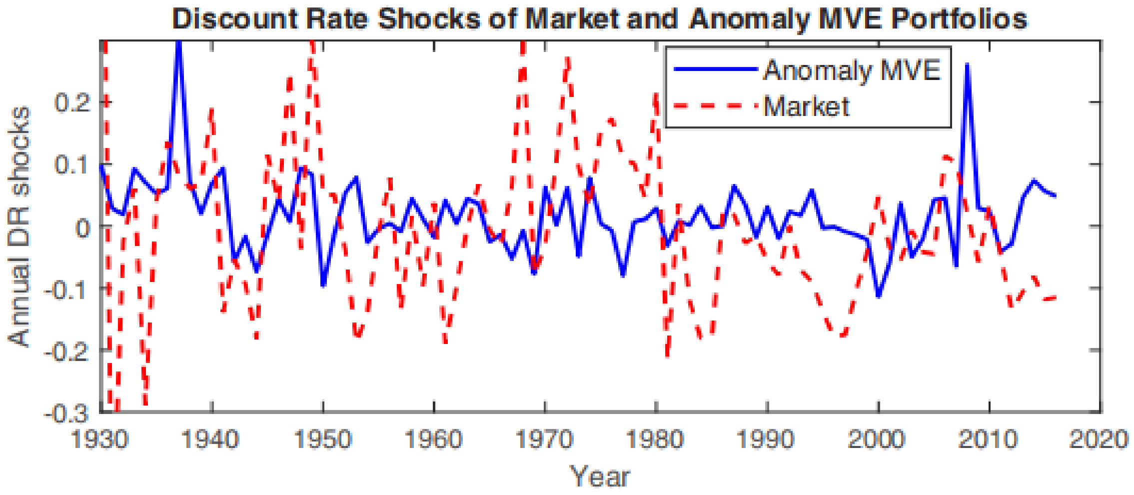


Table VII
Correlations of CF and DR News with Aggregate Metrics

	One-Year GDP Growth	One-Year Cons. Growth	Labor Share	Three-Year Cons. Growth	Investor Sentiment	Default Spread	Term Spread
CF Correlations							
Market	0.37**	0.43**	−0.10	0.35**	0.14	−0.26**	−0.15
Book-to-market	0.21	0.12	−0.01	0.01	0.33*	−0.45**	−0.05
(−) Investment	−0.20	−0.28*	0.03	−0.20	0.33*	−0.09	0.13
Profitability	−0.26	−0.31*	−0.07	−0.18	0.06	0.06	0.19
(−) Size	−0.02	0.08	−0.21	0.11	−0.02	−0.33**	0.00
Momentum	−0.10	−0.09	0.14	0.08	−0.15	0.26*	0.00
MVE ex market	−0.27*	−0.30*	0.04	−0.15	0.08	0.04	0.14
MVE cum market	−0.26*	−0.29*	0.05	−0.09	0.11	0.11	0.14
DR Correlations							
Market	−0.29*	−0.37**	0.14	−0.18	−0.10	0.66**	−0.15
Book-to-market	0.27**	0.15	0.33**	0.33**	0.17	0.53**	−0.26*
(−) Investment	0.15	0.11	0.07	0.29*	−0.06	0.26**	−0.19
Profitability	−0.18	0.00	−0.09	−0.04	−0.18	0.03	−0.05
(−) Size	−0.09	−0.13	0.30**	0.07	−0.16	0.32**	−0.08
Momentum	−0.19	−0.13	−0.32**	−0.35**	−0.16	−0.12	0.24
MVE ex market	−0.19	−0.11	−0.15	−0.15	−0.31*	0.29**	0.06
MVE cum market	−0.38**	−0.39**	0.00	−0.26	−0.26	0.69**	−0.09

V. Robustness

A. Testing VAR Assumptions

Table VIII
Realized versus VAR-Implied Expected Anomaly Returns

	Mkt.	B/M	Prof.	Inv.	Size	Mom.	MVE ex mkt.	MVE cum mkt.
Panel A: Mean log returns								
Anomaly mean return	3.4%	2.1%	3.3%	−3.2%	1.3%	4.6%	12.8%	16.2%
VAR expected return	3.4%	4.7%	2.6%	−2.7%	−0.8%	3.5%	11.8%	13.7%
t-stat for difference	0.00	−1.40	0.61	−0.52	1.51	0.71	0.41	1.03
St. dev. of expected return	8.5%	1.9%	2.2%	2.1%	2.4%	2.5%	5.5%	7.6%
Panel B: Long-run return prediction								
Slope coefficient	0.85	0.82	0.91	1.11	1.15	0.64	0.95	0.83
(standard error)	(0.11)	(0.75)	(0.20)	(0.46)	(0.29)	(0.19)	(0.31)	(0.19)
t-stat vs. 1	−1.42	−0.24	−0.46	0.25	0.51	−1.92	−0.17	−0.89
t-stat vs. 0	7.90**	1.09	4.59**	2.45*	4.01**	3.39**	3.08**	4.37**

B. Reconciling Prior Empirical Findings

Table IX
Decompositions of Firm Return Variance from Alternative Specifications

	Years	Firms: Micro	Firms: Young	Market weights	Variance Decomposition: *var(DR)*	*var(CF)*	*−2cov(DR,CF)*	*corr(DR,CF)*
Panel A: V02 Specifications								
V02: Replication	1954–1996	Yes	No	EW	15%	118%	−33%	0.39
V02: All years	1929–2017	Yes	No	EW	7%	124%	−31%	0.52
V02: No microcaps	1929–2017	No	No	EW	4%	92%	4%	−0.11
V02: Young firms	1929–2017	No	Yes	EW	4%	89%	7%	−0.19
V02: Value-weight	1929–2017	No	Yes	VW	6%	84%	10%	−0.22
V02: LT predictors	1929–2017	No	Yes	VW	8%	72%	20%	−0.42
Panel B: CPV10 Specifications								
CPV10: Replication	1929–2000	Yes	Yes	EW	5%	105%	−10%	0.21
CPV10: All years	1929–2017	Yes	Yes	EW	5%	114%	−19%	0.39
CPV10: No microcaps	1929–2017	No	Yes	EW	4%	81%	15%	−0.41
CPV10: Value-weight	1929–2017	No	Yes	VW	6%	74%	20%	−0.48
CPV10: LT predictors	1929–2017	No	Yes	VW	8%	72%	20%	−0.42
Panel C: LT Specifications								
LT: Baseline	1929–2000	No	Yes	VW	8%	72%	20%	−0.42
LT: No Depression	1939–2017	No	Yes	VW	11%	71%	19%	−0.34
LT: Incl. microcaps	1929–2017	Yes	Yes	VW	14%	115%	−29%	0.36
LT: Accounting ROE	1929–2017	No	Yes	VW	8%	58%	3%	−0.06

Table X
Anomaly Variance Decompositions: Alternative Specifications

Anomaly	Specification	Fraction of Portfolio Return Variance $var(DR)$	$var(CF)$	$-2cov(DR,CF)$	$corr(DR,CF)$
Book-to-market	Baseline: 1929–2017	7%	68%	25%	−0.56
	No Depression: 1939–2017	9%	77%	14%	−0.28
	CF from accounting ROE	7%	60%	10%	−0.24
	Including microcaps	7%	97%	-4%	0.08
Profitability	Baseline: 1929–2017	14%	80%	6%	−0.10
	No Depression: 1939–2017	11%	63%	26%	−0.50
	CF from accounting ROE	14%	119%	−27%	0.33
	Including microcaps	29%	125%	−52%	0.45
Size	Baseline: 1929–2017	7%	64%	29%	−0.68
	No Depression: 1939–2017	9%	63%	28%	−0.61
	CF from accounting ROE	7%	32%	11%	−0.36
	Including microcaps	5%	89%	6%	−0.14
Momentum	Baseline: 1929–2017	7%	70%	23%	−0.55
	No Depression: 1939–2017	10%	70%	20%	−0.39
	CF from accounting ROE	7%	41%	4%	−0.13
	Including microcaps	7%	102%	−9%	0.17
Investment	Baseline: 1929–2017	14%	78%	7%	−0.10
	No Depression: 1939–2017	8%	68%	24%	−0.50
	CF from accounting ROE	14%	79%	−26%	0.38
	Including microcaps	60%	184%	−143%	0.68
MVE ex market	Baseline: 1929–2017	7%	73%	20%	−0.43
	No Depression: 1939–2017	8%	70%	22%	−0.45
	CF from accounting ROE	7%	61%	−6%	0.15
	Including microcaps	13%	105%	−19%	0.25
MVE cum market	Baseline: 1929–2017	36%	69%	−5%	0.05
	No Depression: 1939–2017	60%	74%	−34%	0.26
	CF from accounting ROE	36%	85%	−17%	0.16
	Including microcaps	51%	98%	−49%	0.35

C. Overfitting and Misspecifying Expected Returns

Here, we consider two possible sources of misspecification in the VAR: spurious return predictability and omitted predictors of returns.

This section summarizes a detailed analysis of these issues that appears in Internet Appendix Section VII. Incorrectly specifying the predictors of returns, including estimating predictability coefficients with noise, induces an error in estimated DR.

VI. Interpreting the Results

The stylized facts from the main tables are as follows:

(1) Most variation in firm and anomaly returns comes from variation in CF news, which has significant commonality across anomalies.

(2) Anomaly DR and CF shocks are not significantly correlated with market DR and CF news or standard measures of macroeconomic activity.

(3) Firm- and anomaly-level DR and CF news are negatively correlated.

VII. Conclusion

- First, CF shocks to the stocks underlying the MVE portfolio of anomalies account for 73% of this portfolio's return variance, while DR shocks account for only 7% of this portfolio's variance.
- Second, CF and DR shocks to anomalies exhibit little relation with market CF and DR shocks.
- Third, there is a negative correlation between CF and DR shocks to the anomaly MVE portfolio.