What Drives Anomaly Returns?

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Education

Ph.D. Finance, 2005, University of California, Berkeley
Sivilingeniør Business Economics, 1999, Norwegian University of Science and Technology

Main research interest

asset pricing, where he focuses on the relation between the real economy and financial markets, as well as the pricing of derivative instruments.

Experience

He has taught MBA- and Ph.D.-level finance courses at Haas School of Business and London Business School, as well as at Columbia Graduate School of Business.Prior to his academic career, Lochstoer worked as a quantitative analyst at Carnegie Asset Management in Norway.

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Positions Held:

Visiting Assistant Professor of Finance, Yale University, 2007 – present

Assistant Professor of Finance, University of Texas at Austin, 2004 – present

Graduate Studies:

Ph.D., Economics, Harvard University, 2004

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Behavioral finance, asset pricing, market microstructure, and financial innovation

- Tetlock, Paul C., 2007, "Giving Content to Investor Sentiment: The Role of Media in the Stock Market" Journal of Finance 62, 1139-1168.
- Tetlock, Paul C., Maytal Saar-Tsechansky, and Sofus Macskassy, 2007, "More Than Words: Quantifying Language to Measure Firms' Fundamentals," Journal of Finance, forthcoming.

ABSTRACT

- We decompose the returns of five well-known anomalies into cash flow and discount rate news. Common patterns emerge across the five factor portfolios and their mean variance efficient (MVE) combination.
- Whereas discount rate news predominates in market returns, systematic cash flow news drives the returns of anomaly portfolios and their MVE combination with the market portfolio.
- Anomaly cash flow and discount rate shocks are largely uncorrelated with market cash flow and discount rate shocks and with business cycle fluctuations.
- These rich empirical patterns restrict the joint dynamics of firm cash flows and the pricing kernel, thereby informing models of stocks’ expected returns.

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).

- the model of noise trader risk(De Long et al. (1990)) CFs are constant
- the simplest form of the Capital Asset Pricing Model (CAPM)expected returns DRs are constant

Our empirical work focuses on the annual returns of five well-known anomalies—value, size, profitability, investment, and momentum—from 1929 to 2017.

Novel findings

- For all five anomalies, CF news explains most (64% to 80%) of the variation in anomaly returns.
- The CF and DR components in anomaly returns exhibit only weak correlations with the corresponding components in market returns.
- For most anomalies, CF and DR shocks are negatively correlated.(excluding microcaps)

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- DR news is the primary source of anomaly returns,
- commonality in DRs(time-varying risk aversion,common investor sentiment)
- anomaly CF news is strongly correlated with market CF news

In contrast, some theories of firm-specific biases in information processing as well as theories of firm-specific changes in risk are consistent with our three main findings.

(1)behavioral models in which investors overreact to news about firms' long-run CFs

(2)risk-based models in which firm risk increases after negative news about long-run CFs

Cohen, Polk, and Vuolteenaho (2003,2010; hereafter CPV): CF news is the main determinant of returns on the long-short value-minus-growth portfolio

Vuolteenaho (2002; hereafter V02):CF news is the main determinant of firm-level returns;DR news is the main determinant of market-level returns

Innovation

- Unlike most prior work, we analyze the implications of our firm-level estimates for priced (anomaly) factor portfolios to investigate the fundamental drivers of these factors' returns.

- We analyze multiple anomalies along with the market and most importantly the MVE portfolio, which enables us to uncover robust patterns across anomalies and the MVE portfolio.

- We focus on stock return predictability at the firm level and analyze the sources of anomaly returns.

一、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

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

where $R_{MVE,t} = \sum_{h=1}^{H} \omega_h R_{F_h,t}$ 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 $b < 0$. In

(1) The Return Decomposition

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

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

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

anomaly returns = value-weighted returns of stocks ranked in the highest quintile of a given firm characteristic — the value-weighted returns of stocks ranked in the lowest quintile.

anomaly CF news = the CF news for the top quintile portfolio — the CF news for the bottom quintile portfolio

anomaly DR news = the DR news for the top quintile portfolio — the DR news for the bottom quintile portfolio

(2)Relating the Decomposition to Anomalies

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

- value premium
  - behavioral
    - The model of noise trader risk
      De Long et al. (1990)
    - a model in which investors overextrapolate from long sequences of past firm earnings when forecasting future firm earnings.
      Barberis, Shleifer, and Vishny (1998)
  - risk-based
    - based on firms' dynamic investment decisions
      Berk, Green, and Naik (1999) and Zhang (2005)
    - based on the duration of firms' CFs
      Lettau and Wachter (2007)

（3）Relating the Decomposition to the SDF

Prior studies decompose market returns into CF and DR news. They argue that the substantial variance of market DR news has deep implications for the joint dynamics of investor preferences and aggregate CFs in asset pricing models.

The modern consensus is that the MVE portfolio, and thus the SDF, includes factors other than the market.

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

(4) The Empirical Model

To test these theories, one must analyze firm-level CF and DR news and then aggregate these shocks into anomaly portfolio news.

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} is a vector of market-adjusted characteristics

X_t^{agg} is a vector of aggregate characteristics

To implement the return decompositions, we estimate two separate VAR(1)systems.

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

where $Z_t = [r_t^{agg};\ X_t^{agg}]$ is a $K^{agg} \times 1$ vector, ε_{t+1}^{agg} is a vector of conditionally mean-zero shocks, and r_t^{agg} denotes the value-weighted average log return at time t. We compute aggregate DR shocks using the standard VAR formula from Campbell (1991),

$$\begin{aligned} DR_{t+1}^{agg} &= E_{t+1} \sum_{j=2}^{\infty} \kappa^{j-1} r_{t+j}^{agg} - E_t \sum_{j=2}^{\infty} \kappa^{j-1} r_{t+j}^{agg} \\ &= e_1' \kappa A^{agg} (I_{K^{agg}} - \kappa A^{agg})^{-1} \varepsilon_{t+1}^{agg}. \end{aligned} \tag{7}$$

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.

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

$$r_{it}^{ma} \equiv r_{it} - r_t^{agg}.$$

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

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

$$\begin{aligned} CF_{t+1}^{agg} &= r_{t+1}^{agg} - E_t[r_{t+1}^{agg}] + DR_{t+1}^{agg} \\ &= e_1' \left(I_{K^{agg}} + \kappa A^{agg} (I_{K^{agg}} - \kappa A^{agg})^{-1} \right) \varepsilon_{t+1}^{agg}, \end{aligned} \tag{10}$$

$$\begin{aligned} CF_{i,t+1}^{ma} &= r_{i,t+1}^{ma} - E_t[r_{i,t+1}^{ma}] + DR_{i,t+1}^{ma} \\ &= \iota_1' \left(I_{K^{ma}} + \kappa A^{ma} (I_{K^{ma}} - \kappa A^{ma})^{-1} \right) \varepsilon_{i,t+1}. \end{aligned} \tag{11}$$

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

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

We analyze CF and DR shocks to five long-short anomaly portfolios. Each of these portfolios takes long (short) positions in the top (bottom) quintile of stocks sorted by one of the five anomaly characteristics. We construct the CF and DR shocks to the long and short portfolios by value-weighting the CF and DR shocks to the firms in these portfolios.

II.Data

We estimate the CF and DR components of returns using data on publicly traded U.S. stocks from CRSP from 1926 through 2017.

Variables	
lnRealRet	=log名义股票收益—log通货膨胀
lnROE	= ln(1 + ROE)
lnBM	=log（book equity /market equity ）
lnProf	=log（1+ profitability)
lnInv	= five-year log asset growth
d5.lnME	=the five-year change in log market equity
lnMom6	=six-month momentum variable based on each firm’s December-to-June return.

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

(1)Specification

- In our main specification, the CF shock is the residual from the present value relation—for example, equation (11) for the market-adjusted CF shock.
- The panel regressions allow us to estimate the long-run dynamics of (market adjusted) log returns and log earnings based on the short-run (one-year) properties of a broad cross-section of firms.
- Our VAR specification differs from specifications in prior studies, which could drive differences in our CF-DR decomposition

(2) Panel Regressions

Market-Adjusted Panel VAR

Regressors	Dependent Variables						
	$lnRealRet_t$	$lnBM_t$	$lnProf_t$	$lnInv_t$	$d5.lnME_t$	$lnMom6_t$	$lnROE_t$
$lnRealRet_{t-1}$	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

Since persistent predictors tend to dominate in the DR and CF formulas in equations (9) and (11), we infer that BM, investment, and size are likely the most important characteristics for explaining realized returns.

Aggregate VAR

Regressors	Dependent Variables						
	$lnRealRet_t$	$lnBM_t$	$lnProf_t$	$lnInv_t$	$d5.lnME_t$	$lnMom6_t$	$lnROE_t$
$lnRealRet_{t-1}$	−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

log BM is a primary determinant of long-run aggregate return predictability.

IV.Decomposing Returns

(1) Firm Return Decomposition

Firm-Level and Market Return Variance Decompositions

	$var(DR)$	$var(CF)$	$-2cov(DR, CF)$	$corr(DR, CF)$
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)

The third column shows that negative covariance between DR and CF news tends to amplify return variance.

Because market-adjusted CF news is more volatile than market DR news, CF news accounts for the majority, 55%, of total firm return variance.

The only exception is the negative correlation between firm-level CF and DR shocks, which differs from the positive correlation in V02.

(2) Anomaly Return Decompositions

First, We form anomaly portfolios using cross-sectional sorts on value, size, profitability, investment, and momentum.

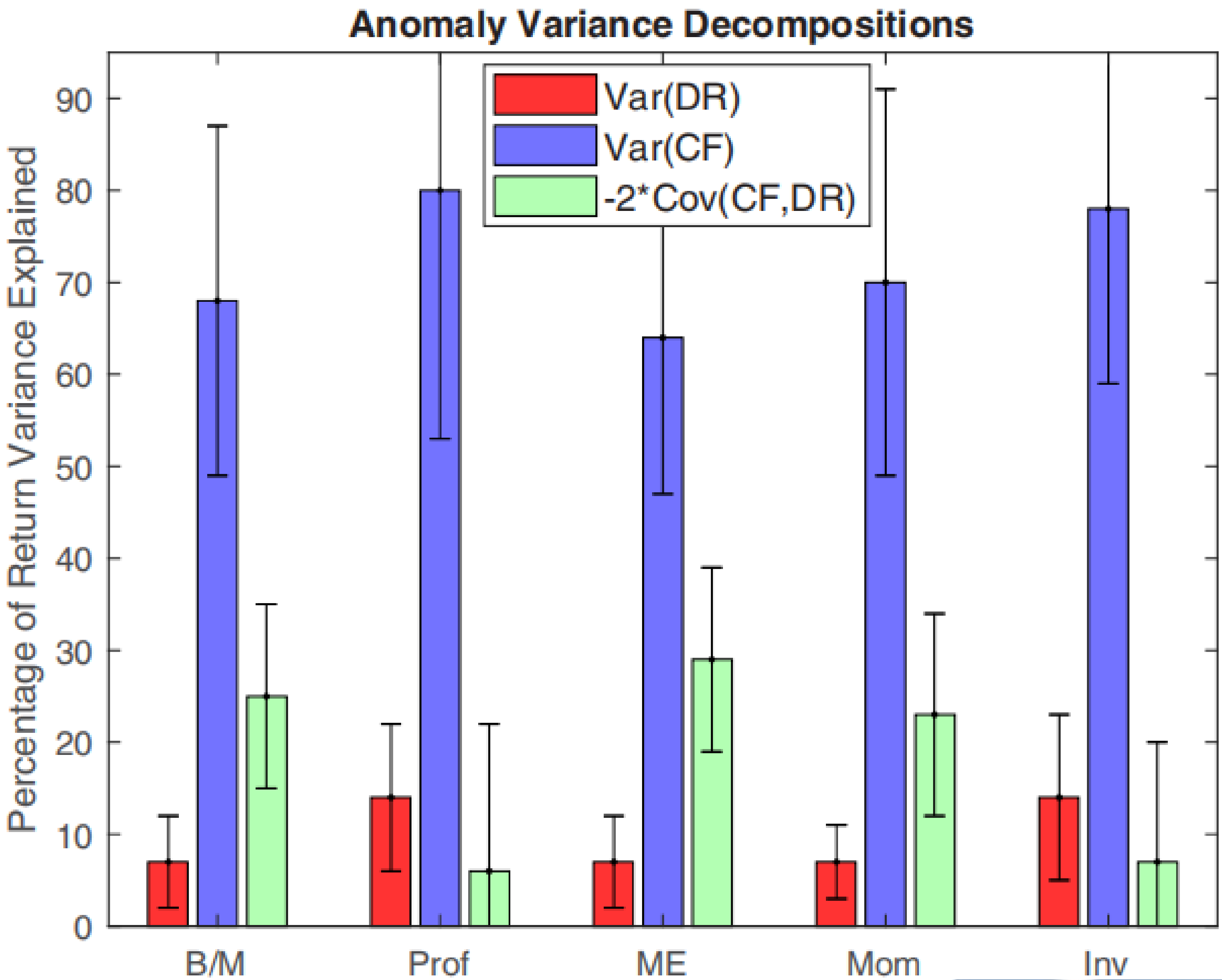
Then,we compute value-weighted averages of firm-level DR and CF estimates to obtain portfolio-level DR and CF estimates.

When aggregating firm-level shocks to the portfolio level, only correlated shocks to firms remain.

Thus, if CF shocks are largely uncorrelated but DR shocks are highlycorrelated, the portfolio return variance decomposition can be very different from the firm return variance decomposition.

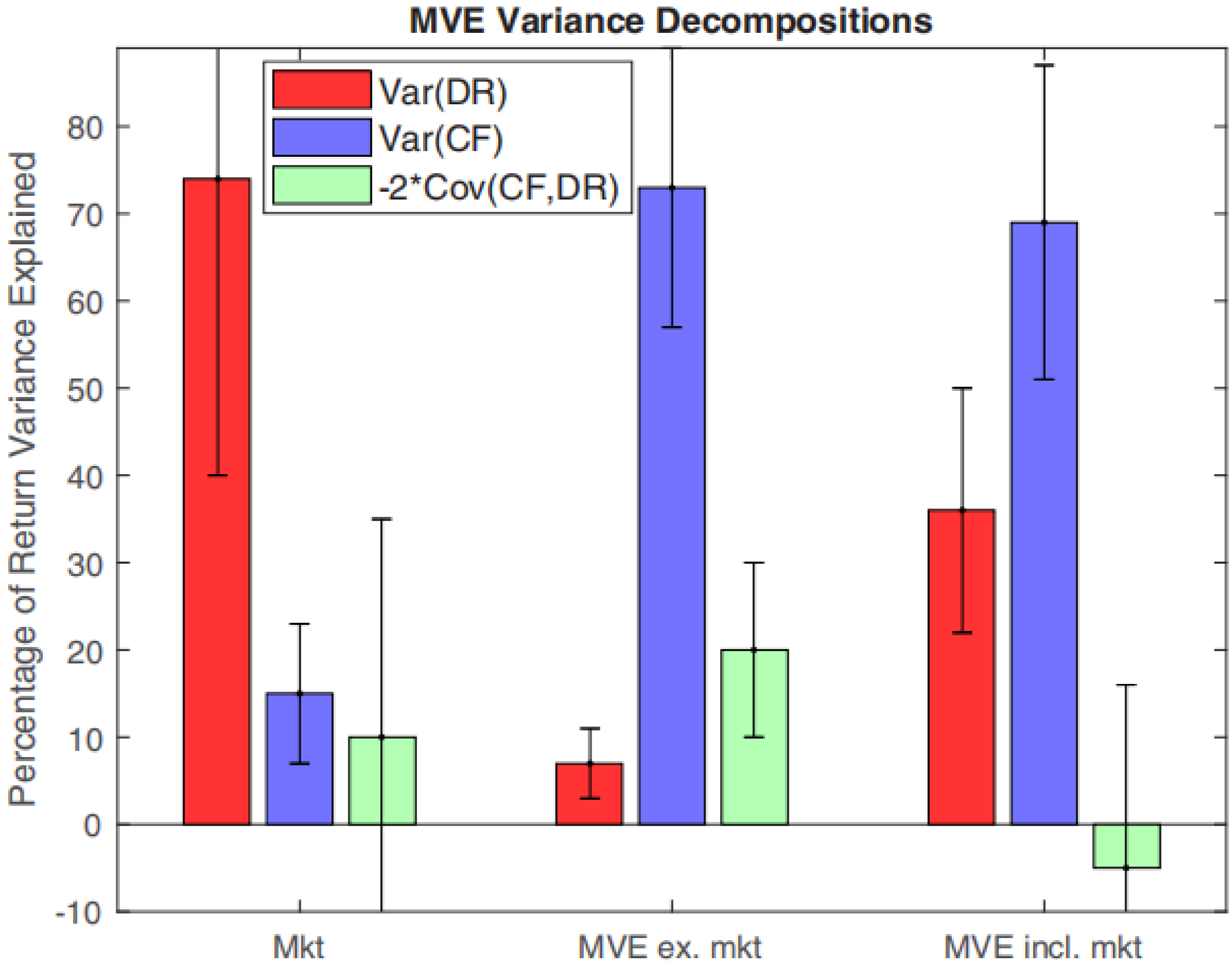
	Fraction of Portfolio Return Variance			
	$var(DR)$	$var(CF)$	$-2cov(DR, CF)$	$corr(DR, CF)$
Panel A: Individual Anomalies				
Book-to-market	7%	68%	25%	−0.56
	(5%)	(19%)	(10%)	(0.10)
Profitability	14%	80%	6%	−0.10
	(8%)	(27%)	(16%)	(0.14)
Size	7%	64%	29%	−0.68
	(5%)	(17%)	(10%)	(0.09)
Momentum	7%	70%	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)

CF news is the main determinant of returns for both MVE portfolios, particularly the anomalies-only MVE portfolio.


Anomaly Variance Decompositions
Var(DR)
Var(CF)
-2*Cov(CF,DR)
Percentage of Return Variance Explained
0
10
20
30
40
50
60
70
80
90
B/M
Prof
ME
Mom
Inv

(Value)

(Size)


MVE Variance Decompositions
Percentage of Return Variance Explained
Var(DR)
Var(CF)
-2*Cov(CF,DR)
80
70
60
50
40
30
20
10
0
-10
Mkt
MVE ex. mkt
MVE incl. mkt

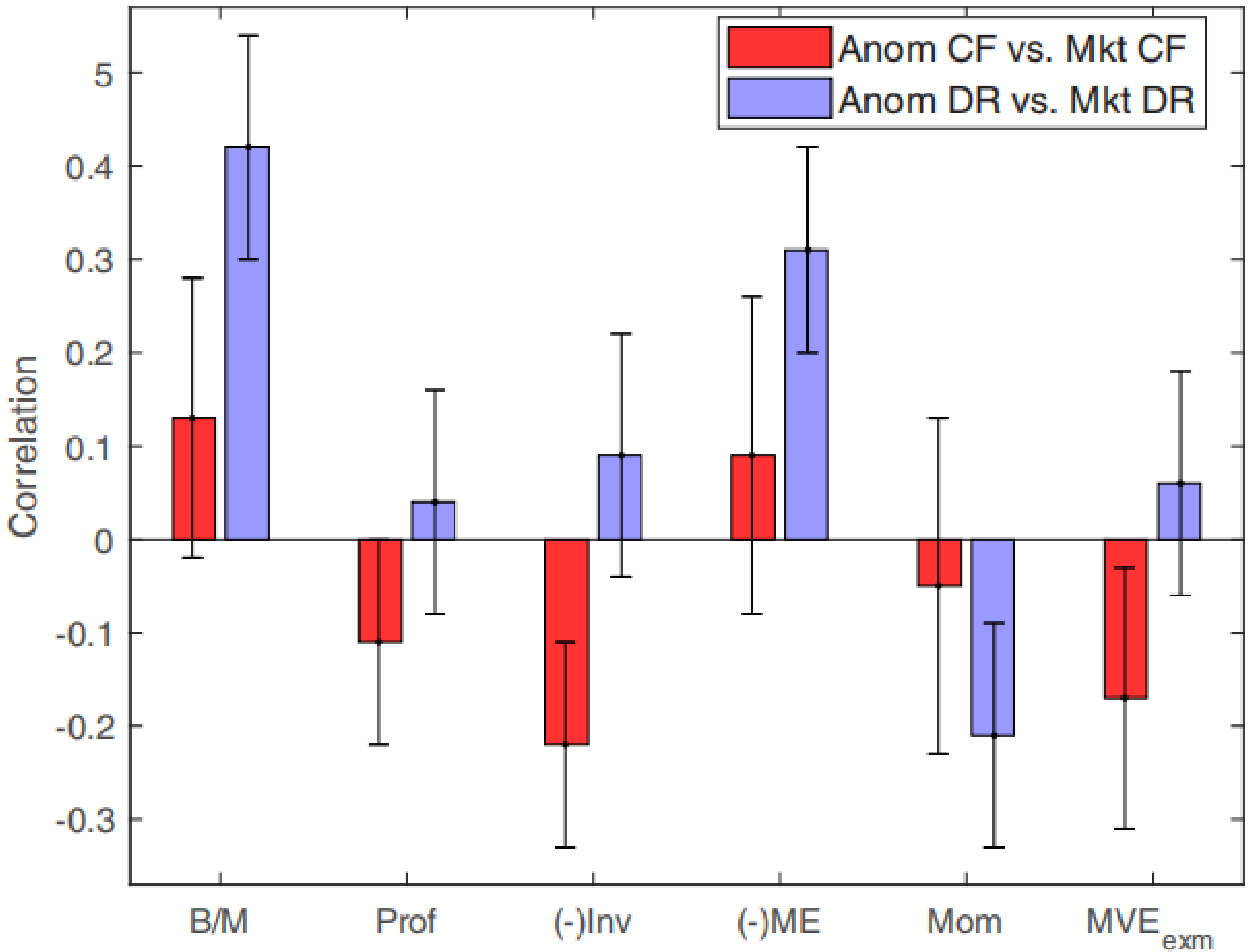
(3) Correlations across Portfolios

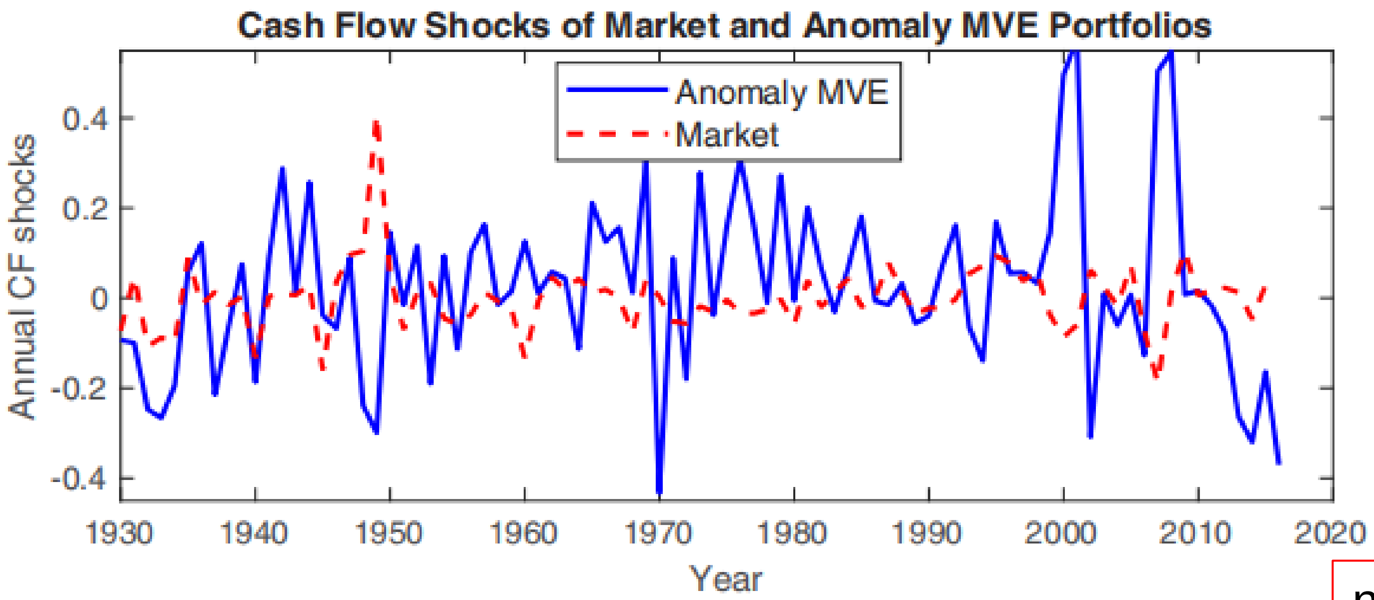
Correlations between Anomaly and Market Return Components

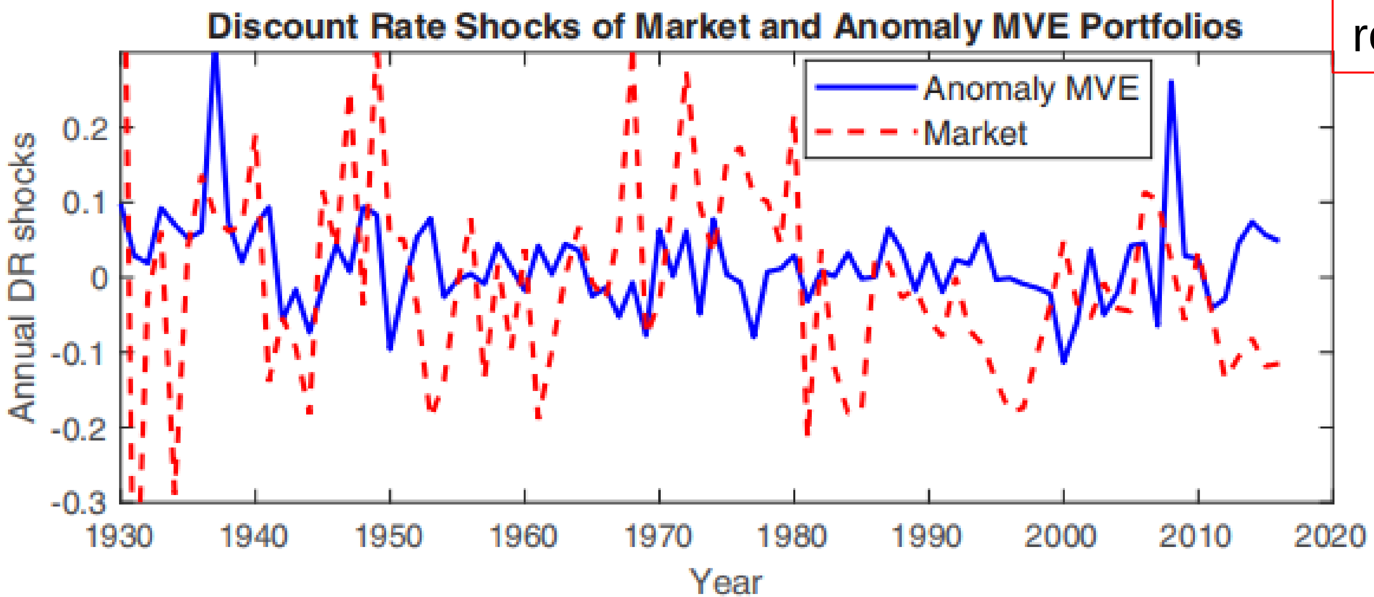
	Market CF		Market DR	
	Anomaly CF	Anomaly DR	Anomaly CF	Anomaly DR
Book-to-market	0.13	−0.23	−0.26	0.42**
	(0.15)	(0.17)	(0.13)	(0.12)
Profitability	−0.11	−0.03	0.02	0.04
	(0.11)	(0.13)	(0.11)	(0.12)
(−) Investment	−0.22*	−0.01	0.05	0.09
	(0.11)	(0.13)	(0.12)	(0.13)
(−) Size	0.09	−0.24	−0.29*	0.31**
	(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)

nonmarket CF factors dominate CF news in this total MVE portfolio

Anomaly and Market Returns Correlations







no discernible relationship

(4)Correlations with Aggregate Shocks

shocks to aggregate risk aversion or DRs

macroeconomic CF shocks

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

(1)Testing VAR Assumptions

Here, we evaluate whether our short-run firm-level regressions accurately predict short-run anomaly-level returns and most importantly long-run anomaly returns, which form the basis of CF and DR shocks.

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**

Thus, we conclude that the VAR does a decent job of capturing actual long-run expected returns and in turn CFs, since we impose the present value constraint.

(2)Reconciling Prior Empirical Findings

V02 and CPV find that the correlation between firm-level CF and DR news is positive, while we find that this correlation is negative.

To investigate how changes in sample selection, sample years, and VAR specification affect CF and DR news, we replicate and update the main findings inV02 and CPV.

(1) Microcaps

(2) Young firms

(3) Market and anomaly portfolio weights

(4) Return predictors

(5) Sample years

The last important result is that CF news always accounts for the majority of firm- and anomaly-level return variance regardless of which methodology or sample one uses.

Decompositions of Firm Return Variance from Alternative Specifications

		Firms		Market	Variance Decomposition			
	Years	Micro	Young	weights	*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

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

(3)Overfitting and Misspecifying Expected Returns

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

Internet Appendix Section VII shows that the use of data-mined characteristics in our VAR framework biases estimates of DR news variance upward.

Our findings indicate that CF shocks are the dominant component of anomaly returns and that the correlation between DR and CF shocks is negative. Without data mining of VAR characteristics, these two conclusions would likely be even more pronounced.

VI. Interpreting the Results

(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.(only if we exclude microcaps and only if CF shocks satisfy the present-value relation)

VII. Conclusion

We provide new evidence on the sources of anomaly portfolio returns by aggregating firm-level CF and DR news from a panel VAR system, producing new insights into the components of anomaly returns.The empirical patterns that we document also hold broadly across individual long-short anomaly portfolios, thus providing guidance for theories of individual anomalies.

Our empirical framework provides three new facts.