

# **Firm Characteristics, Return Predictability, and Long-Run Abnormal Returns in Global Stock Markets**

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# Motivation

- A large literature studies whether U.S. firms earn long-run abnormal returns after corporate events
  - Strong evidence of 1-5 year post-event abnormal returns
    - DI +, Rep +, Splits +, M&A -, SEO -, IPO -, SUE +/-
    - Earnings drift (Bernard and Thomas, 1989), IPOs (Ritter, 1991), SEOs (Eckbo Masulis Norli, 2000), Stock splits (Ikenberry Ramnath, 2002)
    - Recent and notable studies: taxes, monetary policy, Covid vaccine mandates, capital structure, earnings, corporate fraud, short selling bans, Brexit, firm name changes, CEO house size, CEO jet usage, CEO deaths, deaths of CEO family members...
- Many important theories of investor and manager behavior from event studies
  - Investor over (IPOs, SEOs) and underreaction (share repurchases), manager timing ability
    - Rau and Vermaelen (1998), Fama (1998)

# Motivation

- How are long-horizon abnormal returns computed?
  - CARs, BHAR, calendar time portfolio alphas
  - Abnormal is typically defined using
    - Control firms or benchmarks (using market, size, BM, and lagged returns), CAPM expected returns.
- However, there is evidence that other characteristics matter for event firms besides size and BM.
  - Bessembinder and Zhang (2013) show that firms engaging in M&As, SEOs, IPOs, and dividend initiations differ from control firms in term of size, BM, idiosyncratic volatility, liquidity, and rates of asset growth.
  - Brav, Geczy, and Gompers (2000) show that IPO and SEO firms have unique size, BM, and lagged returns relative to other firms.
  - Lyandres, Sun, and Zhang (2008) show that both SEO and IPO firms invest more than other firms.

# Motivation

- Thus, event firms are potentially special in terms of their characteristics
- Also, characteristics predict returns
  - Lakonishok, Shleifer, and Vishny (1994), Fama and French (1992), Lewellen (2015)
- Combining these two features, Bessembinder, Cooper, and Zhang (2019) develop a new method to estimate event study returns using predicted returns from firm characteristics

# Motivation

- Bessembinder, Cooper, and Zhang (2019) “BCZ” use this new approach to evaluate long run U.S. event returns, and find that most of the apparently abnormal returns can be explained by
  - The excess of event firm returns over returns predicted based on relations between firm characteristics and returns estimated using all firms
  - No event specific explanation is required to explain post-event returns
- Their characteristic-based model mostly explains returns to many well-known U.S. corporate events:
  - Credit Rating Downgrades
  - Analyst Recommendation Downgrades
  - Initial Public Offerings
  - Seasoned Public Equity Offerings
  - Mergers and Acquisitions
  - Dividend Initiations
  - Share Repurchases
  - Stock Splits
- Potential implications for event study-based investor and managerial theories

# Motivation

- In this study, we apply BCZ to study international firm events
- Why?
  - Much variation across countries in market-level attributes (size, liquidity, volatility, segmentation)
    - Good out-of-sample test of BCZ
  - No systematic, comprehensive study of long-run post-event abnormal returns in global markets
  - Do firms earn long-run abnormal returns after important corporate events in global markets?
    - Traditional abnormal return estimations
    - BCZ abnormal returns
  - Do the theories of investor and manager behavior from previous US-based event studies hold up in an international setting?

# Motivation

- In non-U.S. countries, there are many studies of long-run abnormal returns after corporate events
- We identified 75 such studies of six corporate events we examine

## Appendix IV

### Existing international long-run event studies

- Sample size ranges from about 10 to over 4,000 event firms
- 1- and 3-year event windows being the most common
- Focus on individual countries
- Most studies use Buy-and-Hold-Abnormal>Returns (BHARs) and Cumulative Abnormal Returns (CARs) to assess long-run returns
- Size, BM, and market adjustments are the most common way to estimate abnormal returns
- Results are mixed



# Existing international long-run event studies

	Dividend initiation	Split	IPO	SEO	M&A	Share repurchase
# papers	1	6	31	7	12	19
# country-events studied	1	6	52	7	13	21
# studies, returns $\geq 0$	1	2	6	1	4	17
% studies, returns $\geq 0$	100.0%	33.3%	11.5%	14.3%	30.8%	81.0%
# studies, returns $\geq 0$ & sig.	1	1	4	1	2	9
% studies, returns $\geq 0$ & sig.	100.0%	16.7%	7.7%	14.3%	15.4%	42.9%
# studies, returns $< 0$	0	4	46	6	9	8
% studies, returns $< 0$	0.0%	66.7%	88.5%	85.7%	69.2%	38.1%
# studies, returns $< 0$ & sig.	0	3	33	6	5	3
% studies, returns $< 0$ & sig.	0.0%	50.0%	63.5%	85.7%	38.5%	14.3%

# Preview of the results

- Assess whether firms in 58 countries (52,000 non-US firms, 38,529 firms with one or more events) earn abnormal returns (using traditional measures) relative to non-event firms after six corporate events:
  - Yes
  - IPOs, SEOs, M&As, stock repurchases, stock splits, dividend initiations
- Apply the BCZ approach
  - Do firm characteristics (Lewellen, 2015) predict stock returns in the 58 markets?
    - Yes
    - Suggests BCZ approach is applicable
- Do firm characteristics help explain the abnormal returns after international corporate events?
  - Yes
  - 14 firm characteristics largely explain the abnormal post-event returns
  - We examine differences between the US and international results
  - We explore variations across country vs. regional vs. global models
  - We explore the drivers of cross-country variation
  - Discuss implications

# Corporate event samples

- SDC Platinum: M&A, IPO, SEO, Repurchase over 1996-2020
- Compustat Global: Dividend initiation, stock splits over 1996-2020
  - (also the source of stock return data).
- 14,698 mergers, acquisitions of majority/partial/remaining interest
  - control bids; deal size > \$5M; relative size > 5%
- 86,538 SEOs;
- 14,405 IPOs: must have valid offer price
- 17,400 share repurchases
- 5,896 dividend initiations: Initiating firms must be listed > 2 years
- 25,564 stock splits (split factor at least 1.25)

# Data filters

- Focus on common stocks that are the primary security of a firm
- Assign stocks to countries based on the country of their stock exchange
- All variables are measured in US dollars
- Winsorize returns at 0.1% and 99.9% within each country
- Winsorize firm characteristics at 1% and 99% within each country
- Characteristics are normalized by subtracting the mean and dividing by the standard deviation within each country each month
- Exclude stocks  $< \$1$  million market cap or  $< \$0.01$  share price at the previous month end
  - Hou Karolyi Kho 2011; Jensen Kelly Pedersen 2021
- At least 50 valid observations in a country-month when estimating the regression of stock returns on one-month lagged firm characteristics

## Table 3

### Sample by Economic Region and by Year

Region	Return Data		Number of Corporate Events					
	Number Unique Stocks	Number Monthly Returns	Dividend initiation	Stock split	IPO	SEO	Merger and acquisition	Share repurchase
Asia Developed	13,959	2,158,996	1,273	6,678	4,808	20,744	3,593	7,620
Asia Emerging	13,000	1,469,705	1,660	11,825	3,550	11,210	2,918	1,641
Australasia	3,264	333,345	288	515	1,385	26,421	1,209	1,119
Canada	3,654	305,326	545	415	317	4,814	1,565	3,122
Europe Developed	12,191	1,323,249	1,184	3,719	3,506	19,978	4,541	2,996
Europe Emerging	2,235	200,113	381	1,039	391	1,124	280	277
Latin America	813	93,018	104	296	152	812	218	360
Middle East & Africa	2,686	294,144	461	1,077	296	1,435	374	265
<b>Total</b>	<b>51,802</b>	<b>6,177,896</b>	<b>5,896</b>	<b>25,564</b>	<b>14,405</b>	<b>86,538</b>	<b>14,698</b>	<b>17,400</b>

Table 3  
Sample  
by year

Year	Number Monthly Returns	Dividend initiation	Stock split	IPO	SEO	Merger and acquisition	Share repurchase	Total Number Events
1996	68,572	85	396	281	614	251	198	1,825
1997	76,790	111	572	321	717	277	282	2,280
1998	93,423	210	520	260	687	304	427	2,408
1999	119,844	184	720	513	1,061	440	582	3,500
2000	135,573	113	838	762	1,632	579	526	4,450
2001	145,599	113	587	407	1,738	456	463	3,764
2002	160,087	130	613	514	2,100	356	803	4,516
2003	166,826	407	707	564	2,476	343	1,175	5,672
2004	182,108	483	1,160	948	2,644	492	486	6,213
2005	202,186	355	1,060	914	2,557	598	491	5,975
2006	223,590	262	1,347	1,101	2,896	754	505	6,865
2007	248,921	295	1,206	1,293	3,839	841	681	8,155
2008	268,118	253	1,144	485	3,470	714	1,228	7,294
2009	278,366	246	947	436	5,835	539	1,132	9,135
2010	305,329	313	1,251	985	5,547	688	688	9,472
2011	316,488	316	1,468	802	4,403	680	1,034	8,703
2012	328,197	282	1,179	537	4,537	597	710	7,842
2013	336,824	291	1,413	495	5,160	619	596	8,574
2014	343,559	251	1,330	761	5,239	776	692	9,049
2015	347,846	256	1,568	830	5,524	946	930	10,054
2016	353,491	239	1,301	399	4,965	833	759	8,496
2017	361,968	226	1,240	267	5,356	789	588	8,466
2018	370,676	177	1,260	322	4,456	761	1,022	7,998
2019	372,070	168	911	162	4,351	658	713	6,963
2020	371,445	130	826	46	4,734	407	689	6,832
Total	6,177,896	5,896	25,564	14,405	86,538	14,698	17,400	14 164,501

## The Method (step 1):

Estimate the “Normal” Relation between returns and prior month characteristics, using all firms in country

- For each country-month, estimate:

$$R_{it} = \alpha_t + \beta_t X_{i,t-1} + \epsilon_{it}$$

- Predicted 1-month ahead return:

$$E[R_{it}|I_{t-1}] = \frac{1}{12} \sum_{s=t-12}^{t-1} \hat{\alpha}_s + \left( \frac{1}{12} \sum_{s=t-12}^{t-1} \hat{\beta}_s \right) X_{i,t-1}$$

- We estimate using both simple and log returns
  - Log returns less affected by certain data errors and have a direct linkage between each time series mean log return and the corresponding buy and hold return
  - But no simple portfolio interpretation in the cross-section

# Characteristics

- We use predicted returns constructed from two sets of characteristics
  - 5 characteristics (C5) – the union of those that underlie recent factor models of Fama-French (2015), Hou, Xue, and Zhang (2015), and Barillas and Shanken (2015)
    - Size, Book-to-market, Momentum, Profitability, Asset Growth
  - 14 characteristics (C14) – drawn from Lewellen (2015)



Table 1  
Do firm  
characteristics  
predict  
1-month  
ahead returns  
in global  
markets?

Dep. Var.	(1)	(2)	(3)	(4)
	C5	C14	C5	C14
	Simple return		Log return	
Log size	-0.1779*** (-3.18)	-0.2103*** (-3.38)	0.1196** (2.41)	-0.1263* (-1.93)
Log Book-to-market	0.3169*** (4.96)	0.1997*** (4.03)	0.4407*** (7.77)	0.2229*** (5.11)
Momentum	0.3632*** (5.46)	0.4193*** (7.82)	0.4515*** (6.73)	0.5253*** (10.18)
ROA	0.2046*** (4.46)	0.1134*** (3.54)	0.4611*** (11.41)	0.2122*** (6.87)
Asset growth	-0.1822*** (-5.18)	-0.1129*** (-4.18)	-0.2645*** (-6.67)	-0.1614*** (-5.94)
Beta		0.0937 (1.57)		0.0205 (0.34)
Accrual		-0.0903*** (-6.03)		-0.1095*** (-7.16)
Dividend		0.0734*** (3.06)		0.1273*** (5.18)
LR return		-0.0180 (-0.60)		0.0535* (1.78)
Idio risk		-0.2072*** (-4.11)		-0.6992*** (-13.47)
Illiquidity		0.0797** (2.39)		0.1354*** (3.63)
Turnover		-0.2508*** (-7.30)		-0.3369*** (-9.81)
Leverage		-0.0704** (-2.17)		-0.1860*** (-5.76)
Sales/price		0.1431*** (5.95)		0.1448*** (5.81)
Constant	0.9090** (2.28)	0.9023** (2.27)	-0.3223 (-0.80)	-0.3205 (-0.78)
Observations	6,177,896	4,620,048	6,177,896	4,620,048
R-squared	0.0122	0.0231	0.0131	0.0272
Number of months	300	300	300	300

## Table 2

### Predicted and realized returns

	(1)	(2)	(3)	(4)
	C5	C14	C5	C14
Dependent var.	Simple return		Log return	
Predicted return	0.2965*** (5.52)	0.2347*** (5.53)	0.3794*** (7.05)	0.3470*** (7.95)
Constant	0.4761 (1.47)	0.5565* (1.66)	-0.2005 (-0.65)	-0.2034 (-0.63)
N	6,177,896	4,620,048	6,177,896	4,620,048
R-squared	0.0208	0.0184	0.0235	0.0230
Number of months	300	300	-0.2005	-0.2034

## Table A2

Difference in firm characteristics pre-event between event and nonevent firms

	Pre-DI	Pre-split	Pre-SEO	Pre-MA	Pre-rep
Size	-0.0879***	0.1808***	0.1739***	0.3800***	0.3713***
Book-to-market	-0.2132***	-0.3201***	-0.2817***	-0.1763***	0.0117
MOM	0.2104***	0.2488***	0.0924***	0.0969***	0.0332***
ROA	0.0495***	0.1757***	-0.1548***	-0.0043	0.2036***
Asset growth	0.1222***	0.1505***	0.0713***	0.0353***	0.0496***
Beta	0.0700***	-0.0335***	0.1580***	0.0806***	0.0055
Accrual	0.0335***	0.0345***	-0.0155**	-0.0115**	0.0366***
Dividend	-0.5779***	-0.0720***	-0.3021***	-0.0111	0.2032***
LR return	0.0474***	0.1688***	-0.0063	0.0681***	0.0984***
Idiosyncratic risk	0.1860***	-0.0745***	0.1515***	-0.1364***	-0.2991***
Illiquidity	0.0476***	-0.0850***	-0.0853***	-0.1654***	-0.1639***
Turnover	0.0649***	0.0401***	0.2735***	0.2376***	0.0742***
Leverage	-0.0725***	-0.1450***	0.0665***	-0.0570***	-0.1511***
Sales/Price	-0.1121***	-0.1653***	-0.0679***	-0.0964***	-0.1035***

# The Method (step 2)

## Do event firms earn long-run abnormal returns?

- We consider three benchmarks for expected returns;
  - Mean returns during same month, all other firms.
  - Same month return to a control firm, matched on size, BM
  - Fitted values from characteristics-based benchmark return.
    - *Note, only information up to t-1.*

- Model

$$R_{it} - E[R_{it}|I_{t-1}] = a + \sum_{k=1}^{K=6} b_k \times D_{itk} + Region_j + u_{it}$$

# Advantages of the proposed method

- Can accommodate as many characteristics as desired.
- Eliminates the need for control firms and/or matching portfolios.
- Can be adapted to give equal weight to each event (as in BHAR) or equal weight to each period (as in CTP).
- Easy to implement.
- Method is ex ante

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- Easy to implement.
- Method is ex ante
- Results...

# Table 4

## Main results (Log returns, Fama-MacBeth)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3667*** (4.61)	0.2914*** (6.09)	0.1750** (2.34)	0.3578*** (4.29)	0.3085*** (5.50)	0.1204 (1.49)
Post-split	-0.3570*** (-3.35)	-0.1298*** (-2.69)	-0.2220** (-2.22)	-0.3011*** (-2.73)	-0.1224** (-2.35)	-0.1083 (-1.00)
Post-IPO	-0.7156*** (-3.90)	-0.2321** (-2.14)	-0.1628 (-1.06)	-0.6330*** (-3.89)	-0.2057* (-1.69)	-0.0484 (-0.34)
Post-SEO	-0.8725*** (-7.46)	-0.6358*** (-8.77)	-0.4202*** (-3.67)	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)
Post-MA	-0.0984 (-1.50)	-0.1792*** (-4.18)	-0.0534 (-0.90)	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)
Post-rep	0.5527*** (5.45)	0.2555*** (6.41)	0.2540** (2.47)	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)
Constant	-0.0786 (-0.19)	0.0789*** (4.02)	0.1200 (0.29)	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0533	0.0013	0.0532	0.0568	0.0018	0.0565
Number of months	300	300	300	300	300	300
AAC	0.5192	0.2873	0.2146	0.4793	0.2878	0.1005
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3228

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Post-SEO	-0.8725*** (-7.46)	-0.6358*** (-8.77)	-0.4202*** (-3.67)	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)
Post-MA	-0.0984 (-1.50)	-0.1792*** (-4.18)	-0.0534 (-0.90)	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)
Post-rep	0.5527*** (5.45)	0.2555*** (6.41)	0.2540** (2.47)	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)
Constant	-0.0786 (-0.19)	0.0789*** (4.02)	0.1200 (0.29)	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0533	0.0013	0.0532	0.0568	0.0018	0.0565
Number of months	300	300	300	300	300	300
AAC	0.5192	0.2873	0.2146	0.4793	0.2878	0.1005
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3228

# Table 4

## Main results (Log returns, Fama-MacBeth)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3667*** (4.61)	0.2914*** (6.09)	0.1750** (2.34)	0.3578*** (4.29)	0.3085*** (5.50)	0.1204 (1.49)
Post-split	-0.3570*** (-3.35)	-0.1298*** (-2.69)	-0.2220** (-2.22)	-0.3011*** (-2.73)	-0.1224** (-2.35)	-0.1083 (-1.00)
Post-IPO	-0.7156*** (-3.90)	-0.2321** (-2.14)	-0.1628 (-1.06)	-0.6330*** (-3.89)	-0.2057* (-1.69)	-0.0484 (-0.34)
Post-SEO	-0.8725*** (-7.46)	-0.6358*** (-8.77)	-0.4202*** (-3.67)	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)
Post-MA	-0.0984 (-1.50)	-0.1792*** (-4.18)	-0.0534 (-0.90)	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)
Post-rep	0.5527*** (5.45)	0.2555*** (6.41)	0.2540** (2.47)	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)
Constant	-0.0786 (-0.19)	0.0789*** (4.02)	0.1200 (0.29)	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0533	0.0013	0.0532	0.0568	0.0018	0.0565
Number of months	300	300	300	300	300	300
AAC	0.5192	0.2873	0.2146	0.4793	0.2878	0.1005
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3228

# Table 4

## Main results (Log returns, Fama-MacBeth)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3667*** (4.61)	0.2914*** (6.09)	0.1750** (2.34)	0.3578*** (4.29)	0.3085*** (5.50)	0.1204 (1.49)
Post-split	-0.3570*** (-3.35)	-0.1298*** (-2.69)	-0.2220** (-2.22)	-0.3011*** (-2.73)	-0.1224** (-2.35)	-0.1083 (-1.00)
Post-IPO	-0.7156*** (-3.90)	-0.2321** (-2.14)	-0.1628 (-1.06)	-0.6330*** (-3.89)	-0.2057* (-1.69)	-0.0484 (-0.34)
Post-SEO	-0.8725*** (-7.46)	-0.6358*** (-8.77)	-0.4202*** (-3.67)	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)
Post-MA	-0.0984 (-1.50)	-0.1792*** (-4.18)	-0.0534 (-0.90)	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)
Post-rep	0.5527*** (5.45)	0.2555*** (6.41)	0.2540** (2.47)	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)
Constant	-0.0786 (-0.19)	0.0789*** (4.02)	0.1200 (0.29)	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0533	0.0013	0.0532	0.0568	0.0018	0.0565
Number of months	300	300	300	300	300	300
AAC	0.5192	0.2873	0.2146	0.4793	0.2878	0.1005
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3228

## Other tests

- Simple returns
- Pooled OLS
- Firm size
- By period
- By country/region/global levels

# Table 4

## Results based on simple returns (Fama-MacBeth)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Simple return – Benchmark simple return					
Post-DI	0.2221*** (2.64)	0.1806*** (3.64)	0.1138 (1.45)	0.2015** (2.35)	0.1717*** (2.92)	0.1046 (1.22)
Post-split	-0.2188** (-2.07)	-0.0317 (-0.64)	-0.1099 (-1.10)	-0.1877* (-1.70)	-0.0460 (-0.86)	-0.0408 (-0.38)
Post-IPO	-0.4027** (-2.45)	-0.1260 (-1.30)	-0.0371 (-0.25)	-0.3377** (-2.29)	-0.0840 (-0.72)	0.0737 (0.54)
Post-SEO	-0.4919*** (-4.43)	-0.3948*** (-6.10)	-0.2392** (-2.14)	-0.5191*** (-4.33)	-0.4208*** (-5.63)	-0.1135 (-0.94)
Post-MA	-0.1978*** (-3.02)	-0.0856** (-2.15)	-0.0250 (-0.42)	-0.2328*** (-3.35)	-0.0949** (-2.11)	-0.0128 (-0.20)
Post-rep	0.1723* (1.69)	0.1371*** (3.67)	0.1589 (1.53)	0.1380 (1.30)	0.1114*** (2.60)	0.1235 (1.07)
Constant	0.9492** (2.37)	0.0287 (1.63)	0.0958 (0.24)	0.9444** (2.36)	0.0358 (1.46)	0.0823 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0496	0.0012	0.0498	0.0528	0.0016	0.0527
Number of months	300	300	300	300	300	300
AAC	0.2843	0.1593	0.1140	0.2695	0.1548	0.0782
Joint 6, p-value	0.0008	0.0000	0.1091	0.0068	0.0000	0.6776

# Table 4

## Results based on simple returns (Fama-MacBeth)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Simple return – Benchmark simple return					
Post-DI	0.2221*** (2.64)	0.1806*** (3.64)	0.1138 (1.45)	0.2015** (2.35)	0.1717*** (2.92)	0.1046 (1.22)
Post-split	-0.2188** (-2.07)	-0.0317 (-0.64)	-0.1099 (-1.10)	-0.1877* (-1.70)	-0.0460 (-0.86)	-0.0408 (-0.38)
Post-IPO	-0.4027** (-2.45)	-0.1260 (-1.30)	-0.0371 (-0.25)	-0.3377** (-2.29)	-0.0840 (-0.72)	0.0737 (0.54)
Post-SEO	-0.4919*** (-4.43)	-0.3948*** (-6.10)	-0.2392** (-2.14)	-0.5191*** (-4.33)	-0.4208*** (-5.63)	-0.1135 (-0.94)
Post-MA	-0.1978*** (-3.02)	-0.0856** (-2.15)	-0.0250 (-0.42)	-0.2328*** (-3.35)	-0.0949** (-2.11)	-0.0128 (-0.20)
Post-rep	0.1723* (1.69)	0.1371*** (3.67)	0.1589 (1.53)	0.1380 (1.30)	0.1114*** (2.60)	0.1235 (1.07)
Constant	0.9492** (2.37)	0.0287 (1.63)	0.0958 (0.24)	0.9444** (2.36)	0.0358 (1.46)	0.0823 (0.21)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0496	0.0012	0.0498	0.0528	0.0016	0.0527
Number of months	300	300	300	300	300	300
AAC	0.2843	0.1593	0.1140	0.2695	0.1548	0.0782
Joint 6, p-value	0.0008	0.0000	0.1091	0.0068	0.0000	0.6776

# Table A6

## Results based on log returns (Pooled OLS)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3919*** (4.43)	0.2710*** (5.88)	0.2440*** (2.84)	0.4058*** (4.89)	0.2975*** (5.29)	0.1355* (1.71)
Post-split	-0.3136*** (-2.73)	-0.1345*** (-3.75)	-0.2299* (-1.96)	-0.2387* (-1.94)	-0.1105*** (-2.87)	-0.0941 (-0.74)
Post-IPO	-0.7013*** (-5.26)	-0.2127*** (-2.96)	-0.0772 (-0.60)	-0.4219*** (-3.11)	-0.0681 (-0.86)	0.0742 (0.57)
Post-SEO	-0.9031*** (-10.53)	-0.6015*** (-11.81)	-0.4105*** (-4.73)	-0.9939*** (-11.16)	-0.6393*** (-11.55)	-0.1473 (-1.63)
Post-MA	-0.1345* (-1.66)	-0.1932*** (-4.91)	-0.0731 (-0.92)	-0.1599* (-1.82)	-0.1842*** (-4.44)	-0.0441 (-0.51)
Post-rep	0.5418*** (6.49)	0.2665*** (7.73)	0.2358*** (2.74)	0.5276*** (5.82)	0.2590*** (6.79)	0.1319 (1.41)
Constant	0.0028 (0.10)	0.1103*** (7.78)	0.1522*** (5.17)	0.0593** (2.02)	0.1264*** (9.20)	0.1223*** (4.12)
Region FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.1250	0.0002	0.1340	0.1269	0.0003	0.1348
AAC	0.4977	0.2799	0.2118	0.4580	0.2598	0.1045
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.1812



# Table A6

## Results based on log returns (Pooled OLS)

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3919*** (4.43)	0.2710*** (5.88)	0.2440*** (2.84)	0.4058*** (4.89)	0.2975*** (5.29)	0.1355* (1.71)
Post-split	-0.3136*** (-2.73)	-0.1345*** (-3.75)	-0.2299* (-1.96)	-0.2387* (-1.94)	-0.1105*** (-2.87)	-0.0941 (-0.74)
Post-IPO	-0.7013*** (-5.26)	-0.2127*** (-2.96)	-0.0772 (-0.60)	-0.4219*** (-3.11)	-0.0681 (-0.86)	0.0742 (0.57)
Post-SEO	-0.9031*** (-10.53)	-0.6015*** (-11.81)	-0.4105*** (-4.73)	-0.9939*** (-11.16)	-0.6393*** (-11.55)	-0.1473 (-1.63)
Post-MA	-0.1345* (-1.66)	-0.1932*** (-4.91)	-0.0731 (-0.92)	-0.1599* (-1.82)	-0.1842*** (-4.44)	-0.0441 (-0.51)
Post-rep	0.5418*** (6.49)	0.2665*** (7.73)	0.2358*** (2.74)	0.5276*** (5.82)	0.2590*** (6.79)	0.1319 (1.41)
Constant	0.0028 (0.10)	0.1103*** (7.78)	0.1522*** (5.17)	0.0593** (2.02)	0.1264*** (9.20)	0.1223*** (4.12)
Region FE	Y	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.1250	0.0002	0.1340	0.1269	0.0003	0.1348
AAC	0.4977	0.2799	0.2118	0.4580	0.2598	0.1045
Joint 6, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.1812

# Table A8

## Results by firm size

	Large firms			Small firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C14	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.1596 (1.53)	0.1479** (1.98)	0.1233 (1.25)	0.5248*** (5.22)	0.5019*** (4.71)	0.1591 (1.62)
Post-split	-0.3598*** (-3.30)	-0.1494** (-2.52)	-0.1668 (-1.50)	-0.2713** (-2.00)	-0.0743 (-0.84)	0.0240 (0.19)
Post-IPO	-0.6877*** (-4.23)	-0.2746** (-1.99)	-0.2029 (-1.35)	-0.5652*** (-2.94)	-0.1012 (-0.64)	0.1208 (0.64)
Post-SEO	-0.7542*** (-6.57)	-0.5979*** (-7.30)	-0.1941* (-1.78)	-1.1998*** (-7.85)	-0.8306*** (-7.83)	-0.0908 (-0.60)
Post-MA	-0.0767 (-1.25)	-0.1023** (-2.18)	0.1076* (1.78)	-0.6112*** (-4.81)	-0.4632*** (-4.82)	-0.2503** (-2.23)
Post-rep	0.4983*** (5.14)	0.2320*** (4.75)	0.2246** (2.18)	0.4332** (2.59)	0.1957** (2.22)	0.1505 (0.90)
Constant	-0.1330 (-0.34)	0.1176*** (4.19)	0.0260 (0.07)	0.0448 (0.10)	0.0665** (2.05)	0.1352 (0.32)
Region FE	Y	Y	Y	Y	Y	Y
Observations	2,480,643	2,474,253	2,480,643	2,139,405	2,137,131	2,139,405
R-squared	0.0675	0.0028	0.0679	0.0555	0.0031	0.0549
Number of months	300	300	300	300	300	300
AAC	0.4227	0.2507	0.1699	0.6009	0.3612	0.1326
Joint 6, p-value	0.0000	0.0000	0.0119	0.0000	0.0000	0.1655

# Table A8

## Results by firm size

	Large firms			Small firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C14	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.1596 (1.53)	0.1479** (1.98)	0.1233 (1.25)	0.5248*** (5.22)	0.5019*** (4.71)	0.1591 (1.62)
Post-split	-0.3598*** (-3.30)	-0.1494** (-2.52)	-0.1668 (-1.50)	-0.2713** (-2.00)	-0.0743 (-0.84)	0.0240 (0.19)
Post-IPO	-0.6877*** (-4.23)	-0.2746** (-1.99)	-0.2029 (-1.35)	-0.5652*** (-2.94)	-0.1012 (-0.64)	0.1208 (0.64)
Post-SEO	-0.7542*** (-6.57)	-0.5979*** (-7.30)	-0.1941* (-1.78)	-1.1998*** (-7.85)	-0.8306*** (-7.83)	-0.0908 (-0.60)
Post-MA	-0.0767 (-1.25)	-0.1023** (-2.18)	0.1076* (1.78)	-0.6112*** (-4.81)	-0.4632*** (-4.82)	-0.2503** (-2.23)
Post-rep	0.4983*** (5.14)	0.2320*** (4.75)	0.2246** (2.18)	0.4332** (2.59)	0.1957** (2.22)	0.1505 (0.90)
Constant	-0.1330 (-0.34)	0.1176*** (4.19)	0.0260 (0.07)	0.0448 (0.10)	0.0665** (2.05)	0.1352 (0.32)
Region FE	Y	Y	Y	Y	Y	Y
Observations	2,480,643	2,474,253	2,480,643	2,139,405	2,137,131	2,139,405
R-squared	0.0675	0.0028	0.0679	0.0555	0.0031	0.0549
Number of months	300	300	300	300	300	300
AAC	0.4227	0.2507	0.1699	0.6009	0.3612	0.1326
Joint 6, p-value	0.0000	0.0000	0.0119	0.0000	0.0000	0.1655

# Table A8

## Results by period

	1996-2007			2008-2020		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C14	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.5318*** (3.89)	0.3722*** (4.30)	0.2354* (1.71)	0.1972** (2.18)	0.2498*** (3.51)	0.0143 (0.17)
Post-split	-0.5057*** (-3.33)	-0.1828* (-1.85)	-0.1751 (-1.17)	-0.1123 (-0.74)	-0.0666* (-1.69)	-0.0466 (-0.30)
Post-IPO	-0.9828*** (-3.26)	-0.4246* (-1.88)	-0.1010 (-0.36)	-0.3100*** (-2.67)	-0.0037 (-0.04)	0.0001 (0.00)
Post-SEO	-0.8564*** (-4.20)	-0.6872*** (-5.02)	-0.2084 (-1.09)	-0.9836*** (-6.88)	-0.6633*** (-6.74)	-0.1146 (-0.78)
Post-MA	-0.1251 (-1.44)	-0.1870** (-2.58)	0.0209 (0.25)	-0.1232 (-1.19)	-0.1659*** (-2.83)	-0.0322 (-0.34)
Post-rep	0.4613*** (2.79)	0.1423** (2.15)	0.1475 (0.81)	0.6072*** (4.32)	0.3292*** (6.02)	0.1704 (1.17)
Constant	-0.2524 (-0.38)	0.0614 (1.57)	-0.0218 (-0.03)	0.1197 (0.25)	0.1131*** (3.28)	0.1855 (0.36)
Region FE	Y	Y	Y	Y	Y	Y
Observations	1,323,547	1,320,443	1,323,547	3,296,501	3,290,941	3,296,501
R-squared	0.0738	0.0025	0.0718	0.0411	0.0012	0.0424
Number of months	144	144	144	156	156	156
AAC	0.5772	0.3327	0.1481	0.3889	0.2464	0.0630
Joint 6, p-value	0.0000	0.0000	0.3925	0.0000	0.0000	0.8992

# Results by country/region/global levels

- Does our approach work better at a country, region, or global level?
- The use of country level versus regional or global level benchmarks has not been broadly considered in international event studies
- Mixed results from the literature
  - Griffin (2002), Fama and French (2012) and Hollstein (2022) show that local risk factors have better explanatory power
  - Bekaert, Hodrick, and Zhang (2009), Hou, Karolyi, and Kho (2011), and Karolyi and Wu (2018) find that models with both local and global risk factors have greater explanatory power

# FM coefficients and $R^2$ vary across country, consistent with better predictability using country- level forecasts

**Table 5**  
Coefficients on firm characteristics, country-by-country regression results

**Panel A: Summary statistics of coefficient estimates on the firm characteristics across individual countries**

	Mean	Median	Max	Min	SD	No. positive & significant	No. positive & insignificant	No. negative & significant	No. negative & insignificant
Log size	-0.19	-0.13	0.33	-0.92	0.27	0	10	12	21
Log Book-to-market	0.23	0.24	0.59	-0.34	0.19	20	20	1	2
Momentum	0.54	0.55	1.01	-0.26	0.31	32	10	0	1
ROA	0.34	0.21	1.20	0.00	0.30	21	22	0	0
Asset growth	-0.14	-0.15	0.31	-0.41	0.15	1	5	14	23
Beta	-0.09	-0.07	0.26	-1.12	0.23	0	15	2	26
Accrual	-0.15	-0.15	0.00	-0.52	0.10	0	2	19	22
Dividend	0.19	0.12	1.63	-0.20	0.34	12	20	0	11
LR return	0.01	0.02	0.45	-0.71	0.17	2	24	3	14
Idio risk	-0.66	-0.58	0.00	-1.82	0.43	0	1	32	10
Illiquidity	-0.15	0.09	1.94	-10.35	1.73	8	19	0	16
Turnover	-0.57	-0.35	0.08	-10.04	1.49	0	1	28	14
Leverage	-0.13	-0.15	2.47	-1.06	0.53	0	11	14	18
Sales/price	0.13	0.16	0.64	-1.74	0.35	16	21	1	5
AAC-equation1	0.33	0.28	1.71	0.15	0.26				
R2	0.22	0.21	0.35	0.07	0.09				

## Table 6

### Results by country/region/global levels

	C14 Return Available				
Benchmark	(1)	(2)	(3)	(4)	(5)
	None	Match	Country-level	Region-level	Global
Dependent var.	Log return – Benchmark log return				
Post-DI	0.3578*** (4.29)	0.3085*** (5.50)	0.1204 (1.49)	0.1884** (2.28)	0.2712*** (3.36)
Post-split	-0.3011*** (-2.73)	-0.1224** (-2.35)	-0.1083 (-1.00)	-0.1314 (-1.23)	-0.1328 (-1.21)
Post-IPO	-0.6330*** (-3.89)	-0.2057* (-1.69)	-0.0484 (-0.34)	-0.3193** (-2.23)	-0.3310** (-2.26)
Post-SEO	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)	-0.2921*** (-2.64)	-0.3284*** (-2.99)
Post-MA	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)	-0.0280 (-0.43)	-0.0039 (-0.06)
Post-rep	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)	0.1797 (1.60)	0.2663** (2.37)
Constant	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)	0.0896 (0.22)	0.1450 (0.34)
Region FE	Y	Y	Y	Y	Y
Observations	4,620,048	4,611,384	4,620,048	4,620,048	4,620,048
R-squared	0.0568	0.0018	0.0565	300	300
Number of months	300	300	300	0.0577	0.0563
AAC	0.4793	0.2878	0.1005	0.1898	0.2223
Joint 6, p-value	0.0000	0.0000	0.3228	0.0020	0.0000

Table 7  
Comparing model performance across countries

(1)	(2) AAC-C14
Country market cap $t-1$	-0.2513*** (-7.75)
GDP per capita $t-1$	0.0284 (0.76)
Country market turnover $t-1$	-0.0511 (-0.87)
Country market return volatility $t-1$	2.9168* (1.98)
Segmentation $t-1$	4.0356* (1.72)
Constant	7.3602*** (7.14)
Year FE	Y
R-squared	0.3510
Observations	639



# Do the C14 Characteristics Proxy for Firm Exposures to Latent Risk Factors?

- Why does the C14 characteristic based model explain post-event returns?
  - Risk or mispricing?
- We implement the Instrumented Principal Component Analysis (IPCA) method of Kelly, Pruitt, and Su (2019).
- IPCA identifies latent risk factors and determines whether observable characteristics explain returns because they effectively predict variation in firms' exposures to these factors.
- We report results that compare the performance of the C14 benchmarks against benchmarks derived from the IPCA model.
- If time variation in firm exposures to latent risk factors account for the C14 model's success, then the expected returns from the IPCA analysis should help explain the post event returns.

## Table 8

### Post-event stock returns using different benchmarks: IPCA risk factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Benchmark	None	Match	C14	IPCA_OOS 2 factors	IPCA_OOS 5 factors	IPCA_IS 2 factors	IPCA_IS 5 factors
Dependent var.	Log return – Benchmark log return						
Post-DI	0.3578*** (4.29)	0.3085*** (5.50)	0.1204 (1.49)	0.1486** (2.01)	0.1683** (2.29)	0.1773** (2.18)	0.1948** (2.43)
Post-split	-0.3011*** (-2.73)	-0.1224** (-2.35)	-0.1083 (-1.00)	-0.2497** (-2.31)	-0.1384 (-1.28)	-0.3051*** (-2.83)	-0.2267** (-2.11)
Post-IPO	-0.6330*** (-3.89)	-0.2057* (-1.69)	-0.0484 (-0.34)	-0.3476** (-2.14)	-0.2799* (-1.77)	-0.4153*** (-2.80)	-0.3998*** (-2.71)
Post-SEO	-0.9226*** (-7.50)	-0.6747*** (-8.12)	-0.1596 (-1.34)	-0.5868*** (-4.45)	-0.3871*** (-2.94)	-0.4121*** (-3.48)	-0.2940** (-2.50)
Post-MA	-0.1241* (-1.83)	-0.1760*** (-3.81)	-0.0067 (-0.11)	-0.2557*** (-3.70)	-0.1793*** (-2.60)	-0.1981*** (-2.89)	-0.1109 (-1.64)
Post-rep	0.5372*** (4.97)	0.2395*** (5.43)	0.1594 (1.37)	0.1918* (1.75)	0.1850* (1.69)	0.1783* (1.67)	0.2101* (1.95)
Constant	-0.0589 (-0.14)	0.0883*** (3.37)	0.0860 (0.21)	1.1292*** (2.82)	1.0437*** (2.61)	0.0599 (0.15)	0.0200 (0.05)
Region FE	Y	Y	Y	Y	Y	Y	Y
Observations	4,620,048	4,611,384	4,620,048	4,453,813	4,453,813	4,620,048	4,620,048
R-squared	0.0568	0.0018	0.0565	0.0517	0.0516	0.0562	0.0562
Number of months	300	300	300	276	276	300	300
AAC	0.4793	0.2878	0.1005	0.2967	0.2230	0.2810	0.2394
Joint 6, p-value	0.0000	0.0000	0.3228	0.0000	0.0000	0.0000	0.0001

# Conclusions

- First large scale study of long-horizon international corporate events
- Non-U.S. event firms earn significantly different size and BM adjusted returns post event than non-event firms
- Firm characteristics significantly predict future stock returns in 58 countries
  - Stronger effect at the country level
- Characteristics-based benchmark returns largely explain post-event abnormal returns
  - Post event returns do not require event specific explanations --- only understanding of national market relation between returns and characteristics.
  - Local/region/global differences
- This approach can serve as a new method for estimating abnormal returns in event studies.
  - U.S. Predicted return data is posted on WRDS
- This paper, along with Bessembinder, Cooper, and Zhang (2019), suggests that most event studies do not earn abnormal returns
  - Our results suggest reexamining popular theories of investor and managerial behavior derived from previous studies of post-event return patterns.

# Other Tables

# Post-event, event firms are different than non-event firms

## Event Firm – Non Event Firm Means

**Table: Difference in firm characteristics between event and nonevent firms**

	(1) Size	(2) Book-to- market	(3) MOM.	(4) ROA	(5) Asset growth	(6) Beta	(7) Accrual
Post-DI	-0.0232 (-1.24)	-0.0836*** (-13.64)	0.0854*** (9.62)	0.2279*** (28.39)	0.1650*** (17.51)	0.0218** (2.06)	0.0748*** (13.90)
Post-split	0.1838*** (10.50)	-0.3934*** (-31.15)	0.0907*** (6.11)	0.2405*** (36.26)	0.2537*** (29.03)	0.0569*** (5.74)	0.1226*** (23.55)
Post-IPO	-0.0928*** (-3.90)	-0.3084*** (-13.27)	-0.0595** (-2.31)	0.1451*** (6.92)	0.3414*** (25.68)	0.1371*** (6.13)	0.1564*** (12.11)
Post-SEO	0.1194*** (11.90)	-0.2699*** (-25.72)	-0.0662*** (-4.07)	-0.2464*** (-18.38)	0.2010*** (23.55)	0.1881*** (17.54)	0.0339*** (5.28)
Post-MA	0.3922*** (31.21)	-0.0785*** (-7.20)	-0.0166** (-2.43)	0.0231*** (4.11)	0.3988*** (55.08)	0.0350*** (5.53)	0.0569*** (9.55)
Post-rep	0.3696*** (18.89)	0.0376*** (3.84)	0.0441*** (4.10)	0.1767*** (25.18)	-0.0428*** (-8.54)	-0.0670*** (-11.42)	-0.0111* (-1.83)
Constant	-0.0453*** (-4.62)	0.1270*** (16.07)	0.0170*** (3.19)	-0.0125** (-2.52)	-0.1341*** (-20.67)	-0.0264*** (-3.64)	-0.0648*** (-23.35)
Region FE	Y	Y	Y	Y	Y	Y	Y
Observations	4,620,048	4,620,048	4,620,048	4,620,048	4,620,048	4,620,048	4,620,048
R-squared	0.0512	0.0400	0.0096	0.0269	0.0416	0.0178	0.0061
Number of months	300	300	300	300	300	300	300

# Results by region, C14

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Benchmark	C14	C14	C14	C14	C14	C14		
Region	Asia Dev.	Asia Emer.	Australasia	Canada	Euro Dev.	Euro Emer.	Latin Amer.	Mideast, Africa
Dependent var.	Log return – Benchmark log return							
Post-DI	0.3287** (2.03)	-0.2167 (-1.06)	0.0738 (0.35)	0.1533 (0.84)	0.0993 (1.14)	0.0080 (0.03)	-0.2287 (-0.62)	-0.1554 (-0.44)
Post-split	0.0251 (0.15)	-0.3608 (-1.62)	-0.1401 (-0.73)	0.2800 (1.34)	0.0195 (0.19)	-0.4870 (-1.11)	-0.0801 (-0.16)	-0.1213 (-0.38)
Post-IPO	0.1048 (0.32)	-0.1869 (-0.41)	-0.2435 (-0.85)	-0.5278 (-1.10)	-0.1470 (-0.83)	0.3861 (0.71)	0.5068 (0.96)	-0.0942 (-0.23)
Post-SEO	0.0144 (0.06)	-0.0392 (-0.24)	-0.1054 (-0.61)	-0.1027 (-0.72)	-0.2772** (-2.21)	-0.1589 (-0.48)	0.0062 (0.02)	0.3508 (0.90)
Post-MA	0.1777 (1.51)	0.1748 (0.83)	0.0079 (0.05)	0.1037 (0.96)	-0.0749 (-1.06)	-0.0953 (-0.40)	0.3047 (0.82)	-0.5104* (-1.97)
Post-rep	0.1527 (0.95)	0.9537* (1.82)	0.4113** (2.33)	0.1706 (0.86)	0.0809 (0.90)	0.3729 (0.90)	-0.3076 (-0.94)	0.0647 (0.25)
Constant	0.0687 (0.17)	-0.0380 (-0.07)	0.0871 (0.16)	0.2894 (0.46)	0.1869 (0.45)	0.5123 (0.75)	0.0914 (0.16)	0.1177 (0.27)
Observations	1,804,072	1,086,703	251,388	290,213	884,229	126,707	39,321	137,415
R-squared	0.0105	0.0194	0.0152	0.0120	0.0076	0.0310	0.0501	0.0274
Number of months	300	294	300	271	300	243	211	286
AAC	0.1339	0.3220	0.1637	0.2230	0.1165	0.2514	0.2390	0.2161
Joint 6, p-value	0.2857	0.2442	0.3074	0.4379	0.1865	0.8147	0.8221	0.5283

# Results by event window – 1<sup>st</sup> year

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.4949*** (6.30)	0.4324*** (6.63)	0.3061*** (4.30)	0.5321*** (6.20)	0.5217*** (6.37)	0.3787*** (4.27)
Post-split	-0.5466*** (-4.04)	-0.1347** (-2.47)	-0.5305*** (-3.94)	-0.4414*** (-3.41)	-0.1702*** (-2.81)	-0.4174*** (-2.99)
Post-SEO	-0.9423*** (-6.03)	-0.6214*** (-7.45)	-0.5381*** (-3.55)	-0.9496*** (-5.86)	-0.6077*** (-6.33)	-0.2523 (-1.59)
Post-MA	-0.0631 (-0.73)	-0.1382** (-2.22)	-0.0253 (-0.33)	-0.0825 (-0.93)	-0.1207* (-1.87)	-0.0175 (-0.22)
Post-rep	0.7003*** (7.16)	0.4054*** (8.08)	0.4074*** (4.28)	0.7192*** (6.91)	0.4177*** (7.49)	0.3168*** (3.10)
Constant	-0.1671 (-0.40)	0.0218** (1.97)	0.0954 (0.23)	-0.1350 (-0.33)	0.0352* (1.83)	0.0787 (0.19)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0504	0.0008	0.0509	0.0541	0.0013	0.0542
Number of months	300	300	300	300	300	300
AAC	0.5742	0.3562	0.3691	0.5741	0.3759	0.2832
Joint 5, p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

# Results by event window, 1<sup>st</sup> year (by time period)

	(1)	(2)	(3)
Benchmark	C14	C14	C14
Region	1 <sup>st</sup> year	1 <sup>st</sup> year, 1996-2007	1 <sup>st</sup> year, 2008-2020
Dependent var.	Log return – Benchmark log return		
Post-DI	0.3787*** (4.27)	0.5198*** (3.83)	0.2485** (2.24)
Post-split	-0.4174*** (-2.99)	-0.6588*** (-3.63)	-0.1945 (-0.97)
Post-SEO	-0.2523 (-1.59)	-0.3630 (-1.38)	-0.1501 (-0.82)
Post-MA	-0.0175 (-0.22)	-0.0483 (-0.53)	0.0109 (0.09)
Post-rep	0.3168*** (3.10)	0.3796** (2.59)	0.2589* (1.83)
Constant	0.0787 (0.19)	-0.0317 (-0.05)	0.1805 (0.34)
Observations	4,620,048	1,323,547	3,296,501
R-squared	0.0542	0.0689	0.0407
Number of months	300	144	156
AAC	0.2832	0.3939	0.17258
Joint 6, p-value	0.0000	0.0000	0.0815



# Results by event window – 2<sup>nd</sup> year

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.3420*** (3.46)	0.2132** (2.35)	0.1835* (1.92)	0.3177*** (3.20)	0.2337** (2.23)	0.1368 (1.32)
Post-split	-0.3742*** (-3.06)	-0.0775 (-1.08)	-0.0791 (-0.67)	-0.3611*** (-2.70)	-0.0960 (-1.28)	-0.0331 (-0.25)
Post-IPO	-0.7179*** (-3.28)	-0.3006** (-2.10)	-0.0335 (-0.19)	-0.2640 (-0.97)	0.0477 (0.16)	0.3859 (1.29)
Post-SEO	-1.0858*** (-8.29)	-0.7805*** (-8.47)	-0.4570*** (-3.80)	-1.1328*** (-8.51)	-0.8211*** (-8.44)	-0.1782 (-1.49)
Post-MA	-0.2227*** (-2.91)	-0.2862*** (-4.48)	-0.0669 (-0.95)	-0.2444*** (-2.97)	-0.2687*** (-3.63)	-0.0078 (-0.10)
Post-rep	0.5216*** (3.57)	0.2678*** (4.10)	0.1422 (0.99)	0.4825*** (3.17)	0.2823*** (4.03)	-0.0065 (-0.04)
Constant	-0.1442 (-0.35)	0.0419*** (3.35)	0.0833 (0.20)	-0.1139 (-0.28)	0.0541*** (2.77)	0.0777 (0.19)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0507	0.0011	0.0509	0.0543	0.0015	0.0542
Number of months	300	300	300	300	300	300
AAC	0.5440	0.3210	0.1604	0.4671	0.2916	0.1247
Joint 6, p-value	0.0000	0.0000	0.0028	0.0000	0.0000	0.4599

# Results by event window – 3<sup>rd</sup> year

	C5 Return Available			C14 Return Available		
	(1)	(2)	(3)	(4)	(5)	(6)
Benchmark	None	Match	C5	None	Match	C14
Dependent var.	Log return – Benchmark log return					
Post-DI	0.2194*	0.1836**	0.0141	0.1147	0.1203	-0.1363
	(1.82)	(2.44)	(0.13)	(0.84)	(1.37)	(-1.07)
Post-split	-0.1666	-0.1322**	-0.0422	-0.1503	-0.0883	0.0303
	(-1.55)	(-2.47)	(-0.40)	(-1.26)	(-1.34)	(0.25)
Post-IPO	-0.6784***	-0.1952*	-0.2144	-0.7924***	-0.3201**	-0.1072
	(-3.92)	(-1.93)	(-1.38)	(-4.12)	(-2.22)	(-0.65)
Post-SEO	-0.8320***	-0.6996***	-0.3731***	-0.9194***	-0.7612***	-0.1228
	(-7.47)	(-8.22)	(-3.44)	(-7.44)	(-7.81)	(-1.06)
Post-MA	-0.0023	-0.1668***	-0.0670	-0.0804	-0.2109***	-0.0096
	(-0.03)	(-3.23)	(-0.99)	(-1.08)	(-3.66)	(-0.13)
Post-rep	0.5750***	0.1694**	0.2251	0.5248***	0.0692	0.0741
	(4.06)	(2.18)	(1.63)	(3.22)	(0.68)	(0.45)
Constant	-0.1691	0.0303**	0.0787	-0.1197	0.0526**	0.0718
	(-0.41)	(2.59)	(0.19)	(-0.29)	(2.49)	(0.18)
Region FE	Y	Y	Y	Y	Y	Y
Observations	6,177,896	6,161,811	6,177,896	4,620,048	4,611,384	4,620,048
R-squared	0.0500	0.0009	0.0504	0.0545	0.0015	0.0545
Number of months	300	300	300	300	300	300
AAC	0.4123	0.2578	0.1560	0.4303	0.2617	0.0801
Joint 6, p-value	0.0000	0.0000	0.0088	0.0000	0.0000	0.8119