Discussion of:
Common Risk Factors in Cryptocurrency
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Overview

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Motivation: Crypto Market

- What do we know about cryptocurrencies?
- Are they a scam? A bubble? Maybe.
- Whether scam or not, it is a big market nowadays, and it has grown exponentially in the last few years.

Motivation: Crypto Market

- It is not obvious if there are any empirical regularities.
- Do cryptocurrency returns share similarities with other asset classes (e.g. equities)?
- This paper: studies the cross-section of cryptocurrency returns using standard empirical asset pricing tools.

A preview of results

- There are nine long-short strategies based in size, momentum, volume, and volatility with statistically significant excess returns.
- A three-factor model with cryptocurrency market, size and momentum accounts for the excess returns of all of the nine successful zero-investment strategies.
- Standard stock market factors (FF3+momentum, FF5) cannot account for the cross-section of cryptocurrency returns.
- Finally, results are generally robust to shorting constraints in the cryptocurrency markets.

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Data

- Trading data of all cryptocurrencies available from Coinmarketcap.com.
- 1,707 coins from the beginning of 2014 to the end of 2018; all coins with over 1 million dollars in market capitalization.
- 25 factors that depend only on price and market information.
- The cryptocurrency market return is simply the value-weighted return of all the underlying available coins.
- 1 month T-bill rates and standard factors from Kenneth French's website.

Summary Statistics A: Coin Market Data

Panel A					
Year	Number of Coins	Market Cap (mil)		Volume (thous)	
		Mean	Median	Mean	Median
2014	109	239.83	3.89	1,146.09	36.24
2015	77	134.53	2.76	1,187.64	11.51
2016	155	160.06	3.39	1,789.24	23.73
2017	804	435.68	9.01	18,509.55	133.56
2018	1,583	357.20	8.91	20,829.12	124.02
Full	1,707	356.71	8.17	18,305.83	103.89

Summary Statistics B: Coin Market Returns

Panel B					
	Mean	Median	SD	Skewness	Kurtosis
Coin Market Return	0.013	0.006	0.117	0.294	4.574
Bitcoin Return	0.012	0.005	0.114	0.367	4.580
Ripple Return	0.035	-0.007	0.267	3.478	21.263
Ethereum Return	0.046	0.001	0.241	1.841	9.843

Factors: Size and Momentum

Category	Factor	Definition
Size	MCAP	Log last day market capitalization in the portfolio formation week
Size	PRC	Log last day price in the portfolio formation week
Size	MAXDPRC	The maximum price of the portfolio formation week
Size	AGE	The number of weeks that have been listed on Coinmarketcap.com
Momentum	r 1,0	One-week momentum
Momentum	r 2,0	Two-week momentum
Momentum	r 3,0	Three-week momentum
Momentum	r 4,0	Four-week momentum
Momentum	r 8,0	Eight-week momentum
Momentum	r 16,0	Sixteen-week momentum
Momentum	r 50,0	Fifty-week momentum
Momentum	r 100,0	Hundred-week momentum

Factors: Volume and Volatility

Volume	VOL	Log average daily volume in the portfolio formation week
Volume	PRCVOL	Log average daily volume times price in the portfolio formation week
Volume	VOLSCALED	Log average daily volume times price scaled by market capitalization in the portfolio formation week
Volatility	BETA	The regression coefficient β^i_{CMKT} in $R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \epsilon_i$. The model is estimated using daily returns of the previous 365 days before the formation week.
Volatility	BETA2	Beta squared
Volatility	IDIOVOL	The idiosyncratic volatility is measured as the standard deviation of the residual after estimating $R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \epsilon_i$. The model is estimated using daily returns of the previous 365 days before the formation week.
Volatility	RETVOL	The standard deviation of daily returns in the portfolio formation week
Volatility	RETSKEW	The skewness of daily returns in the portfolio formation week
Volatility	RETKURT	The kurtosis of daily returns in the portfolio formation week
Volatility	MAXRET	Maximum daily return of the portfolio formation week
Volatility	DELAY	The improvement of R^2 in $R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \beta^i_{CMKT\_1} CMKT\_1 + \beta^i_{CMKT\_2} CMKT\_2 + \epsilon_i$, where $CMKT\_1$ and $CMKT\_2$ are the lagged one and two day coin market index returns, compared to using only current coin market excess returns. The model is estimated using daily returns of the previous 365 days before the formation week.
Volatility	STDPRCVOL	Log standard deviation of dollar volume in the portfolio formation week
Volatility	DAMIHUD	The average absolute daily return divided by dollar volume in the portfolio formation week

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Size Factor Returns

Table 3: Size Factor Returns

This table reports the mean quintile portfolio returns based on the market capitalization, last day price, and maximum day price factors. The mean returns are the time-series averages of weekly value-weighted portfolio excess returns. *, **, *** denote significance levels at the 10%, 5%, and 1%.

	Quintiles					
	1	2	3	4	5	5-1
MCAP	**Low**				**High**	
Mean	0.047***	0.018	0.013	0.013	0.013*	-0.034**
t(Mean)	(2.958)	(1.610)	(1.286)	(1.439)	(1.766)	(-2.557)
PRC	**Low**				**High**	
Mean	0.051***	0.029**	0.001	0.018	0.012*	-0.039**
t(Mean)	(2.739)	(2.118)	(0.117)	(1.419)	(1.689)	(-2.420)
MAXDPRC	**Low**				**High**	
Mean	0.053***	0.025*	0.002	0.021	0.012*	-0.041**
t(Mean)	(2.791)	(1.905)	(0.143)	(1.568)	(1.681)	(-2.483)

Momentum Factor Returns

Table 4: Momentum Factor Returns

This table reports the mean quintile portfolio returns based on the one-week, two-week, three-week, and four-week momentum factors. The mean returns are the time-series averages of weekly value-weighted portfolio excess returns. *, **, *** denote significance levels at the 10%, 5%, and 1%.

	Quintiles					
	1	2	3	4	5	5-1
r 1,0	**Low**				**High**	
Mean	-0.006	-0.002	0.010	0.042**	0.021	0.027**
t(Mean)	(-0.552)	(-0.176)	(1.094)	(2.317)	(1.550)	(1.994)
r 2,0	**Low**				**High**	
Mean	-0.002	0.005	0.010	0.018*	0.030**	0.033**
t(Mean)	(-0.225)	(0.493)	(1.155)	(1.894)	(2.314)	(2.442)
r 3,0	**Low**				**High**	
Mean	0.002	0.001	0.016	0.020**	0.043***	0.041***
t(Mean)	(0.156)	(0.124)	(1.587)	(2.091)	(2.956)	(2.742)
r 4,0	**Low**				**High**	
Mean	0.002	0.004	0.008	0.019*	0.027**	0.025**
t(Mean)	(0.243)	(0.435)	(0.935)	(1.921)	(2.033)	(2.002)

Volume Factor Returns

Table 5: Volume Factor Returns

This table reports the mean quintile portfolio returns based on the price dollar volume factor. The mean returns are the time-series averages of weekly value-weighted portfolio excess returns. *, **, *** denote significance levels at the 10%, 5%, and 1%.

	Quintiles					
	1	2	3	4	5	5-1
PRCVOL	**Low**				**High**	
Mean	0.045**	0.028**	0.017	0.018	0.013*	-0.032**
t(Mean)	(2.438)	(2.154)	(1.375)	(1.456)	(1.745)	(-2.016)

Volatility Factor Returns

Table 6: Volatility Factor Returns

This table reports the mean quintile portfolio returns based on the standard deviation of dollar volume factor. The mean returns are the time-series averages of weekly value-weighted portfolio excess returns. *, **, *** denote significance levels at the 10%, 5%, and 1%.

	Quintiles					
	1	2	3	4	5	5-1
STDPRCVOL	**Low**				**High**	
Mean	0.043***	0.032**	0.021*	0.021	0.013*	-0.030**
t(Mean)	(2.711)	(2.114)	(1.687)	(1.644)	(1.739)	(-2.269)

Insignificant Factor Returns

Table 7: Insignificant Factor Returns

This table reports the mean quintile portfolio returns based on the insignificant factors. The mean returns are the time-series averages of weekly value-weighted portfolio excess returns. *, **, *** denote significance levels at the 10%, 5%, and 1%.

		1	2	3	4	5	5-1
AGE	Mean	0.018	0.010	0.019*	0.014	0.013*	-0.005
	t(Mean)	(1.070)	(1.034)	(1.902)	(1.445)	(1.732)	(-0.558)
r 8,0	Mean	0.016	0.011	0.025**	0.022**	0.022*	0.006
	t(Mean)	(1.366)	(1.266)	(2.016)	(2.211)	(1.740)	(0.421)
r 16,0	Mean	0.017*	0.017*	0.006	0.013	0.021*	0.004
	t(Mean)	(1.695)	(1.806)	(0.714)	(1.300)	(1.661)	(0.310)
r 50,0	Mean	0.015	0.021**	0.017	0.014	0.008	-0.008
	t(Mean)	(1.572)	(2.167)	(1.593)	(1.447)	(0.680)	(-0.764)
r 100,0	Mean	0.052***	0.027**	0.027*	0.024*	0.018	-0.011
	t(Mean)	(2.842)	(2.556)	(1.971)	(1.923)	(1.376)	(-0.804)
VOL	Mean	0.014	0.034*	0.017*	0.014	0.013*	-0.002
	t(Mean)	(1.237)	(1.736)	(1.695)	(1.289)	(1.780)	(-0.170)
VOLSCALED	Mean	0.028*	0.055**	0.019	0.001	0.012*	-0.016
	t(Mean)	(1.915)	(2.347)	(1.481)	(0.120)	(1.699)	(-1.532)
BETA	Mean	0.019*	0.017	0.020*	0.016	0.006	-0.013
	t(Mean)	(1.967)	(1.575)	(1.817)	(1.488)	(0.544)	(-1.256)
BETA2	Mean	0.018*	0.024**	0.017	0.015	0.005	-0.012
	t(Mean)	(1.847)	(2.074)	(1.616)	(1.354)	(0.484)	(-1.191)
IDIOVOL	Mean	0.014*	0.027**	0.023*	0.007	0.022	0.009
	t(Mean)	(1.894)	(2.200)	(1.803)	(0.564)	(1.378)	(0.682)
RETVOL	Mean	0.015	0.022**	0.026*	0.020	-0.004	-0.017
	t(Mean)	(1.549)	(2.102)	(1.951)	(1.163)	(-0.281)	(-1.237)
RETSKEW	Mean	0.011	0.002	0.020*	0.011	0.016	0.005
	t(Mean)	(1.206)	(0.270)	(1.947)	(1.015)	(1.191)	(0.383)
RETKURT	Mean	-0.002	0.022**	0.011	0.021**	0.005	0.006
	t(Mean)	(-0.185)	(2.255)	(1.135)	(2.009)	(0.412)	(0.647)
MAXRET	Mean	0.012	0.018*	0.013	0.030*	0.006	-0.006
	t(Mean)	(1.452)	(1.691)	(1.358)	(1.778)	(0.388)	(-0.441)
DELAY	Mean	0.014*	0.019*	0.018	0.018	0.012	-0.001
	t(Mean)	(1.876)	(1.785)	(1.629)	(1.358)	(1.264)	(-0.159)
DAMIHUD	Mean	0.013*	0.013	0.039**	0.015	0.038*	0.026
	t(Mean)	(1.739)	(1.074)	(2.159)	(1.511)	(1.914)	(1.478)

Crypto CAPM

Table 8: Cryptocurrency One-Factor Model

$$R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \epsilon_i \quad (1)$$

where $CMKT$ is the cryptocurrency excess market returns. The formation of the quintile portfolios for the nine significant strategies are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%. m.a.e and R^2 are the mean of the absolute pricing errors and the average R^2 of the five portfolios, respectively.

		1	2	3	4	5	5-1	m.a.e	$\bar{R^2}$
	α	0.031**	0.005	-0.001	0.002	0.001	-0.031**		
	$t(\alpha)$	(2.346)	(0.640)	(-0.148)	(0.257)	(1.400)	(-2.284)		
MCAP	β_{CMKT}	1.208***	1.074***	0.990***	0.984***	0.998***	-0.210*	0.008	0.571
	$t(\beta_{CMKT})$	(10.606)	(15.302)	(16.025)	(18.662)	(200.564)	(-1.841)		
	R^2	0.305	0.478	0.501	0.576	0.994	0.015		
	α	0.033**	0.013	-0.011	0.005	0.000	-0.032**		
	$t(\alpha)$	(2.153)	(1.307)	(-1.484)	(0.502)	(0.314)	(-2.035)		
PRC	β_{CMKT}	1.544***	1.507***	1.073***	1.083***	0.958***	-0.585***	0.012	0.539
	$t(\beta_{CMKT})$	(11.858)	(15.688)	(16.277)	(12.295)	(89.475)	(-4.209)		
	R^2	0.355	0.490	0.509	0.571	0.969	0.067		
	α	0.034**	0.010	-0.011	0.008	0.000	-0.034**		
	$t(\alpha)$	(2.218)	(1.009)	(-1.459)	(0.722)	(0.271)	(-2.101)		
MAXDPRC	β_{CMKT}	1.551***	1.290***	1.070***	1.094***	0.958***	-0.592***	0.015	0.533
	$t(\beta_{CMKT})$	(11.796)	(15.753)	(16.244)	(11.579)	(89.511)	(-4.310)		
	R^2	0.352	0.492	0.508	0.544	0.969	0.068		
	α	-0.019**	-0.014**	-0.002	0.029*	0.009	0.028**		
	$t(\alpha)$	(-2.415)	(-2.220)	(-0.299)	(1.754)	(0.774)	(2.012)		
r 1,0	β_{CMKT}	1.036***	1.015***	0.975***	1.111***	1.015***	-0.021	0.015	0.437
	$t(\beta_{CMKT})$	(15.655)	(18.950)	(21.158)	(7.865)	(10.058)	(-0.175)		
	R^2	0.489	0.584	0.636	0.195	0.283	0.000		
	α	-0.013	-0.007	-0.002	0.006	0.018	0.031**		
	$t(\alpha)$	(-1.515)	(-1.000)	(-0.586)	(0.955)	(1.649)	(2.506)		
r 2,0	β_{CMKT}	0.872***	0.998***	0.941***	1.048***	1.041***	0.169	0.009	0.484
	$t(\beta_{CMKT})$	(11.682)	(16.539)	(19.940)	(20.302)	(11.241)	(1.468)		
	R^2	0.348	0.517	0.608	0.617	0.330	0.008		
	α	-0.009	-0.011*	0.003	0.007	0.031**	0.040***		
	$t(\alpha)$	(-1.047)	(-1.651)	(0.469)	(1.273)	(2.431)	(2.652)		
r 3,0	β_{CMKT}	0.904***	0.994***	0.955***	1.037***	1.005***	0.101	0.012	0.459
	$t(\beta_{CMKT})$	(11.864)	(17.958)	(15.591)	(21.437)	(9.518)	(0.782)		
	R^2	0.355	0.557	0.487	0.642	0.253	0.002		

Crypto CAPM (contd.)

Table 3 Continued		1	2	3	4	5	5-1	m.a.e	R^2
	α	-0.009	-0.008	-0.004	0.006	0.014	0.024*		
	$t(\alpha)$	(-1.333)	(-1.071)	(-0.770)	(0.993)	(1.300)	(1.906)		
r 4,0	β_{CMKT}	0.939***	0.979***	0.959***	1.067***	1.064***	0.125	0.008	0.522
	$t(\beta_{CMKT})$	(15.586)	(15.407)	(22.943)	(21.056)	(11.353)	(1.174)		
	R^2	0.487	0.481	0.673	0.634	0.335	0.005		
	α	0.029*	0.014	0.003	0.004	0.001	-0.028*		
	$t(\alpha)$	(1.814)	(1.589)	(0.309)	(0.465)	(0.924)	(-1.758)		
PRCVOL	β_{CMKT}	1.334***	1.193***	1.125***	1.114***	0.997***	-0.337**	0.010	0.520
	$t(\beta_{CMKT})$	(9.789)	(14.131)	(14.640)	(14.268)	(156.767)	(-2.454)		
	R^2	0.272	0.438	0.456	0.443	0.990	0.023		
	α	0.028**	0.017	0.006	0.007	0.001	-0.028**		
	$t(\alpha)$	(2.118)	(1.574)	(0.713)	(0.689)	(0.843)	(-2.048)		
STDPRCVOL	β_{CMKT}	1.223***	1.292***	1.192***	1.209***	0.993***	-0.230**	0.012	0.524
	$t(\beta_{CMKT})$	(10.734)	(12.332)	(15.557)	(14.870)	(152.231)	(-1.997)		
	R^2	0.310	0.573	0.486	0.463	0.989	0.015		

Market + Size

Table 9: Cryptocurrency Market and Size Factor Model

$$R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \beta^i_{CSMB} CSMB + \epsilon_i \quad (2)$$

where $CMKT$ is the cryptocurrency excess market returns and $CSMB$ is the cryptocurrency size factor. The formation of the quintile portfolios for the nine significant strategies are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%. m.a.e and R^2 are the mean of the absolute pricing errors and the average R^2 of the five portfolios, respectively.

		1	2	3	4	5	5-1	m.a.e	R^2
	α	0.006	-0.005	-0.006	-0.004	0.001	-0.005		
	$t(\alpha)$	(1.051)	(-0.740)	(-0.858)	(-0.712)	(1.413)	(-0.912)		
	β_{CMKT}	1.036***	1.004***	0.944***	0.946***	0.998***	-0.037		
MCAP	$t(\beta_{CMKT})$	(20.427)	(17.636)	(16.906)	(19.744)	(199.107)	(-0.737)	0.004	0.755
	β_{CSMB}	1.343***	0.548***	0.359***	0.300***	-0.001	-1.344***		
	$t(\beta_{CSMB})$	(32.427)	(11.777)	(7.873)	(7.667)	(-0.211)	(-32.480)		
	R^2	0.864	0.662	0.598	0.656	0.994	0.808		
	α	0.019	0.008	-0.017**	0.002	0.001	-0.018		
	$t(\alpha)$	(1.563)	(0.792)	(-2.254)	(0.147)	(0.690)	(-1.241)		
	β_{CMKT}	1.448***	1.271***	1.057***	1.057***	0.962***	-0.486***		
PRC	$t(\beta_{CMKT})$	(12.272)	(15.661)	(16.492)	(12.095)	(90.547)	(-3.929)	0.009	0.584
	β_{CSMB}	0.748***	0.279***	0.278***	0.197***	-0.025***	-0.773***		
	$t(\beta_{CSMB})$	(7.762)	(4.206)	(5.418)	(2.763)	(-2.884)	(-7.650)		
	R^2	0.478	0.525	0.559	0.390	0.970	0.241		
	α	0.020	0.004	-0.016**	0.004	0.001	-0.019		
	$t(\alpha)$	(1.440)	(0.463)	(-2.176)	(0.386)	(0.644)	(-1.319)		
	β_{CMKT}	1.454***	1.253***	1.056***	1.069***	0.962***	-0.493***		
MAXDPRC	$t(\beta_{CMKT})$	(12.188)	(15.761)	(16.389)	(11.372)	(90.569)	(-3.941)	0.009	0.577
	β_{CSMB}	0.749***	0.287***	0.263***	0.200***	-0.025***	-0.774***		
	$t(\beta_{CSMB})$	(7.686)	(4.424)	(5.093)	(2.607)	(-2.871)	(-7.576)		
	R^2	0.474	0.528	0.553	0.361	0.970	0.239		
	α	-0.021***	-0.014**	-0.006	0.028*	0.004	0.025*		
	$t(\alpha)$	(-2.737)	(-2.260)	(-1.176)	(1.661)	(0.346)	(1.810)		
	β_{CMKT}	1.019***	1.012***	0.948***	1.103***	0.980***	-0.039		
r 1,0	$t(\beta_{CMKT})$	(15.462)	(18.767)	(21.743)	(7.751)	(9.859)	(-0.327)	0.015	0.455
	β_{CSMB}	0.132**	0.021	0.208***	0.068	0.274***	0.141		
	$t(\beta_{CSMB})$	(2.460)	(0.475)	(5.826)	(0.584)	(3.369)	(1.459)		
	R^2	0.501	0.584	0.679	0.196	0.314	0.008		

Market + Size (contd.)

Table 9 Continued		1	2	3	4	5	5-1	m.a.e	R^2
	α	-0.016*	-0.010	-0.005	0.004	0.014	0.030**		
	$t(\alpha)$	(-1.841)	(-1.438)	(-0.611)	(0.696)	(1.325)	(2.230)		
	β_{CMKT}	0.852***	0.977***	0.952***	1.037***	1.016***	0.164		
r 2,0	$t(\beta_{CMKT})$	(11.474)	(16.416)	(19.727)	(20.098)	(11.051)	(1.415)	0.009	0.496
	β_{CSMB}	0.152**	0.160***	0.068*	0.084**	0.190**	0.039		
	$t(\beta_{CSMB})$	(2.498)	(3.295)	(1.751)	(1.982)	(2.528)	(0.408)		
	R^2	0.363	0.536	0.613	0.623	0.347	0.009		
	α	-0.013	-0.014**	0.000	0.006	0.026**	0.039**		
	$t(\alpha)$	(-1.445)	(-2.170)	(0.058)	(1.085)	(2.093)	(2.566)		
	β_{CMKT}	0.880***	0.972***	0.955***	1.050***	0.975***	0.095		
r 3,0	$t(\beta_{CMKT})$	(11.668)	(17.920)	(15.447)	(21.211)	(9.097)	(0.729)	0.012	0.477
	β_{CSMB}	0.186***	0.168***	0.159***	0.055	0.234***	0.048		
	$t(\beta_{CSMB})$	(3.012)	(3.782)	(3.207)	(1.379)	(2.672)	(0.456)		
	R^2	0.377	0.581	0.597	0.645	0.274	0.005		
	α	-0.012*	-0.012	-0.006	0.005	0.011	0.023*		
	$t(\alpha)$	(-1.716)	(-1.615)	(-1.159)	(0.790)	(0.997)	(1.831)		
	β_{CMKT}	0.921***	0.952***	0.946***	1.059***	1.041***	0.120		
r 4,0	$t(\beta_{CMKT})$	(15.418)	(15.348)	(22.851)	(20.834)	(11.143)	(1.120)	0.009	0.537
	β_{CSMB}	0.141***	0.204***	0.100***	0.065	0.179**	0.038		
	$t(\beta_{CSMB})$	(2.893)	(4.023)	(2.967)	(1.516)	(2.344)	(0.431)		
	R^2	0.503	0.512	0.684	0.637	0.349	0.006		
	α	0.008	0.006	-0.006	-0.001	0.001	-0.007		
	$t(\alpha)$	(0.646)	(0.659)	(-0.728)	(-0.101)	(0.110)	(-0.575)		
	β_{CMKT}	1.190***	1.140***	1.065***	1.078***	0.998***	-0.193*		
PRCVOL	$t(\beta_{CMKT})$	(11.095)	(14.422)	(15.499)	(14.236)	(156.423)	(-1.780)	0.004	0.625
	β_{CSMB}	1.116***	0.408***	0.465***	0.276***	-0.008	-1.124***		
	$t(\beta_{CSMB})$	(12.738)	(6.324)	(8.281)	(4.460)	(-1.483)	(-12.726)		
	R^2	0.555	0.514	0.571	0.483	0.990	0.402		
	α	0.011	0.007	-0.001	-0.001	0.001	-0.010		
	$t(\alpha)$	(1.018)	(0.581)	(-0.133)	(-0.134)	(1.124)	(-0.926)		
	β_{CMKT}	1.102***	1.221***	1.140***	1.156***	0.995***	-0.107		
STDPRCVOL	$t(\beta_{CMKT})$	(12.579)	(12.623)	(16.116)	(15.315)	(152.720)	(-1.191)	0.004	0.632
	β_{CSMB}	0.946***	0.550***	0.403***	0.416***	-0.012**	-0.957***		
	$t(\beta_{CSMB})$	(13.011)	(6.964)	(6.967)	(6.749)	(-2.176)	(-13.040)		
	R^2	0.586	0.473	0.568	0.545	0.989	0.409		

Market + Momentum

Table 10: Cryptocurrency Market and Momentum Factor Model

$$R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \beta^i_{CSMB} CMOM + \epsilon_i \quad (3)$$

where $CMKT$ is the cryptocurrency excess market returns and $CMOM$ is the cryptocurrency momentum factor. The formation of the quintile portfolios for the nine significant strategies are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%. m.a.e and R^2 are the mean of the absolute pricing errors and the average R^2 of the five portfolios, respectively.

		1	2	3	4	5	5-1	m.a.e	R^2
	α	0.034**	0.004	0.001	0.003	0.001	-0.033**		
	$t(\alpha)$	(2.503)	(0.509)	(0.179)	(0.458)	(1.341)	(-2.444)		
	β_{CMKT}	1.218***	1.071***	0.991***	0.989***	0.908***	-0.219*		
MCAP	$t(\beta_{CMKT})$	(10.657)	(15.184)	(15.956)	(18.693)	(199.519)	(-1.920)	0.009	0.572
	β_{CMOM}	-0.076	0.027	-0.007	-0.056	0.000	0.076		
	$t(\beta_{CMOM})$	(-1.040)	(0.609)	(-0.179)	(-1.067)	(0.155)	(1.047)		
	R^2	0.308	0.478	0.501	0.578	0.994	0.017		
	α	0.035**	0.011	-0.012	0.005	0.001	-0.034**		
	$t(\alpha)$	(2.257)	(1.082)	(-1.490)	(0.520)	(0.888)	(-2.088)		
	β_{CMKT}	1.552***	1.500***	1.072***	1.084***	0.961***	-0.591***		
PRC	$t(\beta_{CMKT})$	(11.870)	(15.556)	(16.178)	(12.244)	(90.786)	(-4.319)	0.013	0.540
	β_{CMOM}	-0.063	0.055	0.008	-0.008	-0.020***	0.045		
	$t(\beta_{CMOM})$	(-0.755)	(1.040)	(0.188)	(-0.143)	(-2.979)	(0.491)		
	R^2	0.356	0.492	0.509	0.371	0.970	0.068		
	α	0.036**	0.007	-0.012	0.008	0.001	-0.035**		
	$t(\alpha)$	(2.290)	(0.761)	(-1.468)	(0.689)	(0.850)	(-2.124)		
	β_{CMKT}	1.557***	1.282***	1.069***	1.094***	0.961***	-0.596***		
MAXDPRC	$t(\beta_{CMKT})$	(11.792)	(15.619)	(16.145)	(11.512)	(90.851)	(-4.316)	0.013	0.534
	β_{CMOM}	-0.050	0.062	0.009	0.006	-0.020***	0.030		
	$t(\beta_{CMOM})$	(-0.600)	(1.189)	(0.205)	(0.095)	(-3.005)	(0.544)		
	R^2	0.353	0.495	0.508	0.344	0.970	0.068		
	α	-0.013*	-0.009	0.001	0.027	-0.006	0.007		
	$t(\alpha)$	(-1.651)	(-1.507)	(0.118)	(1.570)	(-0.527)	(0.552)		
	β_{CMKT}	1.057***	1.031***	0.985***	1.102***	0.963***	-0.094		
r 1,0	$t(\beta_{CMKT})$	(16.404)	(19.671)	(21.553)	(7.772)	(10.564)	(-0.905)	0.011	0.473
	β_{CMOM}	-0.168***	-0.125***	-0.077***	0.070	0.414***	0.582***		
	$t(\beta_{CMOM})$	(-4.089)	(-3.762)	(-2.664)	(0.771)	(7.010)	(8.781)		
	R^2	0.520	0.606	0.646	0.196	0.399	0.232		

Market + Momentum (contd.)

Table 10 Continued

		1	2	3	4	5	5-1	m.a.e	R^2
	α	-0.005	-0.001	0.001	0.001	0.003	0.006		
	$t(\alpha)$	(-0.350)	(-0.134)	(0.157)	(0.088)	(0.346)	(0.569)		
	β_{CMKT}	0.908***	1.019***	0.951***	1.030***	0.990***	0.082		
r 2,0	$t(\beta_{CMKT})$	(13.062)	(17.485)	(20.365)	(20.644)	(11.756)	(0.876)	0.002	0.542
	β_{CMOM}	-0.286***	-0.170***	-0.083***	0.145***	0.399***	0.685***		
	$t(\beta_{CMOM})$	(-6.476)	(-4.579)	(-2.799)	(4.583)	(7.428)	(11.435)		
	R^2	0.440	0.553	0.620	0.646	0.450	0.544		
	α	0.004	-0.002	0.007	0.005	0.008	0.004		
	$t(\alpha)$	(0.462)	(-0.399)	(0.980)	(0.885)	(0.769)	(0.435)		
	β_{CMKT}	0.950***	1.023***	0.968***	1.030***	0.926***	-0.024		
r 3,0	$t(\beta_{CMKT})$	(14.006)	(20.119)	(15.939)	(21.324)	(10.364)	(-0.276)	0.005	0.555
	β_{CMOM}	-0.362***	-0.229***	-0.103***	0.059*	0.623***	0.985***		
	$t(\beta_{CMOM})$	(-8.386)	(-7.095)	(-2.663)	(1.918)	(10.971)	(18.005)		
	R^2	0.494	0.630	0.501	0.647	0.493	0.561		
	α	0.000	-0.000	-0.001	0.004	-0.004	-0.004		
	$t(\alpha)$	(0.031)	(-0.013)	(-0.141)	(0.639)	(-0.376)	(-0.422)		
	β_{CMKT}	0.973***	1.006***	0.970***	1.060***	1.001***	0.028		
r 4,0	$t(\beta_{CMKT})$	(17.809)	(16.732)	(23.555)	(20.932)	(12.419)	(0.573)	0.002	0.592
	β_{CMOM}	-0.396***	-0.218***	-0.085***	0.057*	0.495***	0.760***		
	$t(\beta_{CMOM})$	(-7.652)	(-5.698)	(-3.249)	(1.756)	(9.648)	(15.751)		
	R^2	0.583	0.540	0.686	0.638	0.515	0.496		
	α	0.011	0.005	0.015	0.007	-0.003	-0.014		
	$t(\alpha)$	(1.235)	(0.980)	(1.504)	(0.944)	(-0.314)	(-1.114)		
	β_{CMKT}	1.137***	0.888***	1.061***	1.006***	1.114***	-0.023		
PRCVOL	$t(\beta_{CMKT})$	(15.660)	(19.048)	(12.725)	(16.897)	(14.675)	(-0.227)	0.008	0.509
	β_{CMOM}	-0.255***	-0.145***	-0.025	0.099***	0.299***	0.554***		
	$t(\beta_{CMOM})$	(-5.099)	(-4.895)	(-0.467)	(2.611)	(6.184)	(8.252)		
	R^2	0.505	0.595	0.589	0.542	0.514	0.211		
	α	0.029**	0.012	0.008	0.006	0.001	-0.028**		
	$t(\alpha)$	(2.118)	(0.954)	(0.885)	(0.629)	(0.912)	(-2.044)		
	β_{CMKT}	1.225***	1.274***	1.198***	1.208***	0.994***	-0.232**		
STDPRCVOL	$t(\beta_{CMKT})$	(10.698)	(12.205)	(15.581)	(14.775)	(151.535)	(-2.002)	0.011	0.527
	β_{CMOM}	-0.016	0.139**	-0.047	0.012	-0.002	0.015		
	$t(\beta_{CMOM})$	(-0.226)	(2.086)	(-0.956)	(0.240)	(-0.445)	(0.198)		
	R^2	0.511	0.383	0.488	0.464	0.989	0.015		

Three Factor Model

Table 11: Cryptocurrency Three-Factor Model

$$R_i - R_f = \alpha^i + \beta^i_{CMKT} CMKT + \beta^i_{CSMB} CSMB + \beta^i_{CHML} CMOM + \epsilon_i \quad (4)$$

where $CMKT$ is the cryptocurrency excess market returns, $CSMB$ is the cryptocurrency size factor, and $CMOM$ is the cryptocurrency momentum factor. The formation of the quintile portfolios for the nine significant strategies are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%. m.a.e is the mean of the absolute pricing errors. R^2 is the average R^2 of the five portfolios.

		1	2	3	4	5	5-1	m.a.e	R^2
MCAP	α	0.007	-0.007	-0.006	-0.005	0.001	-0.007		
	$t(\alpha)$	(1.224)	(-0.974)	(-0.865)	(-0.528)	(1.354)	(-1.091)		
	β_{CMKT}	1.040***	0.998***	0.943***	0.949***	0.998***	-0.042		
	$t(\beta_{CMKT})$	(20.436)	(17.487)	(16.802)	(19.735)	(198.002)	(-0.818)		
	β_{CSMB}	1.541***	0.550***	0.559***	0.298***	-0.001	-1.542***	0.005	0.756
	$t(\beta_{CSMB})$	(32.355)	(11.833)	(7.856)	(7.620)	(-0.205)	(-32.409)		
	β_{CMOM}	-0.032	0.045	0.005	-0.026	0.000	0.032		
	$t(\beta_{CMOM})$	(-0.981)	(1.256)	(0.133)	(-0.857)	(0.146)	(0.997)		
	R^2	0.865	0.664	0.598	0.657	0.994	0.809		
PRC	α	0.020	0.005	-0.017**	0.002	0.002	-0.019		
	$t(\alpha)$	(1.435)	(0.531)	(-2.290)	(0.149)	(1.309)	(-1.258)		
	β_{CMKT}	1.453***	1.262***	1.035***	1.058***	0.964***	-0.488***		
	$t(\beta_{CMKT})$	(12.254)	(15.517)	(16.370)	(12.031)	(92.059)	(-3.927)		
	β_{CSMB}	0.746***	0.282***	0.279***	0.197***	-0.026***	-0.772***	0.009	0.585
	$t(\beta_{CSMB})$	(7.722)	(4.260)	(5.423)	(2.754)	(-3.065)	(-7.620)		
	β_{CMOM}	-0.058	0.065	0.017	-0.002	-0.021***	0.017		
	$t(\beta_{CMOM})$	(-0.511)	(1.254)	(0.427)	(-0.029)	(-3.154)	(0.221)		
	R^2	0.478	0.526	0.560	0.390	0.971	0.242		
MAXDPRC	α	0.021	0.002	-0.017**	0.004	0.002	-0.020		
	$t(\alpha)$	(1.476)	(0.175)	(-2.214)	(0.337)	(1.269)	(-1.502)		
	β_{CMKT}	1.458***	1.242***	1.034***	1.067***	0.964***	-0.494***		
	$t(\beta_{CMKT})$	(12.152)	(15.616)	(16.268)	(11.292)	(92.112)	(-3.924)		
	β_{CSMB}	0.748***	0.291***	0.264***	0.201***	-0.026***	-0.774***	0.009	0.578
	$t(\beta_{CSMB})$	(7.652)	(4.489)	(5.090)	(2.609)	(-3.053)	(-7.552)		
	β_{CMOM}	-0.026	0.072	0.017	0.012	-0.021***	0.005		
	$t(\beta_{CMOM})$	(-0.341)	(1.421)	(0.428)	(0.206)	(-3.180)	(0.060)		
	R^2	0.474	0.532	0.553	0.561	0.971	0.239		

Three Factor Model (contd.)

Table 11 Continued		1	2	3	4	5	5-1	m.a.e	R^2
	α	-0.015**	-0.010	-0.003	0.025	-0.012	0.003		
	$t(\alpha)$	(-1.970)	(-1.535)	(-0.657)	(1.470)	(-1.080)	(0.274)		
	β_{CMKT}	1.041***	1.029***	0.958***	1.093***	0.924***	-0.117		
	$t(\beta_{CMKT})$	(16.198)	(19.486)	(22.122)	(7.650)	(10.171)	(-1.126)		
r 1,0	β_{CSMB}	0.124**	0.014	0.204***	0.072	0.297***	0.173**	0.013	0.491
	$t(\beta_{CSMB})$	(2.560)	(0.328)	(5.776)	(0.617)	(4.014)	(2.043)		
	β_{CMOM}	-0.164***	-0.125***	-0.071**	0.072	0.424***	0.587***		
	$t(\beta_{CMOM})$	(-4.022)	(-3.739)	(-2.581)	(0.796)	(7.378)	(8.914)		
	R^2	0.531	0.606	0.687	0.198	0.435	0.245		
	α	-0.006	-0.004	-0.000	-0.001	-0.001	0.005		
	$t(\alpha)$	(-0.677)	(-0.572)	(-0.068)	(-0.218)	(-0.073)	(0.430)		
	β_{CMKT}	0.890***	0.999***	0.943***	1.017***	0.962***	0.072		
	$t(\beta_{CMKT})$	(12.847)	(17.352)	(20.136)	(20.443)	(11.529)	(0.764)		
r 2,0	β_{CSMB}	0.156**	0.151***	0.063*	0.092**	0.212***	0.076	0.002	0.554
	$t(\beta_{CSMB})$	(2.415)	(3.224)	(1.656)	(2.260)	(3.123)	(0.986)		
	β_{CMOM}	-0.282***	-0.165***	-0.081***	0.148***	0.405***	0.687***		
	$t(\beta_{CMOM})$	(-6.429)	(-4.522)	(-2.736)	(4.711)	(7.679)	(11.466)		
	R^2	0.452	0.571	0.624	0.653	0.470	0.347		
	α	0.000	-0.006	0.004	0.004	0.003	0.002		
	$t(\alpha)$	(0.053)	(-0.924)	(0.565)	(0.680)	(0.273)	(0.256)		
	β_{CMKT}	0.928***	1.002***	0.948***	1.022***	0.890***	-0.037		
	$t(\beta_{CMKT})$	(13.819)	(20.117)	(15.779)	(21.089)	(10.160)	(-0.452)		
r 3,0	β_{CSMB}	0.160***	0.155***	0.153***	0.058	0.268***	0.102	0.003	0.570
	$t(\beta_{CSMB})$	(5.039)	(3.829)	(5.130)	(1.470)	(3.758)	(1.451)		
	β_{CMOM}	-0.356***	-0.224***	-0.098**	0.061**	0.632***	0.988***		
	$t(\beta_{CMOM})$	(-8.385)	(-7.114)	(-2.574)	(1.983)	(11.399)	(18.089)		
	R^2	0.512	0.651	0.519	0.650	0.519	0.564		
	α	-0.002	-0.004	-0.003	0.003	-0.008	-0.005		
	$t(\alpha)$	(-0.358)	(-0.557)	(-0.532)	(0.418)	(-0.809)	(-0.591)		
	β_{CMKT}	0.956***	0.981***	0.957***	1.051***	0.974***	0.018		
	$t(\beta_{CMKT})$	(17.645)	(16.687)	(25.437)	(20.700)	(12.221)	(0.234)		
r 4,0	β_{CSMB}	0.127***	0.192***	0.096***	0.066	0.206***	0.079	0.004	0.606
	$t(\beta_{CSMB})$	(2.876)	(4.019)	(2.885)	(1.599)	(3.174)	(1.273)		
	β_{CMOM}	-0.262***	-0.212***	-0.082***	0.059*	0.501***	0.763***		
	$t(\beta_{CMOM})$	(-7.632)	(-5.690)	(-3.171)	(1.827)	(9.943)	(15.810)		
	R^2	0.596	0.567	0.696	0.642	0.531	0.499		

Three Factor Model (contd.)

Table 11 Continued		1	2	3	4	5	5-1	m.a.e	R^2
	α	0.006	0.002	-0.005	0.000	0.001	-0.005		
	$t(\alpha)$	(0.435)	(0.195)	(-0.582)	(0.024)	(1.151)	(-0.362)		
	β_{CMKT}	1.181***	1.125***	1.069***	1.082***	0.998***	-0.183*		
	$t(\beta_{CMKT})$	(10.968)	(14.298)	(15.483)	(14.221)	(155.617)	(-1.688)		
PRCVOL	β_{CSMB}	1.120***	0.415***	0.463***	0.274***	-0.008	-1.128***	0.003	0.626
	$t(\beta_{CSMB})$	(12.770)	(6.471)	(8.236)	(4.425)	(-1.492)	(-12.759)		
	β_{CMOM}	0.069	0.116**	-0.029	-0.030	-0.001	-0.070		
	$t(\beta_{CMOM})$	(1.014)	(2.329)	(-0.665)	(-0.624)	(-0.324)	(-1.025)		
	R^2	0.557	0.525	0.572	0.484	0.990	0.405		
	α	0.010	0.001	0.000	-0.002	0.001	-0.009		
	$t(\alpha)$	(0.945)	(0.067)	(0.017)	(-0.239)	(1.207)	(-0.848)		
	β_{CMKT}	1.100***	1.200***	1.145***	1.152***	0.995***	-0.105		
	$t(\beta_{CMKT})$	(12.290)	(12.499)	(16.107)	(15.193)	(152.008)	(-1.160)		
STDPRCVOL	β_{CSMB}	0.947***	0.559***	0.401***	0.417***	-0.012**	-0.958***	0.003	0.635
	$t(\beta_{CSMB})$	(12.986)	(7.145)	(6.925)	(6.757)	(-2.194)	(-13.017)		
	β_{CMOM}	0.015	0.157**	-0.034	0.026	-0.002	-0.017		
	$t(\beta_{CMOM})$	(0.258)	(2.582)	(-0.747)	(0.545)	(-0.540)	(-0.295)		
	R^2	0.586	0.486	0.569	0.545	0.989	0.409		

Fama-French Three-Factor Model

Table 14: Fama-French Three-Factor Model

$$R_i - R_f = \alpha^i + \beta^i_{MKT} MKT + \beta^i_{SMB} SMB + \beta^i_{HML} HML + \epsilon_i \quad (5)$$

where MKT is the excess stock market returns, SMB is the Fama-French size factor, and HML is the Fama-French value factor. The formation of the quintile portfolios for the nine significant strategies are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%. m.a.e and R^2 are the mean of the absolute pricing errors and the average R^2 of the five portfolios.

		1	2	3	4	5	5-1	m.a.e	R^2
MCAP	α	0.044***	0.017	0.013	0.012	0.012	-0.032**		
	$t(\alpha)$	(2.737)	(1.469)	(1.220)	(1.278)	(1.626)	(-2.372)		
	β_{MKT}	0.859	0.981	0.311	0.615	0.404	-0.455		
	$t(\beta_{MKT})$	(0.976)	(1.573)	(0.551)	(1.178)	(1.002)	(-0.615)		
	β_{SMB}	-0.208	-0.966	0.124	-0.412	-0.682	-0.384	0.020	0.008
	$t(\beta_{SMB})$	(-0.210)	(-0.961)	(0.136)	(-0.490)	(-1.050)	(-0.323)		
	β_{HML}	-1.398	0.589	-0.434	-0.642	-0.222	1.176		
	$t(\beta_{HML})$	(-1.014)	(0.603)	(-0.491)	(-0.786)	(-0.352)	(1.016)		
	R^2	0.008	0.013	0.002	0.008	0.007	0.007		
PRC	α	0.049**	0.027**	0.000	0.017	0.011	-0.037**		
	$t(\alpha)$	(2.551)	(1.999)	(0.026)	(1.295)	(1.560)	(-2.256)		
	β_{MKT}	1.254	0.503	0.624	1.125	0.396	-0.858		
	$t(\beta_{MKT})$	(1.202)	(0.669)	(1.029)	(1.578)	(1.010)	(-0.944)		
	β_{SMB}	-1.295	-1.512	-0.403	-0.857	-0.592	0.702	0.021	0.008
	$t(\beta_{SMB})$	(-0.770)	(-1.249)	(-0.412)	(-0.729)	(-0.938)	(0.480)		
	β_{HML}	-1.176	0.396	-0.395	1.071	-0.131	1.045		
	$t(\beta_{HML})$	(-0.720)	(0.337)	(-0.416)	(0.960)	(-0.215)	(0.734)		
	R^2	0.008	0.007	0.005	0.014	0.006	0.006		
MAXDPRC	α	0.050***	0.024*	0.001	0.020	0.011	-0.039**		
	$t(\alpha)$	(2.605)	(1.793)	(0.051)	(1.457)	(1.553)	(-2.319)		
	β_{MKT}	1.180	0.499	0.609	1.111	0.395	-0.785		
	$t(\beta_{MKT})$	(1.122)	(0.673)	(1.006)	(1.482)	(1.008)	(-0.855)		
	β_{SMB}	-1.565	-1.195	-0.581	-0.636	-0.592	0.972	0.021	0.007
	$t(\beta_{SMB})$	(-0.924)	(-1.001)	(-0.591)	(-0.526)	(-0.938)	(0.658)		
	β_{HML}	-1.207	0.293	-0.257	1.085	-0.131	1.076		
	$t(\beta_{HML})$	(-0.733)	(0.252)	(-0.271)	(0.925)	(-0.215)	(0.749)		
	R^2	0.008	0.005	0.004	0.012	0.006	0.006		

Fama-French Three-Factor Model (contd.)

Table 14 Continued

		1	2	3	4	5	5-1	m.a.e	R^2
	α	-0.008	-0.003	0.009	0.042**	0.021	0.029**		
	$t(\alpha)$	(-0.732)	(-0.321)	(0.953)	(2.306)	(1.495)	(2.094)		
	β_{MKT}	0.766	0.472	0.367	1.600	-0.381	-1.148		
	$t(\beta_{MKT})$	(1.291)	(0.883)	(0.745)	(1.592)	(-0.498)	(-1.522)		
r 1,0	β_{SMB}	0.047	-1.340	-0.775	1.171	-1.934	-1.981	0.017	0.014
	$t(\beta_{SMB})$	(0.049)	(-1.558)	(-0.978)	(0.724)	(-1.568)	(-1.631)		
	β_{HML}	-1.394	-0.381	-0.517	2.795*	-0.588	0.806		
	$t(\beta_{HML})$	(-1.499)	(-0.456)	(-0.671)	(1.777)	(-0.490)	(0.682)		
	R^2	0.016	0.011	0.006	0.026	0.013	0.027		
	α	-0.004	0.005	0.009	0.018*	0.029**	0.034**		
	$t(\alpha)$	(-0.402)	(0.457)	(0.965)	(1.827)	(2.218)	(2.498)		
	β_{MKT}	0.856	0.373	-0.020	0.186	-0.190	-1.046		
	$t(\beta_{MKT})$	(1.442)	(0.665)	(-0.041)	(0.346)	(-0.261)	(-1.414)		
r 2,0	β_{SMB}	-0.139	0.308	-1.085	-1.294	-1.935*	-1.794	0.013	0.010
	$t(\beta_{SMB})$	(-0.146)	(0.341)	(-1.389)	(-1.497)	(-1.654)	(-1.505)		
	β_{HML}	-0.783	-0.125	-0.640	0.416	-1.140	-0.357		
	$t(\beta_{HML})$	(-0.842)	(-0.142)	(-0.843)	(0.496)	(-1.003)	(-0.308)		
	R^2	0.011	0.003	0.010	0.010	0.015	0.022		
	α	0.001	0.001	0.014	0.018*	0.043***	0.042***		
	$t(\alpha)$	(0.130)	(0.087)	(1.373)	(1.924)	(2.961)	(2.799)		
	β_{MKT}	0.436	0.094	0.615	0.892*	-0.798	-1.234		
	$t(\beta_{MKT})$	(0.714)	(0.174)	(1.115)	(1.718)	(-0.997)	(-1.507)		
r 3,0	β_{SMB}	1.219	-0.373	-0.484	-0.891	-1.864	-3.083**	0.015	0.009
	$t(\beta_{SMB})$	(1.241)	(-0.451)	(-0.545)	(-1.065)	(-1.446)	(-2.338)		
	β_{HML}	-0.474	-0.520	-0.157	0.247	-0.177	0.297		
	$t(\beta_{HML})$	(-0.496)	(-0.619)	(-0.158)	(0.304)	(-0.141)	(0.232)		
	R^2	0.011	0.002	0.005	0.014	0.015	0.038		
	α	0.002	0.003	0.007	0.017*	0.026*	0.024**		
	$t(\alpha)$	(0.210)	(0.265)	(0.843)	(1.749)	(1.969)	(1.975)		
	β_{MKT}	0.206	0.711	0.332	0.717	-0.551	-0.757		
	$t(\beta_{MKT})$	(0.379)	(1.251)	(0.706)	(1.331)	(-0.750)	(-1.121)		
r 4,0	β_{SMB}	0.625	-0.071	-0.850	-0.977	-1.752	-2.375**	0.011	0.009
	$t(\beta_{SMB})$	(0.712)	(-0.077)	(-1.120)	(-1.126)	(-1.479)	(-2.183)		
	β_{HML}	-0.027	-0.279	0.405	-0.358	-1.659	-1.633		
	$t(\beta_{HML})$	(-0.031)	(-0.314)	(0.550)	(-0.401)	(-1.441)	(-1.544)		
	R^2	0.003	0.007	0.007	0.010	0.020	0.036		

Fama-French Three-Factor Model (contd.)

Table 14 Continued

		1	2	3	4	5	5-1	m.a.e	R^2
PRCVOL	α	0.042**	0.026**	0.015	0.017	0.012	-0.030*		
	$t(\alpha)$	(2.222)	(1.987)	(1.190)	(1.566)	(1.607)	(-1.826)		
	β_{MKT}	1.691	0.759	1.009	0.495	0.393	-1.299		
	$t(\beta_{MKT})$	(1.648)	(1.047)	(1.506)	(0.733)	(0.973)	(-1.453)		
	β_{SMB}	-1.596	-0.898	-0.803	-0.008	-0.678	0.918	0.022	0.008
	$t(\beta_{SMB})$	(-0.965)	(-0.769)	(-0.744)	(-0.090)	(-1.043)	(0.638)		
	β_{HML}	-0.563	-0.855	-0.105	-0.509	-0.232	0.331		
	$t(\beta_{HML})$	(-0.350)	(-0.752)	(-0.101)	(-0.482)	(-0.368)	(0.236)		
	R^2	0.012	0.007	0.009	0.005	0.007	0.009		
STDPRCVOL	α	0.040**	0.029*	0.019	0.020	0.012	-0.029**		
	$t(\alpha)$	(2.508)	(1.902)	(1.491)	(1.528)	(1.601)	(-2.098)		
	β_{MKT}	1.302	1.322	0.894	0.721	0.393	-0.909		
	$t(\beta_{MKT})$	(1.475)	(1.556)	(1.500)	(1.007)	(0.978)	(-1.215)		
	β_{SMB}	-1.251	-1.581	-1.137	-0.172	-0.678	0.573	0.024	0.009
	$t(\beta_{SMB})$	(-0.880)	(-1.156)	(-1.027)	(-0.149)	(-1.047)	(0.475)		
	β_{HML}	-0.517	-0.734	-0.667	-0.417	-0.221	0.296		
	$t(\beta_{HML})$	(-0.374)	(-0.552)	(-0.620)	(-0.372)	(-0.351)	(0.253)		
	R^2	0.010	0.013	0.010	0.005	0.007	0.006		

Fama-MacBeth Cross-Sectional Regression

Table 13: Fama-MacBeth Cross-Sectional Regression

This table reports the Fama-MacBeth regression results. Each factor is first sorted into five portfolios at the end of each week. Panel A, B, C, and D are based on the sample of coins with market capitalizations of more than 1 million dollars. Panel E is based on the sample of coins with market capitalizations of more than 10 million dollars. The t-statistics of the coefficient estimates are reported in the parentheses.*, **, *** denote significance levels at the 10%, 5%, and 1%.

			ret_{t+1}				
> 1 mil	Panel A	MCAP	-0.011*				-0.000
			(-1.890)				(-0.210)
		PRC		-0.008***			-0.027
				(-3.120)			(-1.156)
		MAXDPRC			-0.008***		0.019
					(-3.256)		(0.802)
	Panel B	PRCVOL	-0.006**				
			(-2.546)				
	Panel C	STDPRCVOL	-0.007***				
			(-2.894)				
	Panel D	r 1,0	-0.002				-0.004
			(-0.692)				(-1.427)
		r 2,0		0.000			0.003
				(0.020)			(0.751)
		r 3,0			-0.000		-0.002
					(-0.148)		(-0.499)
		r 4,0				-0.001	0.000
						(-0.274)	(0.107)
> 10 mil	Panel E	r 1,0	0.005*				-0.006
			(1.668)				(-1.520)
		r 2,0		0.007**			0.005
				(2.095)			(0.866)
		r 3,0			0.007**		0.006
					(1.978)		(1.086)
		r 4,0				0.005	-0.000
						(0.695)	(-0.061)

Bitcoin for Short Portfolios

Table 12: Bitcoin for Short Portfolios

CMKT is the cryptocurrency excess market returns, *CSMB* is the cryptocurrency size factor, and *CMOM* is the cryptocurrency momentum factor. The formation of nine quintiles are discussed in Section 3. The t-statistics are reported in the parentheses. *, **, *** denote significance levels at the 10%, 5%, and 1%.

		Cons	t	CMKT	t	CSMB	t	CMOM	t	R^2
	Mean	0.054**	(2.425)							
MCAP	C-1	0.051**	(2.216)	0.141	(1.464)					0.008
	C-3	0.004	(0.601)	0.071*	(1.719)	1.431***	(33.786)	-0.024	(-0.716)	0.819
	Mean	0.059**	(2.295)							
PRC	C-1	0.031*	(1.864)	0.397***	(3.531)					0.046
	C-3	0.015	(0.978)	0.357***	(3.542)	0.850***	(8.257)	-0.025	(-0.306)	0.247
	Mean	0.040**	(2.358)							
MAXDPRC	C-1	0.032*	(1.924)	0.405***	(3.571)					0.047
	C-3	0.016	(1.018)	0.363***	(3.572)	0.852***	(8.182)	-0.012	(-0.151)	0.245
	Mean	0.009	(0.694)							
r 1,0	C-1	0.007	(0.559)	0.085	(0.991)					0.004
	C-3	-0.016	(-1.345)	0.027	(0.345)	0.578***	(4.804)	0.428***	(6.949)	0.215
	Mean	0.018	(1.498)							
r 2,0	C-1	0.016	(1.321)	0.102	(1.277)					0.006
	C-3	-0.005	(-0.439)	0.050	(0.684)	0.295***	(3.986)	0.411***	(7.083)	0.205
	Mean	0.030**	(2.248)							
r 3,0	C-1	0.036***	(2.607)	0.092	(0.800)					0.003
	C-3	0.006	(0.506)	0.004	(0.054)	0.348***	(4.536)	0.636***	(10.602)	0.338
	Mean	0.014	(1.204)							
r 4,0	C-1	0.012	(1.000)	0.122	(1.505)					0.009
	C-3	-0.012	(-1.109)	0.061	(0.869)	0.290***	(4.051)	0.506***	(9.027)	0.277
	Mean	0.032*	(1.896)							
PRCVOL	C-1	0.027	(1.607)	0.254**	(2.199)					0.018
	C-3	0.001	(0.041)	0.186**	(2.067)	1.209***	(13.087)	0.079	(1.090)	0.412
	Mean	0.050**	(2.109)							
STDPRCVOL	C-1	0.027*	(1.853)	0.187*	(1.908)					0.014
	C-3	0.005	(0.468)	0.135*	(1.751)	1.035***	(13.304)	0.023	(0.379)	0.417

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Conclusion

- The cross-section of cryptocurrencies can be meaningfully analyzed using standard asset pricing tools.
- Size and momentum factors are important in capturing the cross-section of cryptocurrency returns.
- A parsimonious three-factor model that can be constructed using the market information is successful in pricing the strategies in the cryptocurrency market.

Thank You!