Anomalous Deal Return Capture: A Cross-Sectional Study of Three Hypothetical Global Merger Risk Arbitrage Portfolios 2000-2016.

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Daniel McCarron

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ABSTRACT

This paper examines the annual risks and returns of three disparate merger arbitrage portfolio strategies as an attempt to capture alpha from an in-sample study of 793 global M&A transactions covering the January 2000 thru December 2016 time period. Previously written and undoubtedly the most prominent literature into M&A and merger arbitrage [Schleifer & Vishny '98], [Mitchell & Pulvino '01] and [Baker & Savasoglu '02] focus on the limits of pure arbitrage the creation of such from noise/shock trading and the risk & return characteristics of a merger arbitrage trading strategy respectively. This paper by no means covers the universe of the arbitrage literature and touches only a fraction of arbitrage research – yet, this is the only paper I know of examining global merger arbitrage transactions and the construct of a 'long-only' [e.g. one-sided] alpha merger arbitrage strategy encompassing both US as well as non-US merger arbitrage deals and benchmarking the risk and returns series of these global merger arbitrage portfolios against a non-U.S. benchmark.

In Section 1 – I cover the construction methodology into each of the three merger arbitrage portfolios, code the data and reveal some interesting insight both confirming as well as running counter to the ex-ante economic intuition behind the merger arbitrage data.

In Section II – I examine the ex-post risk and return characteristics of the three merger arbitrage portfolios as tested under the traditional CAPM and Fama-French multi-factor models.

In Section III – I conclude my paper.

Section I Introduction

This Yale SOM –EDHEC Seminar IV Paper examines the empirical research into long-only merger arbitrage portfolio trading strategies. My portfolio methodologies and subsequent modeling techniques although loosely following in the Mitchell & Pulvino '01 and Baker & Savasoglu merger arbitrage portfolio construct – deviates by incorporating a long-only model for US and non-US M&A transactions occurring during the 2000-2016 in-sample period. My paper also deviates from the classical research literature by incorporating M&A transactions comprising from all cash, all stock as well as including cash & stock combination transactions announced during the in-sample period.[1] Moreover, unlike 'pure' merger risk arbitrage portfolios as implemented by event-driven hedge fund managers attempting to hedge out systematic risk by shorting the acquiring company's publicly traded shares in an announced M&A transaction involving acquirer shares as consideration, my portfolio construct rather takes on systematic risk via not shorting the acquirer's shares in addition to exposing the portfolio to the ex-ante deal risk component of each transaction. To test the robustness of this 'long-only' merger arbitrage portfolio – I subsequently construct a portfolio comprising of all terminated /withdrawn deals during the in-sample period as well as a portfolio comprising of all successfully completed deals involving acquirer's stock as deal consideration – that is, excluding cash-only completed M&A transactions.

Target Portfolio Composition & Attributes

In constructing the Target Portfolio, I examine all globally announced M&A transactions announced between January 2000 and December 2016 from the Bloomberg M&A database. Approximately ~ 4,300 transactions were announced during this period. From this starting point, I then deselect any transaction where the target company was not a publicly traded company – thus, any privately held target company was excluded from the data. From here, I then deselected any public traded target with a publicly traded equity market capitalization below US$ 3.2 billion. This market capitalization size determination had nothing to do with the probability of effecting bid-offer side market prices when purchasing target company shares and everything to do

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[1] Both Mitchell & Pulvino and Baker & Savasoglu papers study only all-cash or all-stock announced M&A transactions. In addition, both papers only include US deals in their respective in-sample.

with attempting to match the median market capitalization of publicly traded companies comprising the MSCI ACWI Index.[2] Furthermore, I focused on deals where an officially announced and filed [e.g. publicly promulgated] merger agreement is evidenced in the transaction – depending on the securities rules and regulations governing a merger's jurisdiction – a definitive merger agreement would have been signed by both the acquiring and target companies' respective board of directors . It was my ex-ante prediction that by focusing on a legal document governing an M&A transaction this would provide the opportunity to actively construct a merger arbitrage portfolio by exposing or tilting the portfolio to a certain deal risk factors or by avoiding other deal risk factors. Only including officially announced M&A transactions therefore by definition deselected any proposed or rumor deals or where an investor [activist] took an initial position in a target company as a toe-hold stake to some subsequent announcement.[3] The final sample included 793 M&A transactions. Table #1 below is a partial list [see author for full data] of the deal specifics [company names, completed vs. terminated, payment type] for each of the 793 M&A transaction from 2000-2916.

Table # 1 Partial List of 793 global M&A Transactions Meeting Pre-specified Criteria. Years 2000-2016.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Annce Date	**Complete/Term. Date**	**Target Co.**	**Acquirer Co.**	**Payment Type**	**Deal Status**
1/18/2000	1/30/2000	El Paso CGP Co LLC	El Paso LLC	Stock	Completed
1/18/2000	3/29/2000	Banco Espirito Santo SA	Banco BPI SA	Stock	Terminated
2/29/2000	8/17/2000	PCCW-HKT Ltd	PCCW Ltd	Stock	Completed
3/7/2000	6/9/2000	Verisign Ventures Inc	VeriSign Inc	Stock	Completed
3/9/2000	7/7/2000	Colonial Pty Ltd	Commonwealth Bank of Australia	Stock	Completed
3/15/2000	7/31/2000	LHS Group Inc	Sema PLC	Stock	Completed
3/29/2000	11/22/2000	Veritas Software Technology Corp	Veritas Software	Cash and Stock	Completed
3/29/2000	5/16/2000	Quintiles IMS Inc	TriZetto Corp	Stock	Terminated
5/2/2000	10/5/2000	Bestfoods	Unilever NV	Cash	Completed
5/16/2000	10/30/2000	Lycos Inc	Terra Networks SA	Stock	Completed
5/17/2000	7/27/2000	Granada Group Ltd	Granada Ltd	Stock	Completed
5/31/2000	1/2/2001	Olivetti Tecnost SpA	Telecom Italia SpA/Milano	Stock	Completed
6/20/2000	12/8/2000	Societe d'Edition de Canal Plus SA	Vivendi SA	Stock	Completed
7/10/2000	2/14/2001	SDL Inc	Viavi Solutions Inc	Stock	Completed
7/18/2000	10/8/2001	Georgia-Pacific Corp/Timber Group	Plum Creek Timber Co Inc	Stock	Completed
7/22/2000	2/2/2001	Bank Austria Creditanstalt AG/Old	UniCredit Bank AG	Stock	Completed
7/31/2000	4/2/2001	Entergy Corp	NextEra Energy Inc	Stock	Terminated
Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**
10/26/2000	3/27/2001	Keebler Foods Co	Kellogg Co	Cash	Completed

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[2] MSCI ACWI Indexes offer a modern, seamless, and fully integrated approach to measuring the full equity opportunity set with no gaps or overlaps of equity returns in 23 developed and 23 emerging markets.

[3] I am certain I have introduced a number of unintended sample biases via selection approach. See James Heckman [1979].

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10/27/2000	7/13/2001	Harcourt General Inc	RELX PLC	Cash	Completed
11/13/2000	1/2/2001	Tyson Fresh Meats Inc	Smithfield Foods	Stock	Terminated
11/20/2000	4/2/2001	Old Kent Financial Corp	Fifth Third Banc	Stock	Completed
12/4/2000	8/3/2001	Quaker Oats Co/The	PepsiCo	Stock	Completed
12/11/2000	5/14/2001	Shire Canada Inc	Shire PLC	Stock	Completed
1/8/2001	7/12/2001	Tarmac Cement And Lime Ltd	Lafarge SA	Cash	Completed
1/16/2001	12/13/2001	Nestle Purina PetCare Co	Nestle SA	Cash	Completed
9/3/2001	11/21/2001	Global Marine Inc	GlobalSantaFe	Stock	Completed
9/4/2001	5/6/2002	Compaq Computer Corp	HP Inc	Stock	Completed
9/4/2001	10/17/2001	Anderson Exploration Ltd	Devon Energy Corp	Cash	Completed
9/17/2001	1/10/2003	American Water Co	RWE AG	Cash	Completed
9/20/2001	10/12/2001	Softbank Corp	Vodafone Group PLC	Cash	Completed
9/27/2001	2/20/2002	Orion Power Holdings Inc	GenOn Energy Inc	Cash	Completed
10/13/2015	10/10/2016	Anheuser-Busch InBev SA/NV	Anheuser-Busch InBev	Cash	Completed
10/14/2015	2/15/2016	Mediclinic International Ltd	Mediclinic International PLC	Stock	Completed

Source: Bloomberg

My ex-ante predictions of target attributes were largely confirmed: namely that the majority of the 793 M&A transactions would have taken place in US and Europe and comprising profitably targeted enterprises and that the majority of transactions would be completed over non-completed/failed/withdrawn. This confirms ex-ante predictions that acquirer's management seeks out target deals that are expected be accretive and synergistic to their existing business as well as seeking out those deals which they believe have a very high probability of successfully closing.

The data also confirms other ex-ante predictions that on average management avoid overpaying for target deals as ~70% of deals are within 0-30% premium of target prices 1 week before announcement. Moreover, counter to deal expectations – management doesn't use its stock profligately as currency – as ~ 40% of the deals were all-cash and ~ 73% of the 793 deals consisted of cash being used for deal consideration.

Tables #2-6 below list the deal attributes and data covering the entire in-sample period.

Table #2: Deal Attributes: Target Multiple 793 M&A Transactions: 2000-2016.

Deal Attribute	Column1	Column2	Column3
Target Multiples	# Deals	Min - Max	Median
FFO	27	18.85 - 297.25	105.81
Free Cashflow	528	.75 - 2908.22	62.45
Income B/F XO	640	2.72 - 2766.88	28.15
Net Income	659	1.88 - 1391.57	27.61
EBIT	688	1.42 - 3049.92	17.4
Cashflow from Ops.	684	.75 - 3232.11	17.09

		1.78 -	
Net Income + Depreciation	718	2028.78	17.04
EBITDA	655	.98 - 2046.78	12.24
Book Value	759	.75 - 782.31	3.6
Stockholder Eqty	761	.61 - 782.31	3.46
Revenue	773	.16 - 1964.63	2.7
Market Cap	780	.28 - 10.04	1.54
Total Assets	785	.03 - 61.59	1.35
Enterprise Value	748	.03 - 12.35	1.19

Source: Bloomberg.

Table #3: Deal Attributes: Current Status. 793 M&A Transactions: 2000-2016.

Current Status	# Deals	Volume	Percent
Completed	639	7.07T	78.04
Terminated	140	1.64T	18.15
Withdrawn	14	345.28B	3.81

Source: Bloomberg.

Table #4: Deal Attributes: Deal Type 793 M&A Transactions: 2000-2016.

Deal Type Summary	# Deals	Volume	Percent
Company Takeover	739	8.43T	93.08
Cross Border	315	3.4T	37.5
Tender Offer	208	1.96T	21.69
Private Equity	122	1.16T	12.85
Additional Stake Purchase	114	1.12T	12.37
PE Buyout	104	1.05T	11.57
Majority Purchase	54	628.73B	6.94
Competing Bid	26	321.65B	3.55
Going Private	21	181.38B	2
Management Buyout	13	143.16B	1.58
Real Estate	12	136B	1.5

Source: Bloomberg.

Table #5: Deal Attributes: Payment Type 793 M&A Transactions .2000-2016.

Payment Type Summary	# Deals	Volume	Percent
Cash	436	3.98T	43.98
Cash & Stock	168	2.71T	29.94
Stock	189	2.36T	26.07
Deal Size Breakdown	# Deals	Volume	Percent
> 10,000M	253	6.09T	31.9
5000.01-10,000M	277	1.91T	34.93
1000.01-5000M	263	1.06T	33.17

Source: Bloomberg.

Table #6: Deal Attributes: Nature of Bid. 793 M&A Transactions: 2000-2016.

Nature of Bid Summary	# Deals	Volume	Percent
Friendly	716	7.66T	90.29
Unsolicited	46	795.89B	5.8
Unsolicited to Friendly	23	528.93B	2.9
Hostile to Friendly	8	67.68B	1.01

Source: Bloomberg.

Table #7: Deal Attributes: Deal Size. 793 M&A Transactions: 2000-2016.

Deal Size Breakdown	# Deals	Volume	Percent
> 10,000M	253	6.09T	31.9
5000.01-10,000M	277	1.91T	34.93
1000.01-5000M	263	1.06T	33.17

Source: Bloomberg.

Table #8: Deal Attributes: Premiums Paid. 793 M&A Transactions: 2000-2016.

Premiums Paid	# Deals	Volume	Percent
>100%	11	64.71B	0.71
90.01-100%	4	39.68B	0.44
80.01-90%	3	31.32B	0.35
70.01-80%	4	19.05B	0.21
60.01-70%	24	266.76B	2.95
50.01-60%	30	278.55B	3.08
40.01-50%	65	638.78B	7.05
30.01-40%	118	1.34T	14.74
20.01-30%	166	2.09T	23.08
10.01-20%	202	2.39T	26.41
0-10%	166	1.9T	20.99

Source: Bloomberg.

Table #9: Deal Attributes: Acq. & Target Geograph./Region. 793 M&A Transactions: 2000-2016.

Acquirer Region Summary	# Deals	Volume	Percent
Asia Pacific	105	857.05B	9.46
Europe	227	2.62T	28.94
Middle East & Africa	12	83.92B	0.93
Latin America & Caribbean	18	158.06B	1.75
North America	472	5.74T	63.36
Target Region Summary	**# Deals**	**Volume**	**Percent**
Asia Pacific	76	592.84B	6.55
Europe	181	2.27T	25.04
Middle East & Africa	6	33.81B	0.37
Latin America & Caribbean	11	98.43B	1.09
North America	519	6.06T	66.95

Source: Bloomberg.

Target Portfolio: Construction Rules

I construct the Target Portfolio starting in January 2000 with $100 million to invest in the target company of all formally announced global M&A transaction meeting the pre-specified criteria (i) the target company must be publicly traded [this requirement doesn't need to hold for the acquiring company], (ii) the target's market capitalization must be at least $3.2 billion, (iii) I must purchase every announced transaction's target company at the VWAP the trading day following the transaction - irrespective of the transaction's premium size and hold the target company until closing or termination date, (v) the Target Portfolio cannot hold any cash – thus, the $100 million must be invested in each deal on an equally weighted basis[4] (vi) when a deal either successfully closes or is terminated/withdrawn that respective deal's notional dollar value is equally distributed across the other active target companies at the market closing share price the day following the deal closing or termination date. The Target Portfolio's monthly returns are calculated from compounded daily returns of active deals until either completed or terminated. For example, the first 2 M&A transactions for the Target Portfolio were both announced on the same day - January 18th 2000 with El Paso LLC as acquirer and El Paso CGP Co. as target – the transaction was an all-stock deal and was successfully closed on January 30th 2001. The second M&A transaction also announced on January 18th 2000 involved Banco BPI SA acquiring Banco Espirito Santo SA – this transaction was terminated on March 29th 2000. Thus, as previously described on the Target Portfolio's construction rules – $50 million El Paso CGP shares would have been purchased in the portfolio on January 19th 2000 at the VWAP on the day following announcement date as El Paso CGP's (i.e. target company) purchase date ensures that El Paso's first trading day's return is not upwards biasing by including the announcement's date deal premium as part of El Paso CGP's trading day 1 return. Each trading day the El Paso LLC / El Paso CGP deal is deemed active in the portfolio [e.g. not yet completed, terminated or withdrawn] - El Paso CGP's (a target company) daily closing price return series is given by the following formula:

$$R\tau = P\tau - (P\tau - 1)/(P\tau - 1) = \%\Delta P\tau$$

El Paso CGP's (a target company) daily compounded returns each month is averaged with any other active targets' monthly returns. The Target Portfolio's monthly return series of target companies

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contributing to each calendar month return[5] and is given by the following formula – where the κ-month gross return is defined as the product of κ one month gross returns:

$$1 + R\tau(\kappa) = (1 + P\tau)(1 + P\tau - 1) \cdots (1 + P\tau - \kappa + 1)$$

$$= \prod (1 + R\tau - j)$$

El Paso CGP is maintained in the Target Portfolio until the deal is completed and is sold the follow trading day at mkt close in an all-cash deal or converted to the public shares of the acquirer company as determined in the merger agreement. In the El Paso CGP transaction – the target shares are converted to acquirer's shares and still deposed at market closing price completion day T+1. El Paso CGP portfolio exit proceeds would then be allocated across any remaining Target Portfolio's target companies on an equal weighted basis.

Relating to the Target Portfolio's second purchased target company - Banco BPI SA announced it was acquiring Banco Espirito Santo SA also on January 18TH 2000 – thus, $50 million was invested in Banco Espirito Santo SA [6]January 19th VWAP. The Banco Espirito Santo SA shares were held until T+1 day following the March 29th 2000 termination announcement and were sold at closing price on March 30th 2000. The March 30th, Banco Espirito Santo SA's sale proceeds would have been reallocated to the remaining target companies on an equal weighted basis.

Banco Espirito Santo SA's [as well as every other company in Target Portfolio] daily price return series is calculated by: $R\tau = P\tau - (P\tau - 1)/(P\tau - 1) = \%\Delta P\tau$ *and its monthly price return series is also calculated by* $1 + R\tau(\kappa) = (1 + P\tau)(1 + P\tau - 1) \cdots (1 + P\tau - \kappa + 1)$.

In between the time of Banco Espirito Santo SA's January 19th purchase and subsequent March 30th sale -6 other M&A global transaction were announced fitting the portfolio's purchase rules and thus requiring all being purchased in the Target Portfolio the following trading day: PCCW-HKT Ltd [Hong Kong] on Feb. 29th 2000, Verisign Ventures Inc. on March 7th

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[5] As in Mitchell & Pulvino and Baker & Savasoglu – returns are calculated on a calendar time basis as opposed to being calculated on an event time basis.

[6] Given that ~ 33% of the deals occurred outside U.S. [North America], it would be unrealistic to assume that FX movements would not have a portfolio risk impact at the margin. My assumption is that all portfolio holdings are transacted in the local market FX at the then prevailing exchange rate. The positions are held / marked-to-market in USD. Furthermore, there is an implicit notion that all target companies purchased in the Target Portfolio will be successfully completed within an avg. time of 3-6 months and that exchange rates are mean-reverting in short-run.

Colonial Pty Ltd [Australia] on March 9th, LHS Group Inc. on March 15th, Veritas Software Technology Corp on March 29th and Quintiles IMS Inc on March 29th.

The Target Portfolio went from a 50% weighting or $50 million into each company when the portfolio was initiated with the first 2 target company purchases to the March 2000 month's end with 7 net portfolio positions – 8 total purchases and 1 sale and each having an equal weighting of 14.285%.

The Target Portfolio Equal Weighted holdings and rebalancing is calculated using following formula: $V(1) / V(0) = (1/N) \Sigma P_k(1)/P_k(0)$ Where: N = Total Number of target companies in portfolio positions at & P_k is price of target company between (V0) to V(1).

Target Portfolio: Performance[7].

Table #11 below shows the 3 best and the 3 worst tears in terms of % performance difference between of the Target Portfolio and the EAFE Index.

Table #11: Yearly Returns 2001-2016 Target Portfolio vs. EAFE Index.

Best-Worst	Difference	Target Port Perf	EAFE Index Perf	Date
Best 1	37.70823224	17.76648409	-19.94174815	12/31/2001
Best 2	29.13810136	61.54420716	32.4061058	12/31/2009
Best 3	28.55110454	12.82743519	-15.72366935	12/31/2002
Worst 1	-12.2962688	5.672815394	17.96908419	12/31/2012
Worst 2	-5.863290928	8.069807232	13.93309816	12/30/2005
Worst 3	-5.754266043	17.54156607	23.29583211	12/31/2013

Source: Bloomberg

Table #12 & #13 below shows that The Target Portfolio is a superior portfolio vs. EAFE not just on a return level but more importantly on a risk adjust return – as indicated by Sharpe Ratio, Information Ratio and Beta parameters.

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[7] All performance numbers for all 3 portfolios are absent of any fees.

Table #12 Yearly Returns between Target Portfolio and EAFE.

Date	Total Return (Target Port)	Total Return (EAFE)	+/-
12/31/2001	17.76648409	-19.94174815	37.708232
12/31/2002	12.82743519	-15.72366935	28.551105
12/31/2003	35.73518994	39.21535042	-3.4801605
12/31/2004	25.37811651	20.74723641	4.6308801
12/30/2005	8.069807232	13.93309816	-5.8632909
12/29/2006	24.4384009	26.79670228	-2.3583014
12/31/2007	9.052386465	11.60640244	-2.554016
12/31/2008	-27.57418177	-43.03993586	15.465754
12/31/2009	61.54420716	32.4061058	29.138101
12/31/2010	23.8131421	8.185394175	15.627748
12/30/2011	4.620917337	-11.73660866	16.357526
12/31/2012	5.672815394	17.96908419	-12.296269
12/31/2013	17.54156607	23.29583211	-5.754266
12/31/2014	6.780781168	-4.531842651	11.312624
12/31/2015	1.893634916	-0.393342711	2.2869776
12/30/2016	21.24128416	1.510901845	19.730382

Source: Bloomberg

Portfolio Statistics	Target Port (16 Years)	EAFE (16 Years)
› Return		
Total Return	723.4933379	84.89575532
Maximum Return	9.103723494	8.575523735
Minimum Return	-5.994667475	-8.418546452
Mean Return (Annualized)	21.75811673	8.100415598
Mean Excess Return (Annu	12.63713212	
› Risk		
Standard Deviation (Annua	13.40535965	18.57115004
Downside Risk (Annualized	9.427045742	13.50148017
Skewness	0.213266332	-0.226269732
VaR 95% (ex-post)	-1.114400196	-1.782006115
Tracking Error (Annualized)	15.54084345	
› Risk/Return		
Sharpe Ratio	1.025284697	0.234542344
Jensen Alpha	11.95678714	
Information Ratio	0.57152275	
Treynor Measure	0.334912514	
Beta (ex-post)	0.410385086	
Correlation	0.568528052	
Capture Ratio	0.336175365	

To test the robustness of the Target Portfolio performance – I also test 2 other portfolios (i) a Target Terminated portfolio and (ii) Stock Acquirer Portfolio. Each portfolio construction is explained below.

Terminated Portfolio Composition & Attributes

Table #14: Deal Attributes: Target Multiple 140 Terminated M&A Transactions: 2000-2016.

Deal Attribute	Column1	Column2	Column3
Target Multiples	**# Deals**	**Min - Max**	**Median**
FFO	7	18.85 - 185.60	102.1
Free Cashflow	86	1.11 - 1246.63	54.24
Net Income	110	1.88 - 717.32	26.98
Income B/F XO	108	4.97 - 2766.88	26.82
Net Income + Depreciation	124	1.88 - 109.72	17.04
EBIT	123	1.42 - 2881.64	16.32
Cashflow from Ops.	122	1.07 - 2990.71	16.02
EBITDA	117	2.61 - 198.77	11.31
Book Value	133	.75 - 129.34	3.38
Stockholder Eqty	133	.74 - 52.10	3.25
Revenue	137	.20 - 53.77	2.27
Market Cap	139	.63 - 10.04	1.57
Total Assets	139	.06 - 6.42	1.15

Table #15: Deal Attributes: Current Status. 140 M&A Transactions: 2000-2016.

Current Status	# Deals	Volume	Percent
Terminated	140	1.64T	100

Table #16: Deal Attributes: Payment Type 140 M&A Transactions: 2000-2016.

Payment Type Summary	# Deals	Volume	Percent
Cash & Stock	34	622.5B	37.87
Cash	72	587.87B	35.77
Stock	34	433.32B	26.36

Source: Bloomberg

Table #17: Deal Attributes: Deal Type 140 M&A Transactions .2000-2016.

Deal Type Summary	# Deals	Volume	Percent
Company Takeover	137	1.62T	98.55
Cross Border	55	664.73B	40.44
Additional Stake Purchase	31	322.32B	19.61
Tender Offer	34	287.21B	17.47
PE Buyout	21	217.73B	13.25
Private Equity	21	205.63B	12.51
Competing Bid	10	87.79B	5.34
Management Buyout	4	48.86B	2.97

Source: Bloomberg.

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Table #18: Deal Attributes: Nature of Bid. 140 M&A Transactions: 2000-2016.

Nature of Bid Summary	# Deals	Volume	Percent
Friendly	97	1.09T	69.29
Unsolicited	39	489.81B	27.86
Unsolicited to Friendly	4	67.98B	2.86

Table #19: Deal Attributes: Deal Size. 140 M&A Transactions: 2000-2016.

Deal Size Breakdown	# Deals	Volume	Percent
> 10,000M	43	1.07T	30.71
5000.01-10,000M	59	420.37B	42.14
1000.01-5000M	38	153.17B	27.14

Table #20: Deal Attributes: Premiums Paid. 140 M&A Transactions: 2000-2016.

Premiums Paid	# Deals	Volume	Percent
90.01-100%	1	19.23B	1.17
70.01-80%	1	5.76B	0.35
60.01-70%	5	74.4B	4.53
50.01-60%	8	81.86B	4.98
40.01-50%	6	40.15B	2.44
30.01-40%	17	146.26B	8.9
20.01-30%	25	259.45B	15.78
10.01-20%	45	635.64B	38.67
0-10%	32	380.94B	23.18

Table #21: Deal Attributes: Acq. & Target Geograph./Region. 140 M&A Transactions: 2000-2016.

Acquirer Region Summary	# Deals	Volume	Percent
Asia Pacific	22	138.06B	8.4
Europe	33	355.21B	21.61
Middle East & Africa	1	18.81B	1.14
Latin America & Caribbean	6	63.78B	3.88

Source: Bloomberg.

Tables #14-21 above list the deal attributes and data covering the entire in-sample period for the Terminated portfolio. As a further robustness pass-test an OLS multi regression deal termination model to determine the deal beta factors to either expose or avoid.

Prob Deal (Termination) = *α + β [Mkt] + β [Deal Financing Commitment] + δ [Deal Financial Adviser Dummy Variable] + λ [Deal Legal Advisor Dummy Variable] + φ [CFIUS Deal Review Dummy Variable] + ψ [FTC/DOJ Deal Review Dummy Variable] + Scaled Time to Close Deal + Log No-Shop / Deal Fees.*

The economic tuition behind these beta regressors is that in addition to the usual suspect of premium paid to target, duration days to close deal – this model follows a merger agreement probability approach. The predictions should be **<u>increasing</u>** in top 10 ranked league table financial adviser, top 10 ranked league table legal adviser and CFIUS review and **<u>decreasing</u>** in conditional upon deal financing commitments.

Table #22 League Table – Legal Advisor Terminated Deal

	Rank	Market Share (%)	Total Deal Value	Average Deal Value	Deal Count
Sullivan & Cromwell	1	177.0492	2910131.25	11829.8	246
Skadden Arps Slate Meagher & Flom	2	138.9749	2284310.63	9762.01	234
Simpson Thacher & Bartlett	3	138.1093	2270083.1	12472.98	182
Wachtell Lipton Rosen & Katz	4	131.6398	2163744.49	13870.16	156
Latham & Watkins LLP	5	106.6636	1753214.49	11458.92	153
Cravath Swaine & Moore	6	103.4459	1700324.88	13494.64	126
Davis Polk & Wardwell	7	102.9777	1692629.54	11284.2	150
Cleary Gottlieb Steen & Hamilton	8	89.6107	1472918.4	13269.54	111
Shearman & Sterling LLP	9	88.9308	1461742.3	10366.97	141
Freshfields Bruckhaus Deringer	10	82.9136	1362839.49	13493.46	101
Weil Gotshal & Manges LLP	11	71.7076	1178647.5	12277.58	96
Fried Frank Harris Shriver & Jacobson	12	69.0924	1135661.69	12479.8	91
Clifford Chance LLP	13	58.8525	967350	13251.37	73
Linklaters LLP	14	58.838	967112.26	14878.65	65
Debevoise & Plimpton LLP	15	57.8937	951590.85	15348.24	62
Slaughter and May	16	56.4418	927725.35	12708.57	73
Dewey & LeBoeuf LLP	17	53.4422	878420.92	10457.39	84
Jones Day	18	52.7312	866735.4	10569.94	82
Blake Cassels & Graydon LLP	19	46.1394	758386.24	12854	59

Table #23 League Table – Financial Advisor Terminated Deal

Adviser	Rank	Market Share (%)	Total Deal Value	Average Deal Value	Deal Count
Goldman Sachs	1	242.0675	3978827.79	10812.03	368
JP Morgan	2	201.1343	3306015.24	10462.07	316
Bank of America Merrill Lynch	3	199.3019	3275896.71	11955.83	274
Morgan Stanley	4	178.721	2937611.46	10380.25	283
Citi	5	146.445	2407095.06	11041.72	218
Credit Suisse	6	122.2195	2008903.55	10355.17	194
Lazard Ltd	7	97.6748	1605466.25	12445.47	129
Deutsche Bank	8	88.4481	1453808.57	10026.27	145
UBS	9	82.7124	1359531.87	9996.56	136
Barclays	10	65.6684	1079382.11	11861.34	91
Lehman Brothers	11	58.7827	966202.42	12387.21	78
Rothschild & Co	12	45.7742	752383.26	10449.77	72
Evercore Partners Inc	13	42.779	703151.46	12335.99	57
BNP Paribas	14	38.7402	636767.84	14150.4	45
Centerview Partners LLC	15	33.1208	544401.2	15554.32	35
Greenhill & Co	16	29.5965	486472.57	9928.01	49

Table #24 below provides a partial list of Terminated Transactions.

Table #24: Partial List of Terminate M&A Transactions: 2000-2016.

Deal Type	Announce Date	Completion/ Termination Date	Target Name	Acquirer Name	Payment Type	Deal Status
M&A	1/18/2000	3/29/2000	Banco Espirito Santo S/	Banco BPI SA	Stock	Terminated
M&A	3/29/2000	5/16/2000	Quintiles IMS Inc	TriZetto Corp	Stock	Terminated
M&A	7/31/2000	4/2/2001	Entergy Corp	NextEra Energy Inc	Stock	Terminated
M&A	10/2/2000	1/1/2001	Tyson Fresh Meats Inc	Credit Suisse USA Inc	Cash	Terminated
M&A	10/17/2000	2/5/2001	Iberdrola SA	Endesa SA	Cash and Stock	Terminated
M&A	8/11/2014	9/29/2014	Treasury Wine Estates L	Unnamed Buyer	Cash	Terminated
M&A	11/17/2014	4/30/2016	Baker Hughes Inc	Halliburton Co	Cash and Stock	Terminated
M&A	11/20/2014	12/15/2014	CGG SA	Technip SA	Cash	Terminated
M&A	1/25/2015	8/3/2015	PartnerRe Ltd	Axis Capital Holdings Ltd	Stock	Terminated
M&A	2/4/2015	5/16/2016	Office Depot Inc	Staples Inc	Cash and Stock	Terminated
M&A	3/9/2015	3/31/2015	Macerich Co/The	Simon Property Group Inc	Cash and Stock	Terminated
M&A	3/11/2015	3/16/2015	Salix Pharmaceuticals L	Endo International PLC	Cash and Stock	Terminated
M&A	5/6/2015	7/9/2015	Pacific Exploration and	Alfa SAB de CV,Harbour	Cash	Terminated
M&A	5/13/2015	9/28/2015	Williams Partners LP	Williams Cos Inc/The	Stock	Terminated
M&A	7/1/2015	3/15/2016	Asciano Ltd	GIC Pte Ltd,British Colur	Cash and Stock	Terminated
M&A	7/3/2015	2/14/2017	Humana Inc	Aetna Inc	Cash and Stock	Terminated
M&A	7/24/2015	2/14/2017	Cigna Corp	Anthem Inc	Cash and Stock	Terminated
M&A	8/11/2015	5/16/2016	Terex Corp	Konecranes OYJ	Stock	Terminated
M&A	8/25/2015	9/21/2015	RSA Insurance Group Pl	Zurich Insurance Group A	Cash	Terminated
M&A	9/8/2015	12/7/2015	Oil Search Ltd	Woodside Petroleum Ltd	Stock	Terminated
M&A	9/8/2015	11/24/2015	Power Assets Holdings	Cheung Kong Infrastructu	Stock	Terminated
M&A	9/8/2015	1/27/2016	Meredith Corp	Media General Inc	Cash and Stock	Terminated
M&A	9/20/2015	1/19/2016	Atmel Corp	Dialog Semiconductor Pl	Cash and Stock	Terminated
M&A	9/21/2015	10/21/2015	LEG Immobilien AG	Deutsche Wohnen AG	Stock	Terminated
M&A	10/21/2015	10/5/2016	KLA-Tencor Corp	Lam Research Corp	Cash and Stock	Terminated
M&A	11/17/2015	4/11/2016	Norfolk Southern Corp	Canadian Pacific Railway	Cash and Stock	Terminated

Source: Bloomberg

16

Terminated Portfolio Construction Rules

I constructed the Terminated Portfolio starting in January 2000 with $100 million to invest in all target companies of terminated and withdrawn M&A deals meeting the pre-specified criteria (i) the terminated target company must be publicly, (ii) the target's market capitalization must be at least $3.2 billion, (iii) I must purchase the target company of every announced terminated transaction at the closing price the trading day following the transaction termination and hold this position for 12 months. At the end of the 1 year holding period – I sell the terminated stock portfolio company.

Terminated Portfolio Performance

Table #25 below shows the 3 best and the 3 worst tears in terms of % performance difference between of the Terminated Portfolio and the EAFE Index.

Table #25 the 3 best and the 3 worst tears in terms of % performance difference

Best-Worst	Difference	Terminated Portfolio Perf	EAFE Perf	Date
Best 1	63.74529983	96.15140562	32.4061058	12/31/2009
Best 2	25.85333392	49.14916603	23.29583211	12/31/2013
Best 3	25.35123762	26.86213946	1.510901845	12/30/2016
Worst 1	-11.17545679	6.793627406	17.96908419	12/31/2012
Worst 2	-9.96783082	16.82887146	26.79670228	12/29/2006
Worst 3	-3.795997388	16.95123902	20.74723641	12/31/2004

Tables #26 & #27 below shows that the Terminated Portfolio is a superior portfolio vs. EAFE not just on a return level but more importantly on a risk adjust return – as indicated by Sharpe Ratio, Information Ratio and Beta parameters. That said the Target Portfolio ranks higher than the Terminated Portfolio.

The in-sample cumulative total % return for the Target Portfolio = 723% while the Terminated Portfolio = 440.8%. The MSCI EAFE Index total cumulative return over the same in-sample period = 84.89%. The ex-ante economic tuition behind this is

straightforward – there is a shed of skepticism via the in the idiosyncratic quality of terminated M&A targets – which explains the cumulative total return percent deficit of 383%.

Table #26 Yearly Returns between Terminated Portfolio and EAFE.

Date	Terminated Total Return	EAFE Total Return	/- Diff.
12/31/2001	-11.18347699	-19.94174815	8.7582712
12/31/2002	-12.85937414	-15.72366935	2.8642952
12/31/2003	46.71258627	39.21535042	7.4972359
12/31/2004	16.95123902	20.74723641	-3.7959974
12/30/2005	24.92368319	13.93309816	10.990585
12/29/2006	16.82887146	26.79670228	-9.9678308
12/31/2007	8.039147532	11.60640244	-3.5672549
12/31/2008	-37.18339555	-43.03993586	5.8565403
12/31/2009	96.15140562	32.4061058	63.7453
12/31/2010	5.970935591	8.185394175	-2.2144586
12/30/2011	-14.71476509	-11.73660866	-2.9781564
12/31/2012	6.793627406	17.96908419	-11.175457
12/31/2013	49.14916603	23.29583211	25.853334
12/31/2014	2.821456212	-4.531842651	7.3532989
12/31/2015	11.62632118	-0.393342711	12.019664
12/30/2016	26.86213946	1.510901845	25.351238

Table #27: Adjusted Risk Measures: Terminated Portfolio vs. EAFE Index.

Portfolio Statistics	Terminated Port (16 Years)	EAFE 16 Year(s)
› Return		
Total Return	440.801409	84.89575532
Maximum Return	10.92334287	8.575523735
Minimum Return	-12.68754185	-8.418546452
Mean Return (Annua	20.74045698	8.100415598
Mean Excess Return	11.69550595	
› Risk		
Standard Deviation (	24.16523778	18.57115004
Downside Risk (Annu	17.37046356	13.50148017
Skewness	-0.17756167	-0.226269732
VaR 95% (ex-post)	-2.032657959	-1.782006115
Tracking Error (Annua	21.12194221	
› Risk/Return		
Sharpe Ratio	0.540258981	0.234542344
Jensen Alpha	10.00732041	
Information Ratio	0.389655849	
Treynor Measure	0.186558253	
Beta (ex-post)	0.699807516	
Correlation	0.537806848	
Capture Ratio	0.583290074	

Source: Bloomberg.

The Terminated Portfolio's standard deviation is greater than both the Target portfolio and the EAFE Index and Terminated Portfolio's Sharpe Ratio is greater than the EAFE Index and more than half the Target Portfolio's Sharpe Ratio.

Acquirer's Stock Portfolio Construction Rules.

As in the case of the other 2 portfolios – I constructed the Acquirer Stock Portfolio starting in January 2000 with $100 million to invest in all M&A transaction consisting of stock or stock/cash meeting the pre-specified criteria (i) the terminated target company must be publicly, (ii) the acquirer's market capitalization must be at least $3.2 billion, (iii) I must purchase the acquiring company of every announced successfully closed transaction at the closing price the trading day following the completion and I must

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hold this for 12 months. At the end of the 1 year holding period – I sell the acquirer stock portfolio company. My definition, all-cash deals are deselected from the portfolio – many of these all-cash acquirers were private strategic companies or private equity fund – thus, the deselection process was natural as there is no publicly traded security to purchase to test the Null Hypothesis.

Acquirer's Stock Portfolio Performance

Table #28 below shows the 3 best and the 3 worst tears in terms of % performance difference between of the Acquirer's Stock Portfolio and the EAFE Index.

Table #28: Adjusted Risk Measures: Terminated Portfolio vs. EAFE Index.

Best-Worst	Difference	Acquirer Stock Portfolio Perf	EAFE Index Perf	Date
Best 1	25.38145886	57.78756466	32.4061058	12/31/2009
Best 2	14.90301273	16.41391458	1.510901845	12/30/2016
Best 3	9.554160186	5.022317535	-4.531842651	12/31/2014
Worst 1	-17.25994163	-32.98361098	-15.72366935	12/31/2002
Worst 2	-11.02526883	-11.41861155	-0.393342711	12/31/2015
Worst 3	-7.373076581	4.233325858	11.60640244	12/31/2007

Source: Bloomberg.

Tables #29 & #30 below shows that the Terminated Portfolio is a superior portfolio vs. EAFE not just on a return level but more importantly on a risk adjust return – as indicated by Sharpe Ratio, Information Ratio and Beta parameters.

Table #29 Yearly Returns between Acquirer's Stock Portfolio and EAFE.

Date	Acquirer Stock Total Return	EAFE Total Return	+/-
12/31/2001	-14.23610967	-19.94174815	5.705638485
12/31/2002	-32.98361098	-15.72366935	-17.25994163
12/31/2003	43.23050579	39.21535042	4.015155371
12/31/2004	21.22422754	20.74723641	0.476991132
12/30/2005	7.682914456	13.93309816	-6.250183703
12/29/2006	22.79564783	26.79670228	-4.001054455
12/31/2007	4.233325858	11.60640244	-7.373076581
12/31/2008	-41.10917973	-43.03993586	1.930756126
12/31/2009	57.78756466	32.4061058	25.38145886
12/31/2010	15.26077299	8.185394175	7.07537881
12/30/2011	-6.508072456	-11.73660866	5.2285362
12/31/2012	20.06664497	17.96908419	2.09756078
12/31/2013	28.10964821	23.29583211	4.8138161
12/31/2014	5.022317535	-4.531842651	9.554160186
12/31/2015	-11.41861155	-0.393342711	-11.02526883
12/30/2016	16.41391458	1.510901845	14.90301273

Interesting to note that the Acquirer's Stock portfolio ranks in between the Target Portfolio and the Terminated Portfolio in terms of annualized standard deviation – yet its cumulative total return % ranks 3rd amongst the three disparate portfolios. Skewness of the Acquirer's Stock Portfolio ranks in between the two other portfolios.

The economic tuition is clear when examining the high Beta (.81) – as owning a portfolio of acquirer's stock should increase systemic risk and overall Beta.

Table # 30 Adjusted Risk Measures: acquirer' Stock Portfolio vs. EAFE Index.

Portfolio Statistics	Acq.'s Stock Port (16 Years)	EAFE Index (16 Years)
› Return		
Total Return	129.4330745	84.89575532
Maximum Return	11.740592	8.575523735
Minimum Return	-12.20917059	-8.418546452
Mean Return (Annualized)	11.13529568	8.100415598
Mean Excess Return (Annualized)	2.808071323	
› Risk		
Standard Deviation (Annualized)	21.71122678	18.57115004
Downside Risk (Annualized)	15.52018947	13.50148017
Skewness	-0.008636358	-0.226269732
VaR 95% (ex-post)	-1.956483814	-1.782006115
Tracking Error (Annualized)	15.97309774	
› Risk/Return		
Sharpe Ratio	0.297995451	0.234542344
Jensen Alpha	2.926512039	
Information Ratio	0.125212123	
Treynor Measure	0.079531994	
Beta (ex-post)	0.813489828	
Correlation	0.695835468	
Capture Ratio	0.735553707	

Source: Bloomberg.

Section II Test of the Portfolios: CAPM & Fama-French 3Factor Asset Pricing Models

The most common approach is to compare historical average returns to the CAPM's prediction.

The common compute of the CAPM's estimated prediction by estimating beta (β), the market premium ($E(r_M) - rf$), and the risk free rate (rf). We want the *estimated prediction error (called $\hat{\alpha}$)*

$\hat{\alpha} = r = \bar{r}_i - CAPM\ Prediction = \bar{r}_i - \bar{r}f - \hat{\beta}\_im\ (\bar{r}_M - \bar{r}f).$

Or, in terms of our Target Portfolio – the CAPM equation: *CAPM Target Portfolio = R {(Target portfolio) – (global risk free rate)} = α + β (R global Mkt – global risk free rate)}.*

Table #29 CAPM Regression on Target Portfolio

Regression Statistics	
Multiple R	0.700719158
R Square	0.491007338
Adjusted R Square	0.488475037
Standard Error	2.763997767
Observations	203

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1481.316618	1481.316618	193.8976383	2.67039E-31
Residual	201	1535.576414	7.639683654		
Total	202	3016.893032			

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.79005576	0.194556753	4.060798438	7.00535E-05
-5.41	0.596803187	0.04285928	13.92471322	2.67039E-31

Source: Ken French: Fama/French Global Factors

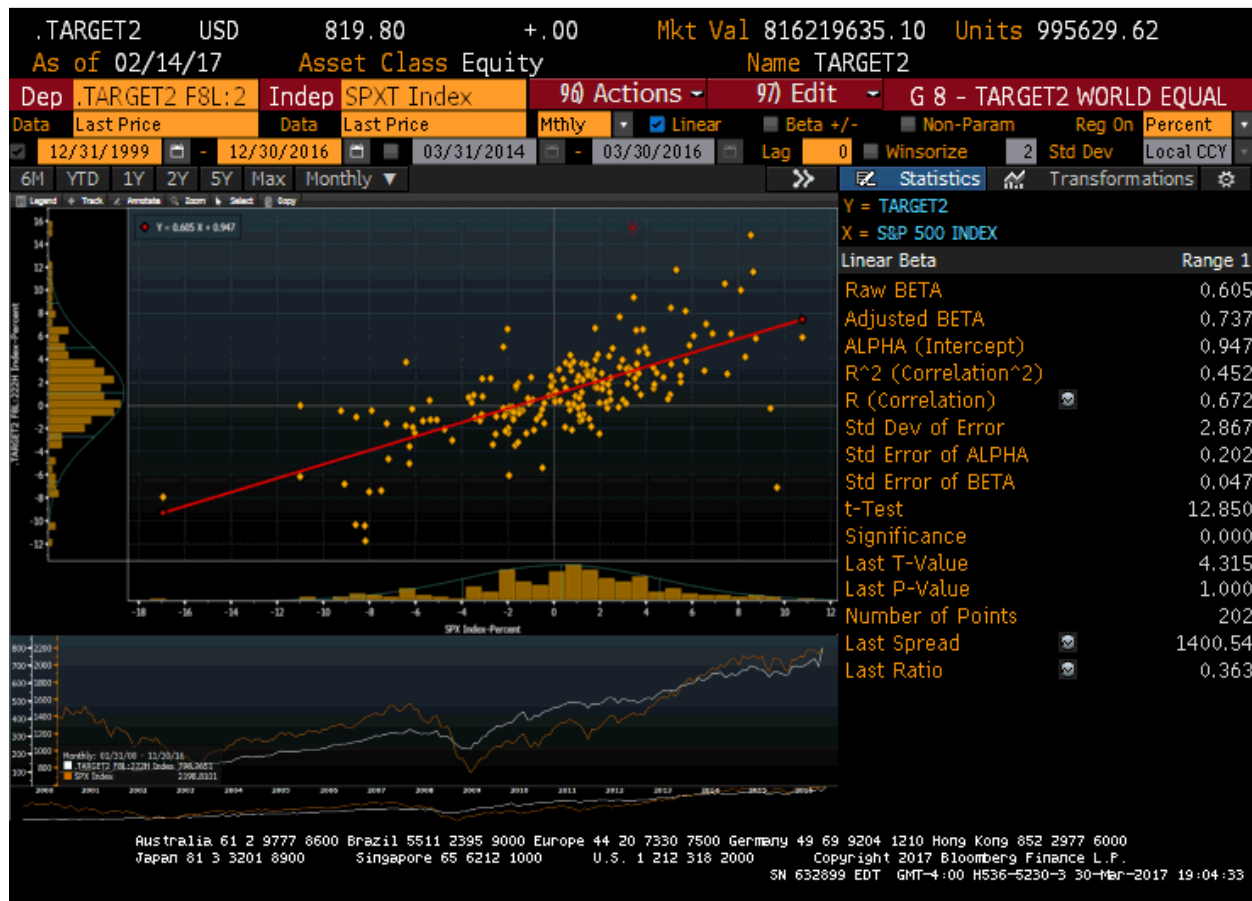**Graph 1: Bloomberg Output of Target Portfolio Non-Excess CAPM Regression on MSCI World:**

Table #30 CAPM Regression on Terminated Portfolio

Regression Statistics	
Multiple R	0.6484873
R Square	0.4205357
Adjusted R Square	0.4175793
Standard Error	5.0408774
Observations	198

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3614.4696	3614.4696	142.24346	5.212E-25
Residual	196	4980.4471	25.410445		
Total	197	8594.9167			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		0.74288	0.359285267	2.067660643	0.0399854	0.0343187	1.4514413	0.034318721	1.451441292
	3.29	0.9415627	0.07894654	11.92658628	5.212E-25	0.785869	1.0972565	0.785868998	1.097256451

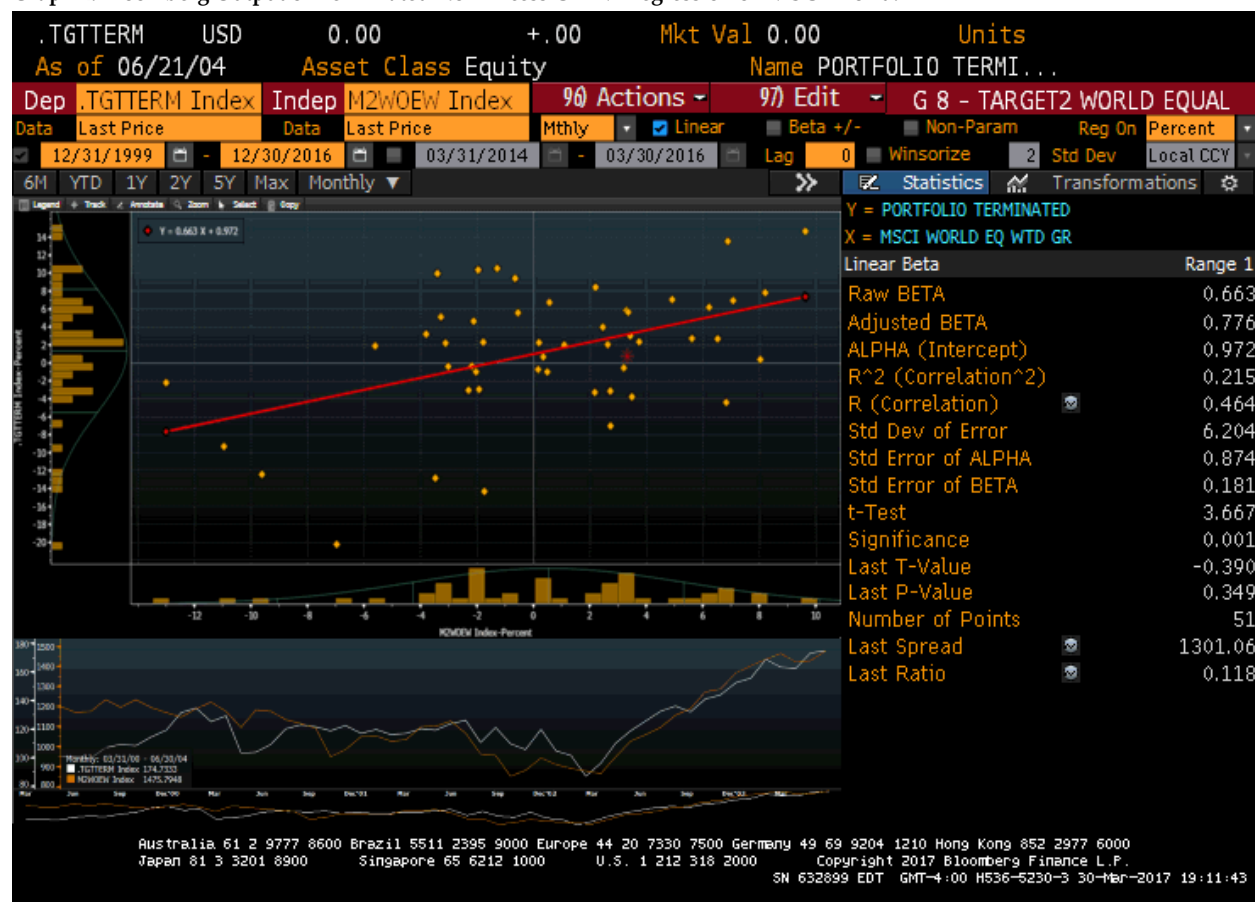**Graph 2: Bloomberg Output of Terminated Non-Excess CAPM Regression on MSCI World:**

Table #31 CAPM Regression on Acquirer's Stock Portfolio

Regression Statistics	
Multiple R	0.903988365
R Square	0.817194965
Adjusted R Square	0.816257503
Standard Error	2.769254854
Observations	197

ANOVA

	df	SS	MS	F	Significance F
Regression	1	6684.9473	6684.9473	871.71022	6.975E-74
Residual	195	1495.4106	7.6687724		
Total	196	8180.358			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		-0.25592386	0.1979398	-1.292938	0.1975623	-0.6463015	0.1344538	-0.6463015	0.1344538
	-3.34	1.282640294	0.0434429	29.524739	6.975E-74	1.196962	1.3683186	1.196962	1.3683186

Graph 3: Bloomberg Output of Acquirer's Stock Portfolio Non-Excess CAPM Regression on MSCI Equal Weighted World:
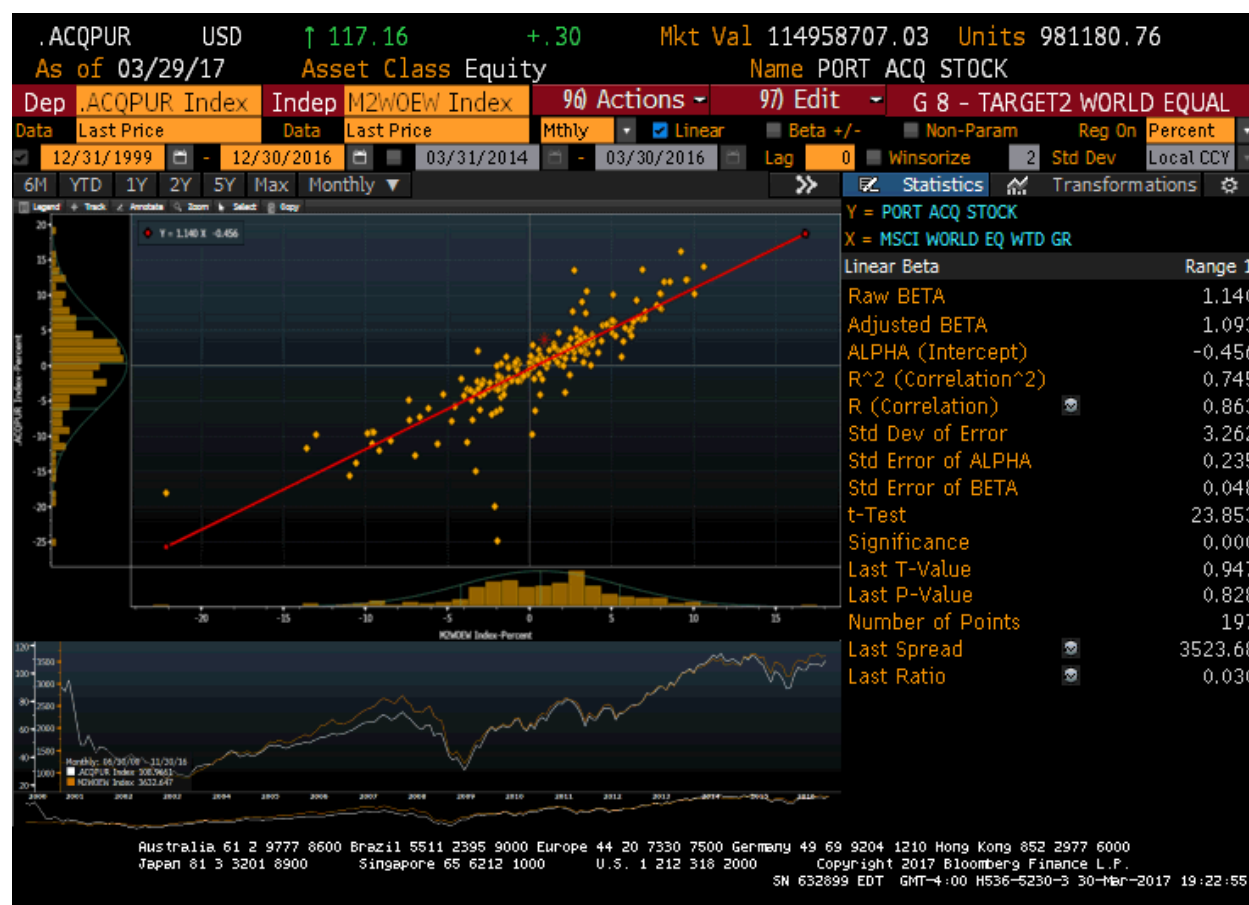
Fama-French 3 Factor Analysis of Portfolios.

Similar to testing risk & return of the 3 portfolios via the traditional CAPM – the test of the 3 portfolios and the revealing beta factors under the FF 3 Factor model is regressed under the following model:

R {(Target portfolio) – (global risk free rate)} = α + β (R global Mkt – global risk free rate)} + β (Small - Big) + β (High – Low)

Table #32 Multi-Factor Regression on Target Portfolio

Regression Statistics	
Multiple R	0.7328001
R Square	0.536996
Adjusted R Square	0.5297991
Standard Error	2.6335697
Observations	197

ANOVA

	df	SS	MS	F	Significance F
Regression	3	1552.5061	517.50204	74.614363	4.388E-32
Residual	193	1338.588	6.9356892		
Total	196	2891.0941			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		0.7708529	0.1942354	3.9686537	0.0001019	0.3877564	1.1539495	0.3877564	1.1539495
	-3.34	0.6090149	0.0418241	14.561324	6.771E-33	0.5265238	0.6915059	0.5265238	0.6915059
	-2.3	0.1212883	0.1116665	1.0861657	0.2787604	-0.0989551	0.3415318	-0.0989551	0.3415318
	5.65	-0.0413193	0.0828561	-0.4986877	0.6185673	-0.204739	0.1221004	-0.204739	0.1221004

Table #33 Multi-Factor Regression on Terminated Portfolio

Regression Statistics	
Multiple R	0.6904229
R Square	0.4766838
Adjusted R Square	0.4685493
Standard Error	4.8274044
Observations	197

ANOVA

	df	SS	MS	F	Significance F
Regression	3	4096.8573	1365.6191	58.600622	5.606E-27
Residual	193	4497.6397	23.303833		

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Total		196	8594.4971						

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		0.3445111	0.3560387	0.9676226	0.3344439	-0.3577153	1.0467374	-0.3577153	1.0467374
	-3.34	0.9848693	0.0766648	12.846438	1.065E-27	0.833661	1.1360777	0.833661	1.1360777
	-2.3	0.0661884	0.2046878	0.3233626	0.7467708	-0.3375238	0.4699005	-0.3375238	0.4699005
	5.65	0.6783467	0.1518775	4.4664078	1.352E-05	0.378794	0.9778995	0.378794	0.9778995

Table #34 Multi-Factor Regression on Acquirer's Stock Portfolio

Regression Statistics	
Multiple R	0.913435
R Square	0.8343635
Adjusted R Square	0.8317888
Standard Error	2.6496318
Observations	197

ANOVA

	df	SS	MS	F	Significance F
Regression	3	6825.3921	2275.1307	324.06737	4.53E-75
Residual	193	1354.9659	7.0205485		
Total	196	8180.358			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		-0.0556405	0.19542	-0.2847224	0.7761621	-0.4410735	0.3297926	-0.4410735	0.3297926
	-3.34	1.2592639	0.0420792	29.926023	1.996E-74	1.1762697	1.342258	1.1762697	1.342258
	-2.3	0.008201	0.1123476	0.072997	0.9418841	-0.2133856	0.2297877	-0.2133856	0.2297877

Section III Conclusion.

The 3 different constructed long-only /one-sided merger arbitrage portfolios – have produced different return streams and risk adjusted returns. The CAPM and Fama French analysis show that the Equally Weighted Target Portfolio from 2000-2016 results produce abnormal returns (e.g. alpha) not explained by the MSCI Global Indices – and the results from this alpha generating, long-only model/portfolio is significantly different from zero. Further refinement to this study could evolve by studying probability of deal success vs. deal failure tested against a number of different scenarios.

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