Stock Market Winners:
Conditional Probabilities, Elapsed Times, and Post-Event Returns

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Abstract

Some common stocks display extreme positive performance. Between 1973 and 2020, 3,615 U.S.-listed stocks generated at least a 5x cumulative gross return relative to a prior low point, and also had a minimum inflation-adjusted market capitalization of $500 million. Among these, 29.8% repeated the performance (to achieve a 25x multiple), 9.7% repeated twice (to achieve a 125x multiple), and 2.4% did so a third time (to achieve a 625x multiple). In general, a substantial portion of the superior performance accrued prior to the year in which the multiple was attained. However, stocks that attained these multiples showed little or no evidence of positive market-adjusted returns in subsequent months, implying that the existence of extreme positive performers does not simply reflect long horizon return momentum.

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1. Introduction

Recent research has highlighted the empirical fact that the majority of individual common stocks generate long-run shareholder losses relative to a Treasury-bill benchmark.[1] This implies that the positive long-run return premium delivered by the broad stock market is attributable to outsize gains generated by a relatively few high-performing stocks, and has generated additional interest in understanding the properties of the returns to the most successful stock market performers.

In this study, I describe the time series properties of returns to stocks whose gross (one plus) returns since a prior low point accumulate to certain multiples, including 5 times, 25 times, 125 times, and 625 times. The data help to illuminate the answers to the following questions. First, do the majority of gains to these "winner" stocks tend to be concentrated in a sharp run-up at or near the month that they reach the specified multiple, or does this event typically involve more moderate rates of price appreciation spread out over longer horizons? Second, what is the probability that a stock that achieves a certain cumulative gross return multiple, e.g. 25 times, will go on to achieve a subsequent multiple, such as 125 times?[2] And, perhaps most important, what are the returns that accrue on average in the months *after* stocks reach these gross return benchmarks?

2. Methods

I study the 25,775 common stocks that were traded on the major U.S. stock exchanges and that were covered by the Center for Research in Security Prices (CRSP) monthly common stock database between January 1973 and December 2020.[3] The starting date is the earliest full month for which CRSP includes Nasdaq-listed common stocks in its database, after which CRSP covers essentially all stocks publicly listed in the U.S. I begin by identifying those stocks that achieve an accumulated gross return,

[1] See Bessembinder (2021) who studies stocks listed in the U.S. since 1926, Bessembinder, Chen, Choi, and Wei (2020) who study global stocks since 1990, and Farago and Hjalmarsson (2021) who demonstrate the probability theory that underlies these results.

[2] Of course, the results are limited by the available sample period. Some stocks in the sample will reach defined valuation multiples in future months, even if they have not done so by the end of the sample period.

[3] Common stocks (as opposed to other securities) are identified based on the CRSP "shrcd" variable equal to 10, 11, or 12. A given common stock is identified and tracked through time based on the CRSP "permno" variable. In those cases where a firm (e.g. Alphabet) issues multiple share classes CRSP assigns a distinct permno to each.

relative to a prior low point, of 5x or greater.[4] I then identify those that repeat the 5x performance one, two, or three times, such that their cumulative gross return relative to the original low point reaches 25x, 125x, and 625x, respectively. "Event" months are defined as the month in which these multiples are first attained.[5] I study returns inclusive of dividends, with the implicit assumption that dividends are reinvested in additional shares of the same stock.

I report some results that are based on all stocks contained in the sample. However, since a number of sample stocks are quite small, I also report results for the subsample of stocks with a minimum inflation-adjusted market capitalization of $500 million, as of the 5x date.[6] In addition, I report some results for the subset of stocks that meet this minimum size criterion and that also reach the specified gross return multiples with no more than ten years' elapsed time between each subsequent event.[7]

To assess the *average* performance of these winner stocks in the months before and after the event months, I compute both equal-weighted and value-weighted average returns for event stocks, for each month from 119 months before the event month to 120 months after the event month.[8] These average returns can be thought of as winner portfolio returns. However, since the event months occur in differing calendar months across stocks, no simple trading strategy could directly capture the returns,

[4] Stocks can reach specified multiples more than once during the sample. For example, a stock might fall to a low point of 10, subsequently climb to 50, drop to 20, and then climb to 100, in which case it would attain the 5x multiple both in the climb from 10 to 50 as well in the climb from 20 to 100. In such instances I focus on the first 5x occurrence, and assess whether the stock reaches subsequent multiples that are all defined relative to the same prior low point.

[5] For example, event months for Apple Computer (whose first full month in the database is January 1981) are February 1987 by the 5x criterion, January 2005 by the 25x criterion, October 2007 by the 125x criterion, and February 2015 by the 625x criterion, all defined relative to a cumulative gross return low point that was reached in June 1982. Since the database in monthly, multiples are defined based on end-of-month returns.

[6] The inflation adjustment relies on the Consumer Price Index, and restates market capitalizations in terms of December 2020 prices. Of the 11,442 stocks that achieve a 5x multiple at some point during the sample period, 3,615 have a market capitalization that exceeds the indicated minimum at the date of the 5x event.

[7] For this sample I also restrict the analysis to stocks that entered the database by 2010 or earlier, so that return data is available for a minimum of ten years.

[8] A stock that experiences a given event is not necessarily present in the database for all of the 120 months before and after the event month. While some stocks delist due to negative performance-related reasons, others exit the database due to acquisition or merger, which tend to be positive valuation events. I compute returns using the stocks that are traded in each month, the implicit assumption being that any disbursements received (quantified based on CRSP's delisting returns) upon a stock's exit from the database are reinvested in other winner stocks, and that the funds required to purchase a stock when it enters the database are obtained by selling shares of existing winnder stocks.

even if the stocks could be identified *ex ante*. In any case, it is important point to keep in mind that each event month is identified based on *ex-post* stock returns.

Equal weighting implicitly assumes rebalancing trades each period, as relatively stronger performers are sold and relatively weaker performers are purchased to reestablish equal weights. Value weighting incorporates a buy-and-hold strategy, except for trades to accommodate net new share issuances. I also consider accumulated returns relative to the performance of the overall market.[9] To do so, I adjust each individual month *t* return as:

$$Market\ Adjusted\ Stock\ Return_t = \frac{1+Stock\ Return_t}{1+Market\ Return_t} - 1,$$

and compute the equal- and value-weighted average of the market-adjusted returns.

3. Outcomes: Event Counts and Probabilities

Table 1 reports on numbers of events and on within-sample event probabilities. Panel A focuses on the full sample of 25,775 stocks. Of these, 11,442, or 44.39%, achieved a 5x multiple relative to a prior low point at some time during the 48-year sample period. Among those that reached a 5x multiple, 3,306 stocks went on to achieve a 25x multiple relative to the same prior low point. The stocks that reached 25x comprised 12.38% of the full sample and 28.89% of those that achieved a 5x multiple. A total of 955 stocks achieved a 125x multiple. The stocks that reached 125x comprised 3.71% of the full sample, 8.35% of those that achieved a 5x multiple and 28.89% of those that achieved a 25x multiple. Finally, 271 stocks achieved a 625x multiple. The stocks that reached a 625x multiple comprised 1.05% of the full sample, 2.37% of those that achieved a 5x multiple, 8.20% of those that achieved a 25x multiple, and 28.38% of those that achieved a 125x multiple.

A striking similarity can be observed with respect to the probability that, conditional on achieving a given multiple, a stock will go on to achieve the next multiple. In particular, 28.89% of those stocks that reached 5x went on to achieve 25x, 28.89% of those that reached 25x went on to reach 125x, and 28.38% of those that reached 125x went on to reach 625x.

[9] The value-weighted market return data is obtained from Professor Kenneth French's website.

Table 2 provides information regarding elapsed times between events, for those stocks that reached the indicated multiples. Panel A focuses on the full sample. The mean time from the prior low point to a 5x multiple for those stocks that did achieve the 5x multiple was 45 months. The mean time from the prior low point to a 25x multiple was 143 months, from the prior low point to a 125x multiple was 271 months, and from the prior low point to a 625x multiple was 375 months.

Table 2 also reports on median, 10th percentile, and 90th percentile times from low points to the indicated multiples, as well as on elapsed times from the 5x to the 25x multiple, from the 25x to the 125x multiple, and from the 125x to the 625x multiple. Some stocks reach successive multiples quickly; the tenth percentile time from the 5x multiple to the 25x multiple is 20 months, while the 10th percentile time from 25x to 125x is 36 months, and from 125x to 625x is 46 months.

Panel B of Table 1 reports on event counts, probabilities and elapsed times for the 3,615 stocks that had a minimum inflation-adjusted market capitalization of $500 million at the date that they achieved a 5x multiple. While it might have been anticipated that returns to larger stocks would be less volatile and therefore less likely, other things equal, to reach subsequent high multiples, the data on Panel B of Table 1 show a higher propensity for these larger stocks to reach subsequent multiples as compared to the full sample data on Panel A. For the full sample (Panel A), probabilities of reaching the 25x, 125x and 625x multiples (conditional on reaching the 5x multiple) are 12.83%, 3.71%, and 1.05%, respectively, while the same probabilities for the larger stocks considered in Panel B are more than twice as large, equal to 29.82%, 9.68%, and 2.43%, respectively.

Panel B of Table 2 reports on elapsed times between events for this sample of stocks. In general, elapsed times between events are moderately longer for the larger stocks with results in Panel B as compared to the full sample with results in Panel A. For example, mean elapsed times after reaching 5x to reaching 25x, 125x, and 625x for those stocks that do so are 110 months, 138 months, and 148 months, respectively, for the larger stocks in Panel B, compared to 91 months, 127 months, and 139 months, respectively, for the full sample in Panel A. Table 3 lists the 88 individual stocks that meet the minimum market capitalization hurdle at the 5x date and also go on to achieve a 625x multiple.

In some cases, elapsed times between successive events are long. For example, the 90th percentile elapsed time from the 125x multiple to the 625x multiple for the full sample of firms that reach this milestone (Panel A of Table 2) is 236 months, or nearly 20 years. Panel C of Table 1 reports on event counts and probabilities for those stocks that achieve the indicated multiples, have a minimum inflation-adjusted market capitalization of $500 million at the date of the 5x event, and achieve each successive return multiple within ten years of the prior event. A total of 3,004 stocks in this sample achieve a 5x multiple within ten years of their prior low point. Of these, 588 reach the 25x multiple within ten years of reaching the 5x multiple, 99 also reach the 125x multiple within ten years of reaching the 25x multiple, and 16 also reach the 625x multiple within ten years of reaching the 125x multiple. Panel C of Table 2 reports on elapsed times between events for this sample of stocks (which by construction are shorter). The mean times between successive events for this sample are 68 months from 5x to 25x, 70 months from 25x to 125x, and 56 months from 125x to 625x.

Finally, the last column of Table 3 identifies the sixteen stocks in this sample that reached the 5x, 25x, 125x, and 625x multiples, with each event occurring within ten years of the prior event. Ten of these achieved the 625x multiple during the "dot-com bubble" years 1998 or 1999.

4. Outcomes: Average Returns in the Months Before and After the Event Dates

I next report on equal- and value-weighted sample mean returns for stocks that reach the specified valuation multiples, delineated based on the number of months prior to or after the event month. Since event months are identified *ex post*, average returns prior to the event month are mainly informative regarding the timing of the gains that define the event. In particular, these results help to understand whether those stocks that achieve defined valuation multiples are mainly characterized by sharp price run ups over short time intervals, or by more moderate rates of appreciation spread over longer horizons. Average returns in the months after the event month are informative regarding the investment results that would have been obtained based on a strategy of purchasing stocks upon observing that a given multiple-based event had occurred.

Figure 1 displays average cumulative gross (one plus) returns by month for the 3,615 stocks that achieved a 5x gross return relative to a prior low point and that had a minimum $500 million inflation-adjusted market capitalization at the date of the 5x event, from 120 months before the event until 120 months after the event. The Figure displays outcomes when average returns are computed on an equal- and a value-weighted basis, for both unadjusted and market-adjusted returns. Table 4 reports on average annual returns (obtained by compounding monthly returns) for the same sample of stocks. Figures 2 to 4 display the same information as Figure 1 for the subsets of these stocks that achieve 25x, 125x, and 625x events, respectively, while Tables 5, 6, and 7 report on annual returns for the corresponding sets of stocks. In addition to reporting annual returns, Tables 4 to 7 report geometric means of annual portfolio returns for years -9 to -1, -9 to 0, and 1 to 10. The geometric mean return in years -9 to -1 is informative as to the extent by which event stocks outperform even prior to the year that culminates in the defining multiple. The geometric mean return in years 1 to 10 is informative as to whether stocks continue to outperform in the period subsequent to the stock price increase that defines the event.

The definitions of the events studied here ensures that returns during the calendar period that includes the event are large. For 5x events (Table 4), for example, the equal-weighted market-adjusted return during the event year is 101.87%, while the value-weighted market-adjusted return is 41.05%. In general, though, a substantive proportion of the abnormal performance accrues prior to the calendar period that defines the event.[10] Focusing, for example, on 25x events, the cumulative gross equal-weighted and market-adjusted return up to 12 months prior to the event month is 2.2637, while the equivalent figure up through the event month is 4.2858, implying that (2.2637 – 1)/(4.2858 – 1) = 48.35% of the cumulative net return accrued prior to the calendar year that culminated in the event.[11] That is, a

[10] A notable exception is the value-weighted and market-adjusted return ahead of 5x events, where the geometric mean return for years -9 to -1 is -0.5%. It is of interest to note that the equal-weighted market-adjusted return over the same period for the same events is 4.1% per year.

[11] Note that the cumulative gross return up through the event month can be smaller than the defining multiple, even without the market adjustment. For example, the cumulative gross equal-weighted return through the 25x event month as displayed on Figure 2 is 17.18. This reflects that Figures 1 to 4 and Tables 4 through 7 are limited to 120 months, while the trough that preceded the defining multiple can occur more than 120 months prior to the event.

significant proportion of the unusual performance is spread through time rather than being concentrated in a short calendar interval as the performance multiple is hit.

It is also worth noting that equal-weighted returns up through the event month are uniformly higher than value-weighted monthly returns. For 125x events, for example, the cumulative gross equal-weighted return for the 120 months including the event month is 12.04x or 1204%, as compared to 5.51x or 551% for the value-weighted return. Since returns measured at the monthly horizon have historically displayed a degree of negative autocorrelation, i.e., reversals, this result reflects in part the benefits that result from the monthly rebalancing implicit in equal-weighted returns, as noted by Hsu (2006). Also, the "small firm effect" (e.g. Banz, 1981), by which stocks of smaller market capitalization have historically earned higher average returns, contributes because small firms receive relatively more weight in the equal- as compared to the value-weighted average. Of course, transaction costs would be relevant in any attempt to capture the superior equal-weighted returns.

Arguably the most important results contained in Figures 1 to 4 and Tables 4 to 7 are those focused on returns in the months after the defining events. While the events themselves are defined based on stocks reaching valuation multiples that are only observed ex-post, it would in principle have been possible to adopt a strategy of purchasing stocks upon their reaching the defined cumulative return multiples. While unadjusted portfolio returns are strongly positive in the periods following the event months, the results show rather little evidence of positive market-adjusted returns after the events. For the value-weighted portfolio, the geometric mean market-adjusted annual return for the ten post-event years is -0.25% for 5x events, 0.34% for 25x events, -0.74% for 125x events, and 1.61% for 625x events. While the last of these is a non-trivial figure, as it compounds to 17.32% over ten years, it is based on a small sample of just 88 events. For equal-weighted portfolios the results are slightly more encouraging, as the geometric mean market-adjusted annual return for the ten post-event years is 1.79% for 5x events, 1.75% for 125x events, and 1.38% for 125x events, before dropping to -0.14% for the small sample of 625x events. Here also transaction costs would be relevant in any attempt to capture the positive equal-weighted and market-adjusted returns.

5. Conclusions

The results reported here show that "winner" stocks, identified based on cumulative gross returns that exceed certain pre-defined multiples, are not uncommon in the U.S. markets. Nearly 13% of sample stocks generate a 25x cumulative gross return during at least one interval within the 1973 to 2020 sample period, nearly 4% generate a 125x cumulative gross return, and over 1% generate a 625x return. The within-sample probability that a sample stock that reaches one of these multiples will subsequently reach the next (e.g. that a stock that has reached 25x will also go on to reach 125x) is surprisingly stable, being equal to 28-29%.

However, this study reveals little or no evidence that a strategy of investing in those stocks that previously attained a given gross return multiple generates abnormal returns during subsequent months. Stated alternatively, the fact that some stocks generate outsize long-run returns does not imply that the markets are characterized by a form of long-horizon return momentum that can be exploited by simply purchasing stocks with large prior price runups. To be successful, investment strategies that involve concentrated portfolio positions require the ability to reliably discern between stocks where the current market price fully incorporates the firm's future potential versus those that do not.

References

Banz, R., 1981, The Relationship between Return and Market Value of Common Stocks, *Journal of Financial Economics*, 9, 3-18.

Bessembinder, H. 2021, Wealth Creation in the U.S. Public Stock Markets 1926–2019, *Journal of Investing*, https://doi.org/10.3905/joi.2021.1.168. Pre-publication version available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3537838.

Bessembinder, H, T. Chen, G. Choi, and K. Wei, 2020, Long-Term Shareholder Returns: Evidence from 64,000 Global Stocks, available for download at ssrn.com/abstract=3710251.

Farago, A., and E. Hjalmarsson, 2021, Long-horizon stock returns are positively skewed, working paper, available for download at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3835813.

Hsu, J., 2006, Cap-weighted portfolios are sub-optimal portfolios, *Journal of Investment Management* 4, 1-10.

Table 1: Counts and Transition Probabilities, Stocks with indicated trough-to-current month multiples

Panel A: All Stocks in Sample, 1973 to 2020

Numbers of Stocks						Probabilities			
Total	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x	Sample	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x
25,775	11,442	3,306	955	271	All	44.39%	12.83%	3.71%	1.05%
					Achieve 5x		28.89%	8.35%	2.37%
					Achieve 25x			28.89%	8.20%
					Achieve 125x				28.38%

Panel B: Minimum Market Capitalization of $500 million at 5x Date

Numbers of Stocks						Probabilities			
Total	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x	Sample	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x
	3,615	1,078	350	88	Achieve 5x		29.82%	9.68%	2.43%
					Achieve 25x			32.47%	8.16%
					Achieve 125x				25.14%

Panel C: Minimum $500 Million Cap at 5x Date, Each Multiple Reached within 10 Years, Listed by 2010

Numbers of Stocks						Probabilities			
Total	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x	Sample	Achieve 5x	Achieve 25x	Achieve 125x	Achieve 625x
	3004	588	99	16	Achieve 5x		19.57%	3.30%	0.53%
					Achieve 25x			16.84%	2.72%
					Achieve 125x				16.16%

Table 2: Elapsed time between events in months,
stocks with indicated trough to current month multiples

Panel A: All Stocks in Sample, 1973 to 2020

	Trough to 5x	Trough to 25x	Trough to 125x	Trough to 625x	5x to 25x	25x to 125x	125x to 625x
Mean	45	143	271	375	91	127	139
10th Percentile	8	42	118	221	20	36	46
Median	35	133	271	385	78	119	136
90th Percentile	99	262	423	523	178	227	236

Panel B: Stocks with Minimum Market Capitalization of $500 million at 5x Date

	Trough to 5x	Trough to 25x	Trough to 125x	Trough to 625x	5x to 25x	25x to 125x	125x to 625x
Mean	56	177	310	409	110	138	148
10th Percentile	12	58	148	210	31	49	54
Median	46	178	301	445	102	131	151
90th Percentile	117	285	481	535	193	236	243

Panel C: Minimum $500 Million Cap at 5x Date, and Each Multiple Reached within 10 Years, List by 2010

	Trough to 5x	Trough to 25x	Trough to 125x	Trough to 625x	5x to 25x	25x to 125x	125x to 625x
Mean	49	119	182	209	68	70	56
10th Percentile	12	40	88	104	17	22	16
Median	44	123	179	206	71	76	57
90th Percentile	98	195	278	289	110	112	110

Table 3: List of Stocks that attained a 625x trough-to-current month multiple, 1973 to 2020

(minimum inflation-adjusted market capitalization at 5x event date of $500 million)

Company Name (most recent)	PERMNO	First Date	Trough Date	625x Date	Months, Trough to 625x	All Multiples reached within 10 Years?
ABBOTT LABORATORIES	20482	31-Jan-73	30-Sep-74	30-Apr-12	451	N
ADOBE INC	75510	30-Sep-86	30-Sep-86	31-Oct-17	373	N
AFLAC INC	57904	28-Sep-73	31-Dec-74	30-Oct-98	286	Y
ALLEGHENY TECHNOLOGIES	43123	31-Jan-73	29-Nov-74	31-May-07	390	N
ALTRIA GROUP INC	13901	31-Jan-73	30-Sep-74	30-Sep-10	432	N
AMAZON COM INC	84788	30-Jun-97	30-Jun-97	31-May-17	239	N
AMGEN INC	14008	29-Jul-83	30-Nov-84	31-Dec-99	181	Y
APPLE INC	14593	30-Jan-81	30-Jun-82	27-Feb-15	392	N
AUTOMATIC DATA PROCESSING INC	44644	31-Jan-73	30-Sep-74	30-Jun-16	501	N
BARD C R INC	46877	31-Jan-73	30-Sep-74	28-Apr-17	511	N
BERKSHIRE HATHAWAY INC DEL	17778	30-Nov-76	30-Nov-76	30-Jan-98	254	Y
BLOCK H & R INC	49373	31-Jan-73	31-May-73	28-Mar-13	478	N
BOEING CO	19561	31-Jan-73	31-Dec-73	30-Apr-13	472	N
BROWN FORMAN CORP	29946	31-Jan-73	31-Dec-74	30-Nov-11	443	N
BROWN FORMAN CORP	29938	31-Jan-73	31-Dec-74	30-Nov-11	443	N
C V S HEALTH CORP	17005	31-Jan-73	29-Nov-74	31-Mar-14	472	N
CELGENE CORP	11552	31-Aug-87	28-Apr-95	31-Aug-17	268	N
CHEMED CORP NEW	64194	31-Jan-73	30-Sep-74	30-Nov-17	518	N
CINCINNATI FINANCIAL CORP	23473	31-Jan-73	31-Dec-74	31-Jan-13	457	N
CISCO SYSTEMS INC	76076	30-Mar-90	28-Sep-90	31-Dec-99	111	Y
CLOROX CO	46578	31-Jan-73	28-Jun-74	30-Oct-15	496	N
CONSOLIDATED EDISON INC	11404	31-Jan-73	28-Jun-74	31-Oct-14	484	N
CRANE CO	20204	31-Jan-73	31-May-73	29-Dec-17	535	N
CURTISS WRIGHT CORP	18091	31-Jan-73	31-Dec-74	30-Nov-16	503	N
D X C TECHNOLOGY CO	40125	31-Jan-73	31-Dec-74	28-Feb-17	506	N
DELL INC	11081	29-Jul-88	31-Jan-90	30-Sep-98	104	Y
DISNEY WALT CO	26403	31-Jan-73	30-Sep-74	31-Dec-20	555	N
DONALDSON INC	61313	31-Jan-73	29-Nov-74	31-Jan-12	446	N
DOVER CORP	25953	31-Jan-73	30-Sep-74	29-Sep-17	516	N
E M C CORP MA	10147	30-May-86	29-Dec-89	31-Dec-99	120	Y
E Q T CORP	24328	31-Jan-73	30-Sep-74	30-Apr-13	463	N
ESSENTIAL UTILITIES INC	52898	31-Jan-73	30-Sep-74	30-Nov-04	362	N
F M C CORP	19166	31-Jan-73	31-Dec-74	31-Oct-17	514	N
FRANKLIN RESOURCES INC	37584	31-Oct-83	30-Nov-83	31-Jan-06	266	Y
GENERAL DYNAMICS CORP	12052	31-Jan-73	31-Oct-74	28-Sep-07	395	N
GOLDEN WEST FINANCIAL CORP	53479	31-Jan-73	30-Aug-74	31-Oct-03	350	N
HERSHEY CO	16600	31-Jan-73	30-Sep-74	29-Jun-12	453	N
HILL ROM HOLDINGS INC	52716	31-Jan-73	31-Dec-74	31-Dec-19	540	N
HILLSHIRE BRANDS CO	22840	31-Jan-73	30-Sep-74	30-Jun-14	477	N
HOME DEPOT INC	66181	30-Oct-81	30-Oct-81	31-Jul-98	201	Y
HORMEL FOODS CORP	32870	31-Jan-73	29-Jun-73	31-Oct-14	496	N
ILLINOIS TOOL WORKS INC	56573	30-Apr-73	31-Dec-74	30-Jun-17	510	N
INTEL CORP	59328	31-Jan-73	30-Sep-74	31-Jul-97	274	Y
JOHNSON CONTROLS INC	42534	31-Jan-73	29-Nov-74	30-Apr-07	389	N
KIMBERLY CLARK CORP	17750	31-Jan-73	30-Sep-74	31-Jul-20	550	N
KROGER COMPANY	16678	31-Jan-73	29-Jun-73	31-Jul-13	481	N
L3HARRIS TECHNOLOGIES INC	25582	31-Jan-73	30-Sep-74	31-Jan-18	520	N
LAM RESH CORP	48486	29-Jun-84	31-Oct-90	30-Nov-20	361	N
LOCKHEED MARTIN CORP	21178	31-Jan-73	31-Dec-73	29-Aug-08	416	N
LOEWS CORP	26710	31-Jan-73	30-Sep-74	30-Apr-07	391	N
LOWES COMPANIES INC	61399	31-Jan-73	30-Sep-74	31-Dec-14	483	N
MCCORMICK & CO INC	52090	31-Jan-73	30-Aug-74	30-Aug-19	540	N
MCDONALDS CORP	43449	31-Jan-73	30-Sep-74	30-Nov-18	530	N
MEDTRONIC PLC	60097	31-Jan-73	31-Jan-78	31-Oct-13	429	N
MICROSOFT CORP	10107	30-Apr-86	30-Sep-86	29-Aug-14	335	N
MOODYS CORP	48506	31-Jan-73	29-Nov-74	30-Apr-15	485	N
N V R INC	79785	31-Dec-93	30-Nov-94	31-Oct-17	275	N
NETFLIX INC	89393	28-Jun-02	31-Oct-02	30-Apr-20	210	Y
NEWMARKET CORP	42550	31-Jan-73	30-Sep-74	30-Jan-15	484	N
NEXTERA ENERGY INC	24205	31-Jan-73	30-Aug-74	31-Jul-19	539	N
NIKE INC	57665	30-Jan-81	31-Oct-84	30-Sep-14	359	N
NORTHROP GRUMMAN CORP	24766	31-Jan-73	29-Jun-73	29-Aug-14	494	N
ONEOK INC NEW	25232	31-Jan-73	30-Sep-74	29-Jun-18	525	N
ORACLE CORP	10104	30-Apr-86	30-Sep-86	31-Dec-99	159	Y
P P G INDUSTRIES INC	22509	31-Jan-73	30-Sep-74	31-Jan-18	520	N
PACCAR INC	60506	31-Jan-73	31-Dec-74	30-Apr-07	388	N
PARKER HANNIFIN CORP	41355	31-Jan-73	31-Dec-74	30-Nov-20	551	N
PAYCHEX INC	61621	30-Sep-83	29-Feb-84	30-Nov-15	381	N
PEPSICO INC	13856	31-Jan-73	30-Sep-74	31-May-17	512	N
PERKINELMER INC	42200	31-Jan-73	30-Sep-74	31-Dec-20	555	N
RAYTHEON TECHNOLOGIES CORP	17830	31-Jan-73	31-Jan-74	29-Dec-17	527	N
ROLLINS INC	36003	31-Jan-73	30-Aug-74	30-Nov-16	507	N
ROSS STORES INC	91556	30-Sep-85	30-Nov-87	30-Sep-16	346	N
S & P GLOBAL INC	17478	31-Jan-73	29-Nov-74	31-Oct-13	467	N
SHERWIN WILLIAMS CO	36468	31-Jan-73	31-Oct-78	31-May-13	415	N
SUNAMERICA INC	33312	31-Jan-73	30-Sep-74	31-Mar-98	282	Y
SYSCO CORP	52038	31-Jan-73	31-Dec-74	31-Oct-02	334	Y
TARGET CORP	49154	31-Jan-73	31-Dec-74	29-Oct-04	358	N
TIME WARNER INC NEW	77418	30-Apr-92	30-Apr-92	31-Mar-99	83	Y
TOTAL SYSTEM SERVICES INC	76639	30-Sep-83	30-Sep-83	31-May-19	428	N
U S T INC	15077	31-Jan-73	30-Sep-74	30-Nov-07	398	N
UNILEVER N V	28310	31-Jan-73	30-Sep-74	31-Mar-17	510	N
UNION PACIFIC CORP	48725	31-Jan-73	29-Jun-73	31-Dec-20	570	N
UNITEDHEALTH GROUP INC	92655	30-Nov-84	31-Dec-87	31-Jul-13	307	N
V F CORP	43553	31-Jan-73	30-Sep-74	29-Jul-11	442	N
VARIAN MEDICAL SYSTEMS INC	27043	31-Jan-73	30-Sep-74	31-Jan-14	472	N
WALGREENS BOOTS ALLIANCE INC	19502	31-Jan-73	30-Sep-74	30-Oct-98	289	Y
WALMART INC	55976	31-Jan-73	31-Dec-74	31-May-91	197	Y

Table 4: Annual Portfolio Returns, 5X-Since-Trough Events (N = 3,615)				
Years to Event	Equal-Weighted Return	Equal-Weighted Market-Adjusted Return	Value-Weighted Return	Value-Weighted Market-Adjusted Return
-9	7.04%	1.51%	-0.74%	-5.00%
-8	6.67%	-0.36%	6.55%	0.22%
-7	13.20%	1.15%	9.38%	-1.72%
-6	9.80%	1.58%	5.14%	-2.48%
-5	8.81%	0.31%	3.97%	-2.43%
-4	16.75%	4.54%	9.19%	-1.76%
-3	16.75%	4.52%	11.07%	1.43%
-2	21.45%	7.10%	13.42%	1.05%
-1	31.93%	17.27%	19.09%	6.76%
0	144.75%	101.87%	67.73%	41.05%
1	14.77%	2.99%	10.88%	1.34%
2	12.70%	-0.34%	5.49%	-4.78%
3	11.83%	-0.99%	7.60%	-4.14%
4	21.74%	6.53%	13.92%	2.32%
5	12.83%	1.57%	10.40%	0.47%
6	18.14%	2.69%	16.15%	0.66%
7	15.02%	0.52%	15.49%	1.62%
8	15.34%	2.45%	17.61%	6.83%
9	10.35%	-0.05%	6.39%	-2.61%
10	16.46%	2.77%	7.70%	-3.64%
Geometric Mean, - 9 to -1	14.46%	4.06%	8.43%	-0.49%
Geometric Mean, - 9 to 0	23.50%	11.19%	13.26%	3.05%
Geometric Mean, 1 to 10	14.88%	1.79%	11.09%	-0.25%

Table 5: Annual Portfolio Returns, 25X-Since-Trough Events (N = 1078)				
Years to Event	Equal-Weighted Return	Equal-Weighted Market-Adjusted Return	Value-Weighted Return	Value-Weighted Market-Adjusted Return
-9	19.71%	6.51%	9.24%	-1.14%
-8	23.90%	7.77%	11.99%	-0.42%
-7	22.99%	8.72%	16.19%	1.95%
-6	27.13%	10.83%	16.69%	2.52%
-5	22.05%	10.24%	13.60%	4.15%
-4	26.51%	9.69%	15.65%	2.39%
-3	29.54%	14.33%	15.90%	2.50%
-2	32.23%	14.10%	19.65%	4.53%
-1	39.44%	20.85%	20.85%	6.72%
0	100.86%	66.32%	58.03%	32.24%
1	9.17%	-0.74%	12.49%	0.04%
2	11.15%	-1.90%	6.94%	-2.17%
3	13.67%	1.00%	10.59%	0.69%
4	19.94%	5.05%	9.33%	-0.93%
5	11.35%	0.54%	12.83%	2.28%
6	17.12%	1.92%	13.43%	3.04%
7	14.41%	1.11%	18.06%	5.54%
8	11.62%	1.56%	5.49%	-4.28%
9	10.00%	3.38%	0.20%	-4.70%
10	18.34%	5.87%	7.24%	4.44%
Geometric Mean, - 9 to -1	26.93%	11.38%	15.48%	2.55%
Geometric Mean, - 9 to 0	32.89%	15.93%	19.16%	5.19%
Geometric Mean, 1 to 10	13.62%	1.75%	9.56%	0.34%

Table 6: Annual Portfolio Returns, 125X-Since-Trough Events (N = 350)				
Years to Event	Equal-Weighted Return	Equal-Weighted Market-Adjusted Return	Value-Weighted Return	Value-Weighted Market-Adjusted Return
-9	25.73%	9.97%	15.26%	3.21%
-8	18.46%	4.80%	10.64%	-0.38%
-7	22.81%	7.33%	13.66%	0.79%
-6	21.88%	12.74%	10.19%	8.35%
-5	21.90%	10.61%	11.12%	0.19%
-4	24.67%	11.40%	12.64%	4.21%
-3	27.27%	12.69%	15.39%	4.81%
-2	26.85%	11.29%	19.71%	7.35%
-1	32.53%	14.16%	26.08%	6.78%
0	66.05%	40.47%	58.30%	35.58%
1	11.68%	2.89%	9.89%	0.56%
2	7.29%	-0.34%	8.11%	2.09%
3	16.78%	6.06%	8.66%	1.55%
4	10.29%	2.55%	-3.30%	-4.26%
5	8.74%	2.54%	8.06%	1.67%
6	15.56%	1.96%	11.36%	-0.55%
7	10.17%	-2.95%	12.52%	-1.68%
8	6.02%	-2.48%	3.83%	-4.36%
9	9.70%	2.15%	6.07%	0.08%
10	12.16%	1.75%	10.48%	-2.21%
Geometric Mean, - 9 to -1	24.62%	10.52%	14.87%	3.88%
Geometric Mean, - 9 to 0	28.25%	13.20%	18.61%	6.68%
Geometric Mean, 1 to 10	10.79%	1.38%	7.48%	-0.74%

Table 7: Annual Portfolio Returns, 625X-Since-Trough Events (N = 88)				
Years to Event	Equal-Weighted Return	Equal-Weighted Market-Adjusted Return	Value-Weighted Return	Value-Weighted Market-Adjusted Return
-9	18.96%	12.51%	12.71%	10.15%
-8	22.82%	12.17%	6.81%	2.97%
-7	27.16%	11.20%	19.52%	4.82%
-6	21.05%	13.63%	9.87%	5.90%
-5	16.16%	9.05%	11.07%	7.57%
-4	20.87%	9.66%	17.78%	4.40%
-3	27.72%	13.41%	22.82%	9.47%
-2	21.41%	7.38%	12.45%	1.74%
-1	35.17%	17.22%	30.53%	12.44%
0	54.36%	31.48%	56.49%	32.91%
1	14.65%	4.33%	6.31%	0.46%
2	9.95%	-0.28%	3.95%	-4.49%
3	8.59%	-0.65%	16.66%	8.06%
4	17.06%	3.70%	11.28%	-3.29%
5	13.29%	-0.59%	21.19%	13.25%
6	14.88%	-0.11%	45.58%	16.44%
7	18.64%	2.50%	7.90%	-8.00%
8	12.21%	-4.92%	13.39%	-2.39%
9	-0.42%	-5.95%	-1.33%	-2.12%
10	7.28%	1.03%	5.20%	0.97%
Geometric Mean, - 9 to -1	23.37%	11.77%	15.75%	6.56%
Geometric Mean, - 9 to 0	26.16%	13.60%	19.29%	8.94%
Geometric Mean, 1 to 10	11.48%	-0.14%	12.39%	1.61%

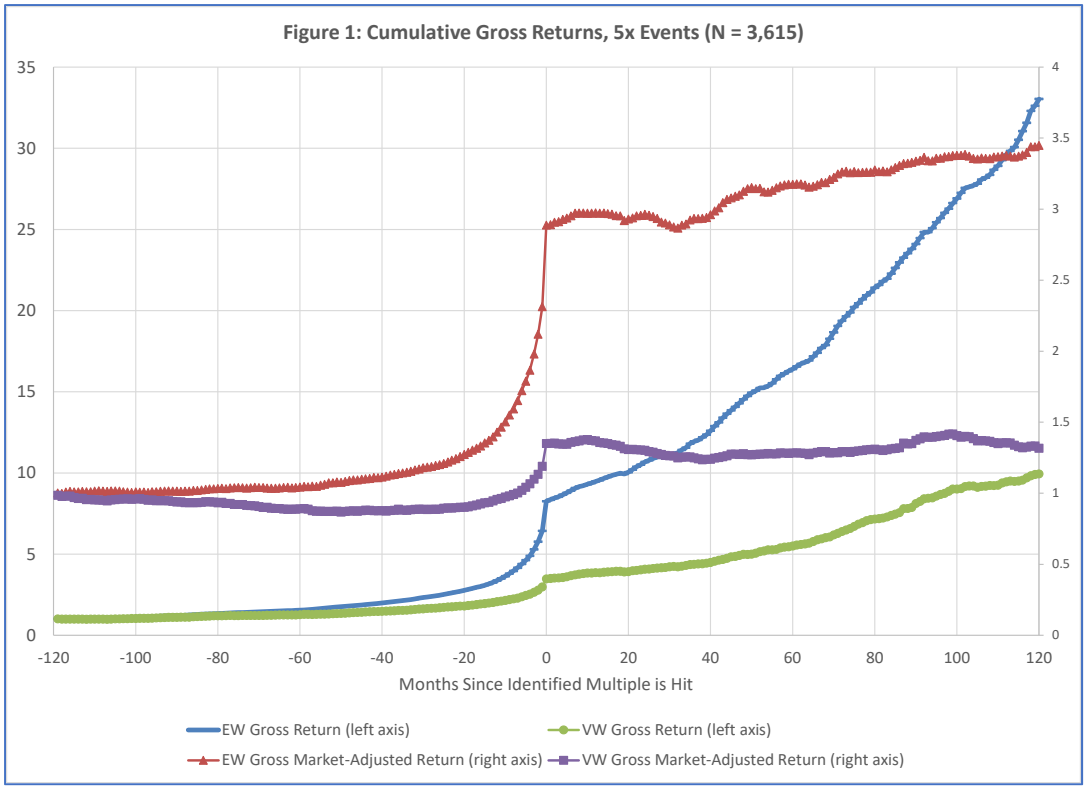
Figure 1: Cumulative Gross Returns, 5x Events (N = 3,615)
35
30
25
20
15
10
5
0
4
3.5
3
2.5
2
1.5
1
0.5
0
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
Months Since Identified Multiple is Hit
EW Gross Return (left axis)
VW Gross Return (left axis)
EW Gross Market-Adjusted Return (right axis)
VW Gross Market-Adjusted Return (right axis)

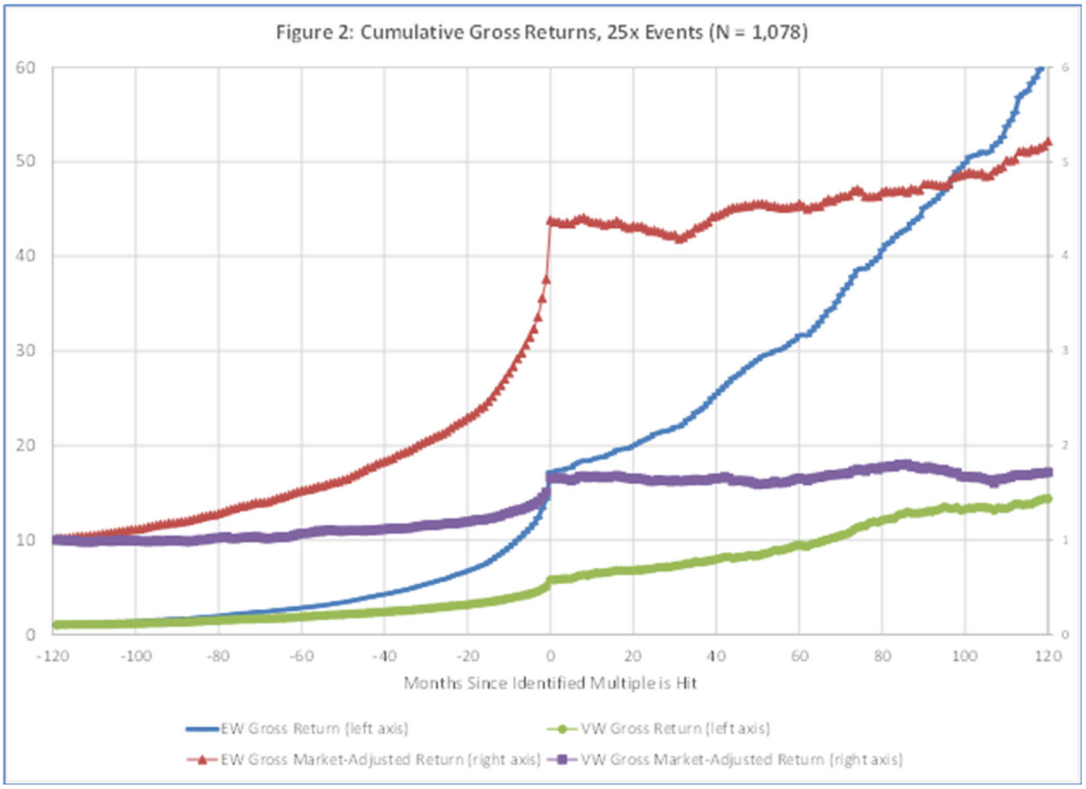
Figure 2: Cumulative Gross Returns, 25x Events (N = 1,078)
60
50
40
30
20
10
0
6
5
4
3
2
1
0
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
Months Since Identified Multiple is Hit
EW Gross Return (left axis)
VW Gross Return (left axis)
EW Gross Market-Adjusted Return (right axis)
VW Gross Market-Adjusted Return (right axis)

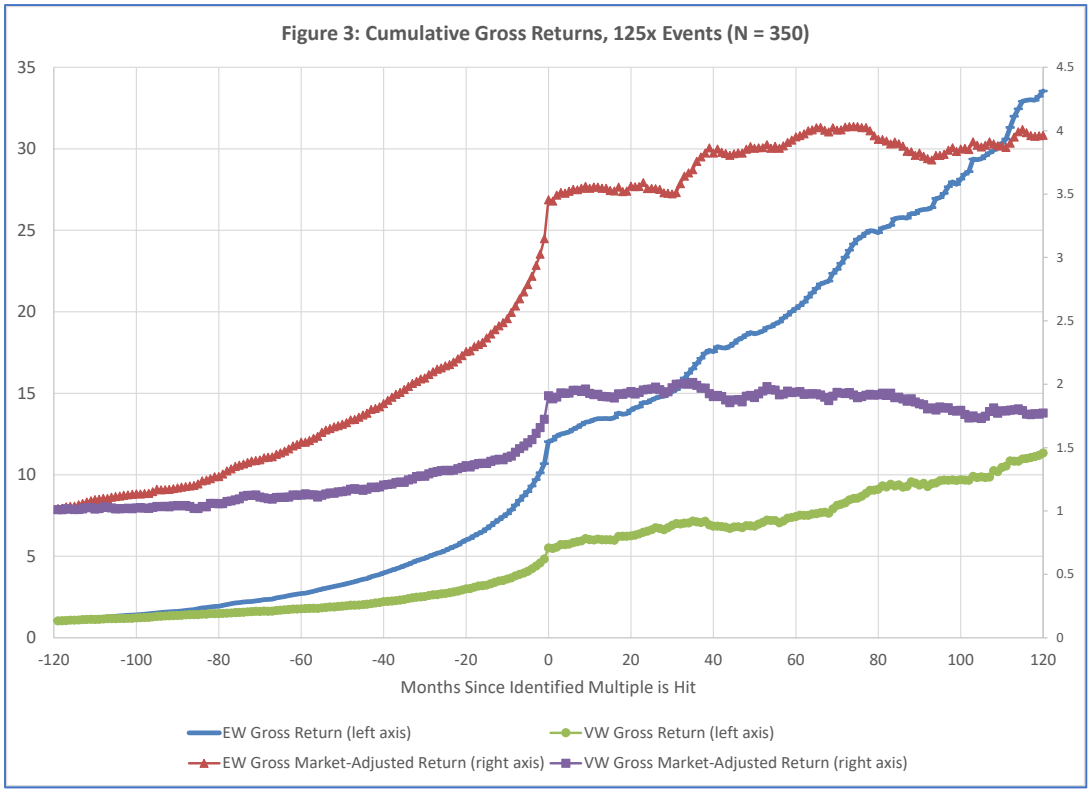
Figure 3: Cumulative Gross Returns, 125x Events (N = 350)
35
30
25
20
15
10
5
0
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
Months Since Identified Multiple is Hit
EW Gross Return (left axis)
VW Gross Return (left axis)
EW Gross Market-Adjusted Return (right axis)
VW Gross Market-Adjusted Return (right axis)

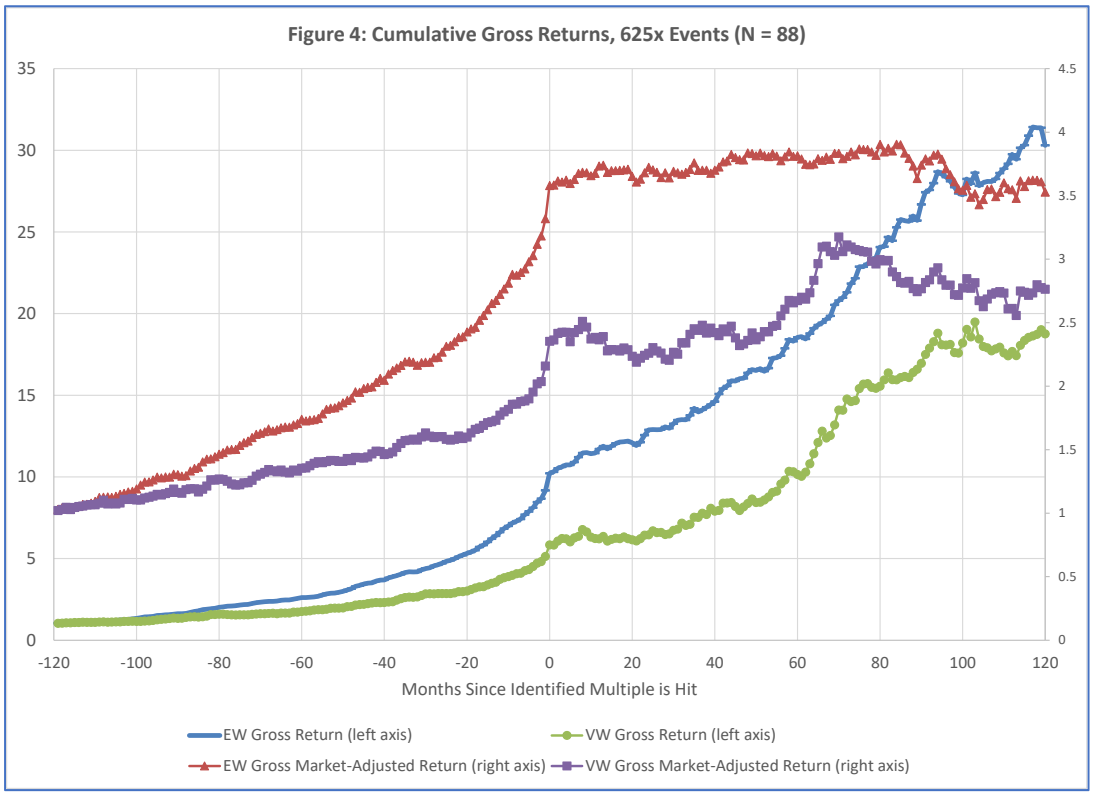
Figure 4: Cumulative Gross Returns, 625x Events (N = 88)
35
30
25
20
15
10
5
0
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
Months Since Identified Multiple is Hit
EW Gross Return (left axis)
VW Gross Return (left axis)
EW Gross Market-Adjusted Return (right axis)
VW Gross Market-Adjusted Return (right axis)