GAP-DOWNS: THE BIGGER THEY ARE, THE HARDER THEY FALL

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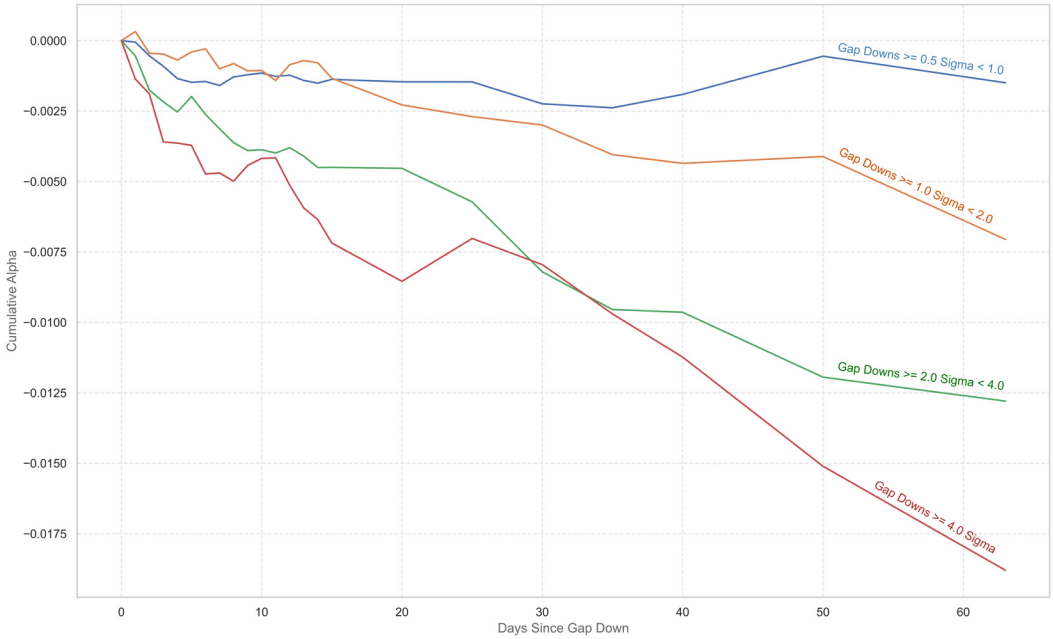

Figure 1: Cumulative excess U.S. stock returns by number of days since a gap-down event by gap size (in standard deviations) from 1995 to 2020. Excess returns are standardized by the average volatility of the companies with the event. Results for gap events occurring on the same day are aggregated and liquidity weighted, then averaged over time.

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KEY FINDINGS:

- As with gap-ups, the size of gap-downs was significantly related to post-event alpha for up to three months.
- Gap-downs between one to two standard deviations had average alpha of around -0.71%.
- Gap-downs of two to four standard deviations had average alpha of -1.28%.
- Gap-downs greater than four standard deviations had average alpha of -1.88%.

EXECUTIVE SUMMARY

We studied patterns of stock returns following price gap-down events across our U.S. equity universe from 1995–2020. The results mirror the effect we saw with gap-ups: the magnitude of negative excess returns following the gap-down increased with the size of the gap expressed in standard deviations, which persisted for up to three months. Gap-downs of less than two standard deviations (2σ) generated negative alpha that differed only minimally from zero. However, gaps of 2σ to 4σ in magnitude returned alpha of -1.28% on average, which increased in magnitude to -1.88% for gap-downs greater than 4σ. These results suggest not only that incorporation of the arrival of new information into prices occurs with a tradable delay but that such effects are a function of the magnitude of information implied by the size of the gap.

INTRODUCTION

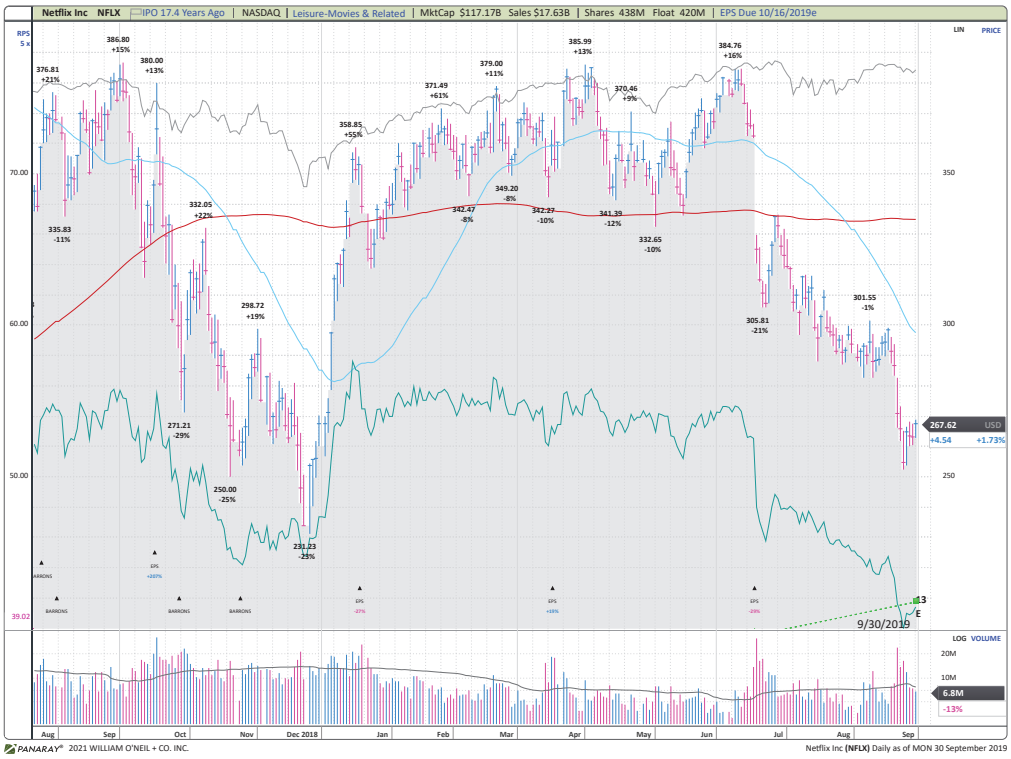

Figure 2: A four standard-deviation gap-down is observed in the price of Netflix (NFLX) on July 18, 2019 following reports of slowing subscriber growth.

In our prior brief on gap-up events (Marble & Ognar 2021), we demonstrated that gap-ups in price were on average followed by further excess returns over the ensuing 10 weeks in the direction of the gap and that the magnitude of such outperformance was related to the size of the gap.

We conjecture that gaps such as these reflect the arrival of new information that is not immediately incorporated into prices but rather incorporated with a tradable delay. It stands to reason that if the arrival of new bullish information implied by a gap-up produces momentum-like positive excess returns that, symmetrically, the arrival of bearish information implicit in a gap-down would similarly be followed by further negative excess returns, the magnitude of which might increase in some monotonic fashion with the magnitude of the gap.

METHODOLOGY

We empirically tested, over a range of gap-down size buckets, the conditional expectations of cumulative excess returns[1] following price gap-downs over the period January 1995 to September 2020. Each day, for all stocks experiencing a gap-down in price, we measured the size of the gap by dividing the log-differential of the low price on the day of the gap by the high price on the prior day then dividing by the stock-specific one-year trailing standard deviation of returns to measure the volatility-normalized size of the gap in standard deviations (σ).

We then aggregated all stocks in our U.S. universe[2] that experienced a price gap-down into gap-size buckets of 0.5–1.0, 1–2, 2–4, and greater than 4 daily standard deviations.

1 Each day, for each stock in our universe, we apply a forward-looking beta estimate using our proprietary model that weights the results of multiple OLS regressions over various timeframes together with expectations of coefficient drift and mean reversion. Excess returns are equivalent to CAPM alphas under zero risk-free rate and zero dividend yield assumptions with the S&P 500 used as a proxy for market returns.

2 Our universe construction methodology is free of survivorship bias and considers each stock each day for inclusion on the basis of investability while excluding potential confounders such as penny stocks, ADRs, ETFs, and corporate events. The bottom 20% of stocks by price and the bottom 50% by liquidity are removed, with the remaining stocks weighted by liquidity.

This resulted in a total of approximately 115,000 price gap-down events during our study period. We measured cumulative excess returns each day over a subsequent 63-day window starting with the day after the gap and standardized by each stock's individual volatility. We then aggregated the normalized excess returns according to days since the gap-down event and weighted them by liquidity so that our results are driven by the most well-known companies. We then further normalize by longer-term shifts in broader market volatility so that undue weight is not given to more volatile time periods.

RESULTS

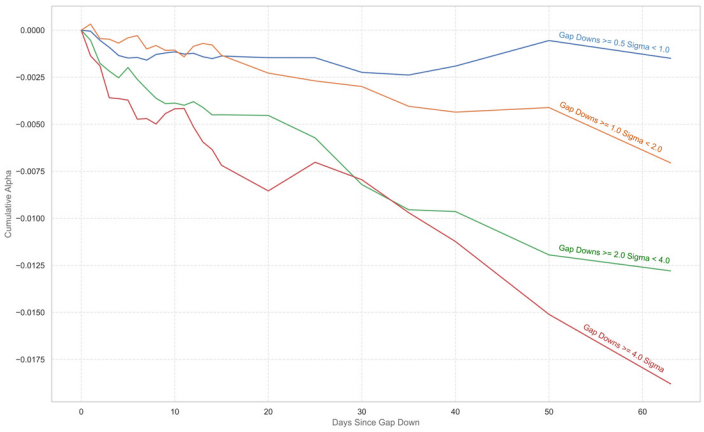

Figure 3: Cumulative excess returns by number of days since a gap-down event by gap size in standard deviations (σ) for U.S. stocks from 1995 to 2020. Excess returns are standardized by the average volatility of the companies with the event. Results for gap events occurring on the same day are aggregated and liquidity weighted, then averaged over time.

Consistent with our hypothesis, we found that the magnitude of the gap in terms of standard deviations of daily returns was related to the post-event excess returns over a period of three months after the event. As with gap-ups, 2σ proved to be a meaningful threshold, in this case for materially bearish negative expectations. The 0.5–1.0σ and 1–2σ buckets had average alpha of -0.15% and -0.71%, respectively, while the 2–4σ and greater than 4σ buckets had statistically significant average alpha of -1.28% and -1.88%, respectively. Such a monotonic relationship between gap size and subsequent alpha in the negative direction is supportive of our initial hypothesis and general theory of the momentum-like relationship between gaps and subsequent excess returns: that the greater the magnitude of the initial gap, positive or negative, the greater the magnitude of subsequent excess return expectation in the same direction as the gap.

Gap Downs, 63D Post-Event Performance by Size of Gap in StdDev (σ)–U.S. Equities

Gap Down–Gap Size	0.5σ–1.0σ	1.0σ–2.0σ	2.0σ–4.0σ	>4.0σ
Cumulative Return	0.82%	0.16%	-0.79%	-0.95%
Cumulative Alpha	-0.15%	-0.71%	-1.28%	-1.88%
Hit Rate	57.98%	56.76%	54.55%	54.10%
Average Gain	13.24%	13.19%	13.33%	15.27%
Average Loss	-14.83%	-15.50%	-16.54%	-18.02%
Average Maximum Favorable Excursion	13.00%	12.91%	12.82%	14.76%
Average Maximum Adverse Excursion	-12.80%	-13.50%	-14.79%	-16.30%

Table 1: This table shows average post-event performance statistics for the three months following a gap-down event in the U.S. from 1995 to 2020 segmented by gap size in terms of the standard deviation of daily log returns. Returns and alpha are statistically significant at the 99% confidence level. Cumulative Alpha is based on the CAPM, with the S&P 500 as a proxy for market returns. Hit Rate refers to the percentage of events on average yielding positive returns.

CONCLUSION

Our general working theory of price gaps is the suggestion that such gaps reflect the arrival of new information that is not immediately incorporated into prices but rather incorporated with a tradable delay. Such conditions imply momentum-like returns where subsequent excess returns are related to the direction of the gap, and further that the size of the gap implies the magnitude of the new information, which should be further related to future returns. Having previously demonstrated that such a relationship exists in the positive domain of gap-ups, for this relation to hold, it should exist in symmetrical fashion in the negative case of gap-downs, that is the arrival of new bearish information implicit in a gap-down would similarly be followed by further negative excess returns, the magnitude of which might increase in some monotonic fashion with the magnitude of the gap. Our results, at least over the three-month horizon following the gap, provided evidence in support of our hypothesis.

In our studies of both gap-ups and gap-downs, we focus on gaps in the most general terms and only consider their relative size. We do not distinguish between different types of gaps (e.g., Breakaway, Continuation, Exhaustion), so there remain opportunities to fine-tune our studies in the future by layering additional logical conditions and dimensions, such as market segment, trading volume, and prior trend strength/direction. Proceeding down these paths in a

systematic way, we hope to arrive at objectively useful rules that traders can use to extract the essence of otherwise subjectively backward-looking observations.

REFERENCES

Marble, T. & Ognar, R.P. (2021). *Mind the Gap Size: Look For Two Sigma or More*. Los Angeles: O'Neil Global Advisors, Inc.

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