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"Buy the Dip"

Benjamin Felix MBA, CFA, CIM®, CFP
Portfolio Manager
PWL Capital Inc.

Braden Warwick PhD
Wealth Management Research Associate
PWL Capital Inc.

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Benjamin Felix, *Portfolio Manager*, and Braden Warwick, *Wealth Management Research Associate*, PWL Capital Inc.,"Buy the Dip"

For more information about this or other publications from PWL Capital, contact:
PWL Capital – Passmore, 265 Carling Avenue, 8th Floor, Ottawa, ON K1S 2E1
Tel 613-237-5544 • 1-800-230-5544 Fax 613-237-5949
ottawa@pwlcapital.com

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1. Introduction

Heuristics, like rules of thumb, help individual investors make quick decisions under conditions of uncertainty. Investing a lump sum prior to a sharp stock price decline is an outcome that many investors fear; it seems intuitive that investing a lump sum is risky. One popular heuristic for dealing with this concern is "buying the dip." Rather than investing a lump sum of cash at the time that it becomes available, an investor may choose to hold their cash until the stock market has declined, allowing them to take advantage of lower prices while also avoiding participation in the decline that they had feared. This approach feels appealing because humans are loss averse – they fear taking losses more than missing gains.

The perceived attractiveness of "buying the dip" may become particularly pronounced when the stock market appears to be expensive based on measures like the Shiller price earnings ratio, or the market index reaching new all-time highs. Many investors take an alternative perspective; instead of waiting for a market drop out of fear, they might sit on cash hoping to make excess profits by investing after a drop and participating in a recovery. Some may even use leverage to increase their market exposure after a drop in hopes of earning excess returns.

While it seems appealing to "buy the dip", the strategy implies that available capital is sitting idle while waiting for the right time to invest. This implication raises an important question about opportunity costs. Does the opportunity cost of waiting for a drop outweigh the perceived benefit of buying low? In this paper we set out to answer that question by testing "buy the dip" strategies in six individual country stock indexes, the MSCI World index, and the MSCI World ex-US index. We find no compelling evidence in favor of waiting for market drops to invest. Instead, we find that "buying the dip" is a sub-optimal strategy in both normal times and when the market appears expensive. On average, "buying the dip" trails investing a lump sum by a wide margin over 10-year periods.

2. Analysis

To evaluate "buying the dip" as an investment strategy we compare it to lump sum investing for rolling 10-year investment periods with monthly steps. All returns are measured in USD using monthly returns for one-month US Treasury Bills and the eight stock indexes listed in Table 1.

We consider two systematic approaches to "buying the dip"; in one approach we hold one-month US Treasury bills until a 10% drop in the market, and in the second approach we hold one-month Treasury bills until a 20% drop. In both approaches we invest a lump sum into stocks immediately after the drop.

Once the dip has been bought, the lump sum and "buy the dip" strategies will both be fully invested in stocks for the remainder of the period. To drill down further we isolate periods starting with months where the stock market is at an all-time high to see if "buying the dip" is more effective when the market may be perceived as expensive due to a recent increase in total return.

Table 1 – Stock Market Indexes

Market	Index	Time Series
Australia	MSCI Australia Index (net div.)	(01/1970 - 12/2020)
Canada	S&P/TSX Composite Index	(01/1970 - 12/2020)
Germany	MSCI Germany Index (net div.)	(01/1970 - 12/2020)
Japan	MSCI Japan Index (net div.)	(01/1970 - 12/2020)
United Kingdom	MSCI United Kingdom Index (net div.)	(01/1970 - 12/2020)
United States	CRSP 1-10 Index	(07/1926 - 12/2020)
World ex-US	MSCI World ex-US Index (net div.)	(01/1970 - 12/2020)
World	MSCI World Index (net div.)	(01/1970 - 12/2020)

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc.

3. Strategy Evaluation Metrics

To evaluate "buying the dip" we measure its performance relative to investing a lump sum at contemporaneous starting points using multiple metrics.

Annualized Return: The average annualized return for 10-year contemporaneous periods allows us to compare the performance of investment strategies in terms of investment returns. All else equal a strategy with higher returns may be favorable, but all else is typically not equal which is why we evaluate multiple metrics.

Sharpe Ratio: The Sharpe Ratio measures the excess returns of a strategy over one-month Treasury bills divided by the standard deviation of the strategy's excess returns. This metric helps us to think about returns adjusted for their riskiness. A high Sharpe Ratio indicates more excess return per unit of risk.

Conditional Value at Risk (CVaR): In this paper CVaR is the average amount an investor can expect their portfolio to drop 5% of the time. A criticism of VaR is that it does not consider the worst possible outcome, or how much can one lose. CVaR overcomes this by taking the average outcome in the 5^{th} percentile.

Value at Risk (VaR): In this paper VaR is the minimum amount an investor can expect their portfolio to drop 5% of the time. It is calculated as the 5^{th} percentile of monthly returns each period and implies a 95% level of confidence that the monthly portfolio return will be above the VaR.

Outperformance frequency: The outperformance frequency is the percentage of rolling time-periods where "buying the dip" results in greater ending wealth than the lump sum strategy. It is important to note that this is not a probability based on independent samples due the significant overlap between rolling periods.

4. All Time Highs and Peaks

Investing at a peak and "buying the dip" are two sides of the same coin. Waiting to invest in anticipation of a stock price decline implies the belief that the market is at, or near, a peak. An important note is that all-time highs are not always peaks; in fact, it is rare for an all-time high to be a peak. We define a peak as an all-time high that precedes a decline of 10% or greater within 12 months and find that stock market peaks occur less than 3% of the time for all individual countries studied. It is useful for the reader to understand the frequency of all-time highs and whether they contain any useful information about expected stock returns. These results are tabulated in Table 2.

Table 2 – All-Time Highs and Peaks (US: 07/1926 – 12/2020, International: 01/1970 – 12/2020).

Market	% of ATH Months	% of ATH Months Followed by >10% Drop within 12 Months
Australia	14.68	2.45
Canada	20.88	2.61
Germany	16.64	2.12
Japan	15.01	1.47
United Kingdom	19.90	2.77
United States	23.94	1.14
World ex-US	21.86	2.12
World	29.04	2.12

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

5. Average "Buy the Dip" Results

The average annualized returns for "buying the dip" (BTD) and lump sum (LS) strategies are presented in Table 3 for each equity region under investigation. In all regions considered, lump sums have greater average annualized returns than "buying the dip" by a meaningful margin. In most countries – Australia being the exception – waiting for a 20% dip is more detrimental than waiting for a 10% dip. These results are consistent with a persistently positive expected equity risk premium.

Table 3 – Average annualized returns for "buying the dip" (BTD) and lump sum (LS) strategies for all countries considered (US: 07/1926 – 12/2020, International:01/1970 – 12/2020).

	World	World Ex US	AUS	CAN	GER	JPN	UK	US
Lump Sum	9.27%	9.04%	9.48%	9.62%	9.18%	7.74%	10.01%	10.25%
BTD (10%)	8.68%	8.37%	9.01%	8.65%	7.98%	6.99%	9.40%	8.80%
BTD (20%)	7.08%	8.01%	9.17%	8.61%	7.68%	6.72%	8.08%	6.85%
Spread (10%)	0.60%	0.67%	0.48%	0.97%	1.21%	0.76%	0.60%	1.44%
Spread (20%)	2.20%	1.03%	0.31%	1.01%	1.51%	1.02%	1.92%	3.40%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

A diversified equity investor should find most relevance in the World data but based on the dispersion of individual country outcomes it is interesting to examine a selection of the results at the country level.

5.1 World Results

Results for the World index, consisting of 23 developed markets weighted by capitalization, are available Table 4. At the 10% drop trigger "buying the dip" beats lump sums in 43.81% of rolling historical periods, and at the 20% trigger that number drops to 31.85%. On average lump sums beat "buying the dip" by 0.60% at the 10% trigger and 2.20% at the 20% trigger. Clearly the average cost of holding cash for longer periods of time is detrimental. The Sharpe Ratio monotonically decreases from lump sum to the 20% "buy the dip" strategy. There are material improvements in CVaR and VaR, but they come at the cost of all other metrics.

Table 4 – Return characteristics for MSCI World Index stock market portfolios (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	9.27%	8.68%	7.08%
Sharpe Ratio	0.35	0.34	0.28
CVaR	-9.92%	-9.03%	-7.60%
VaR	-6.71%	-6.08%	-4.39%
Outperformance %	-	43.81%	31.85%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

5.2 Canada Results

Results for the Canadian stock market are presented in Table 5. Waiting for a 10% drop beats investing a lump sum in 48.07% of the sample periods but trails lump sum investments by an annualized 0.97% while maintaining a lower Sharpe Ratio. Both VaR and CVaR are improved by "buying the dip"; not surprising considering the larger average cash allocation for this strategy. If the goal of an investor is to limit their downside risk, they may feel compelled to "buy the dip", but doing so comes at a meaningful average cost in terms of returns, risk-adjusted returns, and the frequency of outperformance. This trade-off is only made more extreme by holding out for a larger (20%) dip.

Table 5 – Return characteristics for Canadian stock market portfolios (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	9.62%	8.65%	8.61%
Sharpe Ratio	0.33	0.29	0.31
CVaR	-13.39%	-12.79%	-10.78%
VaR	-8.29%	-7.66%	-6.98%
Outperformance %	-	48.07%	34.89%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

5.3 US Results

With the longest time series, the US data make for an insightful investigation; the summary data are available in Table 6. Lump sums in the US market data are particularly difficult to beat. Delaying investments for a market decline decreases annualized returns and Sharpe Ratios monotonically. As expected, due to the larger cash allocations throughout most sample periods, "buying the dip" improves VaR and CVaR at the cost of all other metrics in consideration.

Table 6 – Return characteristics for US stock market portfolios (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	10.25%	8.80%	6.85%
Sharpe Ratio	0.47	0.42	0.37
CVaR	-10.48%	-9.82%	-8.62%
VaR	-7.28%	-6.65%	-5.65%
Outperformance %	-	46.56%	36.81%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

5.4 Japan Results

From 1990 through 2020 the Japanese stock market trailed one-month US Treasury bills. This unique stock market experience affects the efficacy of our buy the dip strategies, with more than 50% of samples outperforming lump sum investments. Despite a higher frequency of underperformance, the average lump sum investment still comes out ahead in terms of average annualized returns and risk-adjusted returns. This is largely driven by the exceptionally high returns in the early portion of the sample. Improvements in VaR and CVaR for "buying the dip" over lump sums are less pronounced than other samples, though still evident.

Table 7 – Return characteristics for Japanese stock market portfolios (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	7.74%	6.99%	6.72%
Sharpe Ratio	0.24	0.20	0.20
CVaR	-11.25%	-11.15%	-10.51%
VaR	-8.67%	-8.34%	-7.55%
Outperformance %	-	58.62%	53.75%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

6. "Buying the Dip" at All-time Highs

We have seen evidence that "buying the dip" is a strategy that may accomplish the singular goal of improving the worst outcomes while negatively affecting performance evaluation metrics more relevant to a long-term investor. Improving the worst outcomes may seem compelling when the market is reaching new all-time highs. To test the relationship, we isolate 10-year periods starting in months where the market reached a new all-time high.

The summary data are available in Table 8. There are two countries, Canada and Germany, where "buying the dip" (20%) outperforms lump sums starting at all-time high months. We are hesitant to draw any conclusions from this result considering that the four other countries in the sample showed the opposite result. In addition, the World and World ex-US markets see "buying the dip" (20%) trail the lump sums by an average annualized 1.31% and 0.22% respectively when starting at all-time high months.

Table 8 – Average annualized returns for "buying the dip" (BTD) and lump sum (LS) strategies for all countries considered, filtered for all-time high starting months (US: 07/1926 – 12/2020, International:01/1970 – 12/2020).

	World	World Ex US	AUS	CAN	GER	JPN	UK	US
Lump Sum	8.86%	8.29%	8.34%	8.94%	8.05%	13.00%	8.65%	7.96%
BTD (10%)	8.62%	8.11%	7.13%	8.44%	6.90%	11.31%	8.35%	6.40%
BTD (20%)	7.55%	8.07%	8.25%	9.33%	8.25%	10.62%	7.66%	5.28%
Spread (10%)	0.24%	0.18%	1.21%	0.50%	1.15%	1.69%	0.30%	1.56%
Spread (20%)	1.31%	0.22%	0.08%	-0.39%	-0.20%	2.38%	0.98%	2.68%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

6.1 World Results

Across the capitalization weighted index of 23 developed market countries all-time highs are more frequent than any individual country in our sample, while peaks occur with a similar frequency. This example of diversification at work extends to the "buy the dip" outcomes which trail lump sum investments on average, and trail in most of the rolling periods examined. At the 20% dip, we see a lower frequency of outperformance than any other equity index in our sample. These data are available in Table 9.

Table 9 – Return characteristics for MSCI World Index stock market portfolios at All-Time Highs (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	8.86%	8.62%	7.55%
Sharpe Ratio	0.30	0.30	0.25
CVaR	-10.22%	-8.98%	-7.69%
VaR	-6.47%	-6.07%	-4.82%
Outperformance %	-	46.04%	33.09%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

6.2 Canada Results

In Canada, 20.88% of months were all-time highs measured by the total return index. The subset of 10-year periods starting with these months proves that it is possible for "buying the dip" to be successful. Unfortunately, the result is inconsistent within its own sample, with only the 20% drop signal producing a favorable result.

Table 10 – Return characteristics for Canadian stock market portfolios at All-Time Highs (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	8.94%	8.44%	9.33%
Sharpe Ratio	0.29	0.27	0.34
CVaR	-13.57%	-13.01%	-10.95%
VaR	-8.55%	-8.03%	-7.37%
Outperformance %	-	46.09%	56.52%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

6.3 US Results

The US stock market has the most frequent all-time high occurrence (23.94%) and the least frequent peak (all-time high followed by a 10% or greater drop (1.14%)) occurrence in the sample. Based on this it is not a surprise to see lump sums delivering superior average performance and risk-adjusted performance and outperforming in the majority of all-time high samples.

Table 11 – Return characteristics for US stock market portfolios at All-Time Highs (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	7.96%	6.40%	5.28%
Sharpe Ratio	0.35	0.28	0.23
CVaR	-11.33%	-10.20%	-9.71%
VaR	-8.27%	-7.69%	-7.08%
Outperformance %	-	42.29%	37.00%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

6.4 Japan Results

Japan's experience is characterized by a concentration of frequent all-time highs early in the sample followed by a decades-long drought. Investing lump sums at all-time highs early in the sample proved a fruitful strategy due to the persistently steep market increases.

Table 12 – Return characteristics for Japanese stock market portfolios at All-Time Highs (01/1970 – 12/2020).

	Lump Sum	BTD (10%)	BTD (20%)
Annualized Return	13.00%	11.31%	10.62%
Sharpe Ratio	0.34	0.28	0.26
CVaR	-12.77%	-12.43%	-11.28%
VaR	-9.73%	-9.46%	-8.35%
Outperformance %	-	41.46%	40.24%

Source: Benjamin Felix & Braden Warwick, PWL Capital Inc., Data source: Dimensional Returns Web

7. Borrowing to "Buy the Dip"

A common idea when markets decline is that it may be wise to borrow funds to invest in stocks that have become less expensive. This concept is a special case of "buying the dip." Access to leverage at the time the markets have declined implies access to leverage prior to the drop. If an optimal investment policy includes leverage after a market decline, the same investment policy should have already been in place. We have demonstrated that delaying the deployment of an ideal investment policy to wait for a 10% or 20% market decline produces consistently inferior average results compared to deploying the investment policy as soon as it has been established. This conclusion applies to leverage in the same way that is applies to deploying uninvested cash. If it is possible, and palatable, for an investor to borrow to "buy the dip", they should be borrowing now.

8. Conclusion

The concept of “buying the dip” is a casually appealing strategy where an investment is delayed until the market has declined. To test this strategy, we devise a simple experiment, where lump sum investments are compared to buy the dip strategies triggered by 10% and 20% declines in the total return index, for 10-year rolling periods with a monthly step. In six countries, the MSCI World index, and the MSCI World ex-US index we find that “buying the dip” has a meaningful cost in terms of annualized returns. The strategy is successful in improving the worst outcomes relative to a lump sum investment, but this is driven by the large average cash allocation that a buy the dip strategy maintains while waiting for a market decline. This fact holds even when periods starting with all-time highs are isolated. When markets decline, it is common to hear the phrase “buy the dip” in reference to using leverage to take advantage of the decrease in stock prices. Given the average underperformance of our buy the dip strategies, it is clear that investors are better off deploying their optimal investment policy at the time that it is established rather than waiting for a market decline. This extends to the use of leverage; if borrowing to invest would be acceptable as an investment policy after a decline, a better average result would be obtained by deploying it immediately.

The Authors

Benjamin Felix MBA, CFA, CIM®, CFP
Portfolio Manager

PWL Capital Inc.
www.pwlcapital.com/author/benjamin-felix

CONTACT

Braden Warwick PhD
Wealth Management Research Associate

PWL Capital Inc.

CONTACT

PWL

www.pwlcapital.com/teams/passmore-felix

PWL Montreal
3400 de Maisonneuve O.
Suite 1501
Montreal, Quebec
H3Z 3B8

T 514.875.7566
1-800.875.7566
F 514.875.9611
montreal@pwlcapital.com
www.pwlcapital.com/montreal

PWL Ottawa
265 Carling Avenue,
8th Floor,
Ottawa, Ontario
K1S 2E1

T 613.237.5544
1-800.230.5544
F 613.237.5949
ottawa@pwlcapital.com
www.pwlcapital.com/ottawa

PWL Toronto
8 Wellington Street East
3rd Floor
Toronto, Ontario
M5E 1C5

T 416.203.0067
1-866.242.0203
F 416.203.0544
toronto@pwlcapital.com
www.pwlcapital.com/toronto

PWL Waterloo
20 Erb St. West
Suite 506
Waterloo, Ontario
N2L 1T2

T 519.880.0888
1-877.517.0888
F 519.880.9997
waterloo@pwlcapital.com
www.pwlcapital.com/waterloo