



A Leveraged Portfolio Management Approach Applying The CBOE Russell 2000 PutWrite Index

The CBOE Russell 2000 PutWrite Index (PUTRSM Index) is an index that depicts a systematic cash secured put selling investment strategy. The index represents the performance that would be expected from owning a portfolio selling at the money Russell 2000 (RUT) put options against collateralized cash reserves held in a money market account. The strike price of the put options is based on a level that is the nearest strike just below the Russell 2000 on the dates that the strategy is rebalanced. Over most of the time periods analyzed, PUTR has tended to outperform the total return of a portfolio that replicates the total return of the Russell 2000 on both an absolute and risk adjusted basis. After analyzing historical returns, the authors took a look at applying the PUTR strategy in a leveraged portfolio. The result is that, based on historical returns, a leveraged PUTR strategy has outperformed the total return of the Russell 2000 while experiencing less volatility than a portfolio mirroring the Russell 2000.

PUTR Index Construction

The strategy that is depicted by the performance of PUTR is rolled on the standard third Friday option expiration date each month. RUT put options that expire on the following standard expiration date will be sold against a hypothetical cash account. The strike price of the put options is based on the level of the Russell 2000 at 10:00 am central time. The RUT strike price that is closest to, but less than, the Russell 2000 at 10:00 am central time is then chosen to be the put option sold as part of the strategy. Finally, a volume weighted average price (VWAP) from 10:30 am to 11:00 am central time is calculated and recorded as the premium received for selling this put.

For example –

July 21, 2017 – the last Russell 2000 quote before 10:00 am central time = 1435.66

The strike price closest to, but less than 1435.66 is 1435.

The premium for the RUT Aug 1435 Put is determined through the VWAP from 10:30 am to 11:00 am central time (in this case the outcome was 16.90).

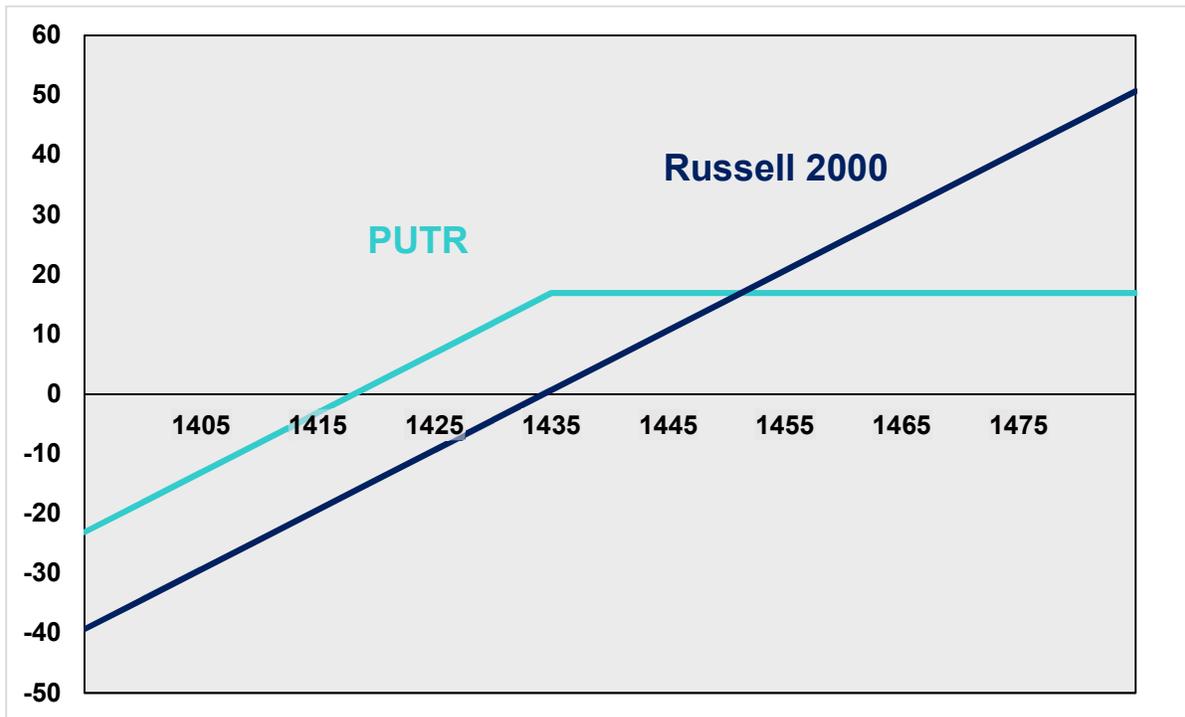
On Friday, August 18, 2017, this option will expire based on the Russell 2000 special opening quotation price (RLS) with cash settlement resulting if the option is in-the-money.

This process is then repeated at 10:00 am central time on August 18 when an appropriate number of standard September put options are sold against the cash portfolio.

PUTR Payoff Diagram

The payoff diagram in Figure 1 below compares the profit and loss of PUTR and the Russell 2000 at different price levels for August expiration. At any price level below 1451.24, PUTR outperforms the Russell 2000. This 1451.24 level is determined by adding the premium received for selling the options (16.90) to the Russell 2000 reference strike price (1435.66).

Figure 1 – Payoff Diagram Comparing PUTR and Russell 2000



Data Adjustment

Since PUTR is rebalanced on the standard option expiration date of each month, the month-to-month performance comparisons were measured taking these dates into consideration. For example, the performance for September would incorporate the Russell 2000's performance from the standard third Friday expiration date in August to the standard third Friday expiration date in September. Obviously, this is not the typical method of calculating monthly performance, but the authors believe this is a more accurate depiction of performance if these strategies are being replicated in a portfolio since positions are initiated and rebalanced on those dates.

The data used in this paper for the performance of PUTR was obtained from the Chicago Board Options Exchange® (CBOE®) and the total return data for the Russell 2000 was sourced from Bloomberg. Based on data availability, all calculations in this paper begin with the February 2001 option expiration, which was February 16, 2001, and run through June 16, 2017, which was also a standard option expiration date. The result is over sixteen years of performance data which represents a wide variety of market scenarios.

Performance and Risk Comparison

The average annual return for PUTR from expiration in February 2001 through June 2017 was 8.45% with an annualized standard deviation of 14.55%. Over the same time period, the average annualized total return for the Russell 2000 was 7.99% with an annualized standard deviation of 21.73%. Therefore, on a risk adjusted and an absolute basis, the PUTR strategy outperformed the total return for the Russell 2000.

After taking a look at the annualized standard deviation of PUTR relative to that of the Russell 2000, we explored implementing a leveraged PUTR strategy and compared it to the Russell 2000. This was done in increments of 10% leverage from 110% to 150%. The assumption is made that leveraged performance of the PUTR strategy is easily replicated by a portfolio manager. One method of implementing a leveraged PUTR portfolio will be demonstrated later in this paper. The annualized returns along with the annualized volatility of those returns appear in Table 1.

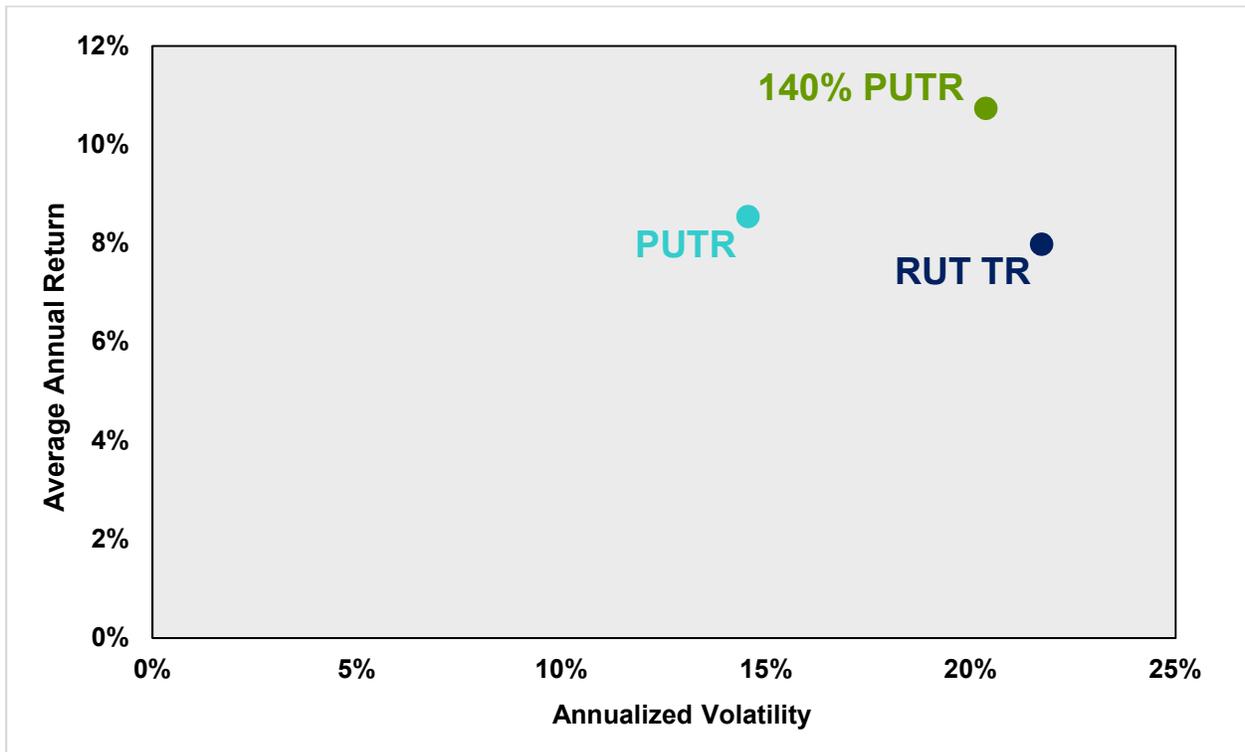
A component of the PUTR strategy involves returns equal to the three month and one month US T-bill rates. For leveraged returns, we adjusted the per-period performance down by the amount of leverage implemented by the three month rate. The authors felt this adjustment was warranted to account for the lower interest earned by the cash deposit to account for any potential cost of margin.

Table 1 – Leveraged PUTR Performance vs. Russell 2000 Total Return: Feb 2001 – Jun 2017

	Russell 2000	PUTR	110% PUTR	120% PUTR	130% PUTR	140% PUTR	150% PUTR
Avg. Annual Return	7.99%	8.54%	9.14%	9.70%	10.24%	10.73%	11.20%
Annualized Volatility	21.73%	14.55%	16.00%	17.46%	18.91%	20.36%	21.82%

We discovered that a strategy that returns 140% of the historical PUTR performance has a lower annualized standard deviation relative to the Russell 2000. In addition to having less volatility than unleveraged direct exposure to the Russell 2000, the 140% leveraged portfolio also outperformed the Russell 2000 by an average of just over 370 basis points. A risk-return profile showing the leveraged PUTR portfolio, unleveraged PUTR portfolio, and Russell 2000 total return appears in Figure 2.

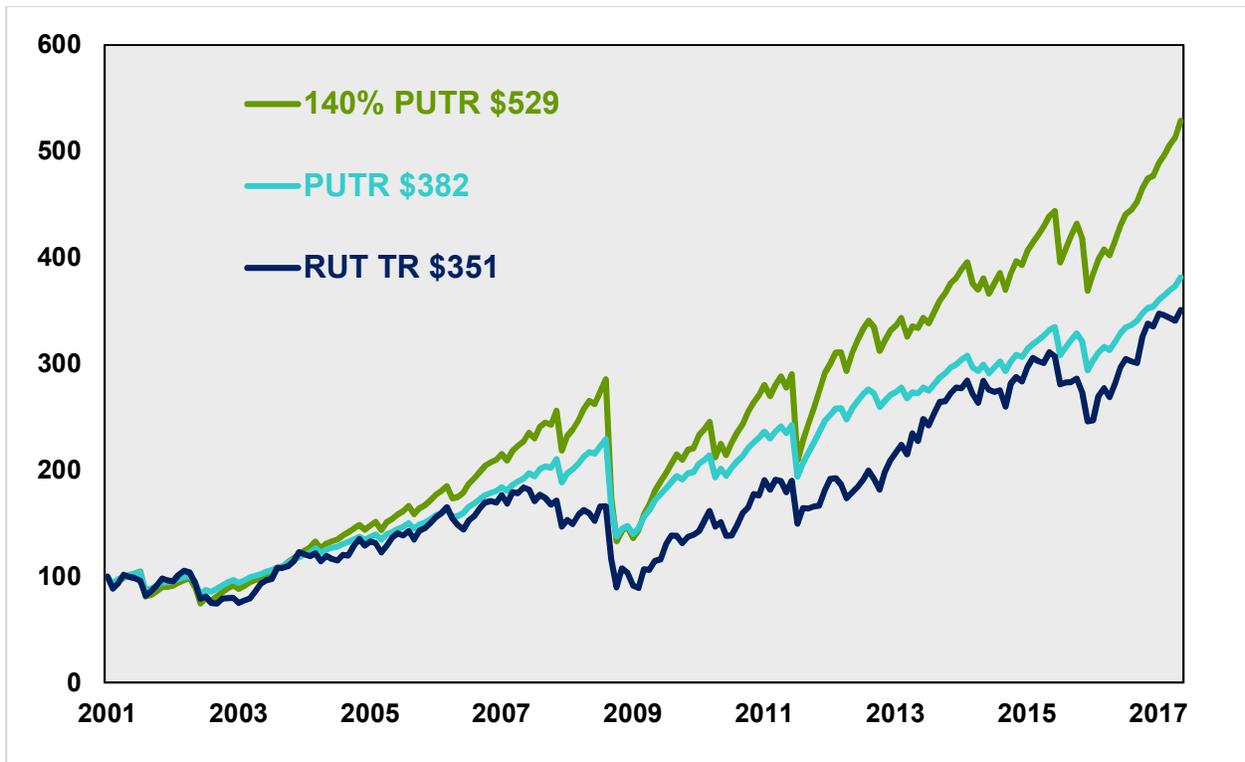
Figure 2 – Annualized Returns versus Risk for Russell 2000, PUTR, and 140% PUTR



Over the sixteen plus years of data analyzed, a 140% leveraged portfolio constructed using the PUTR methodology outperformed a buy and hold strategy for the Russell 2000. This improved relative and absolute performance was achieved with slightly less risk than a buy and hold Russell 2000 portfolio.

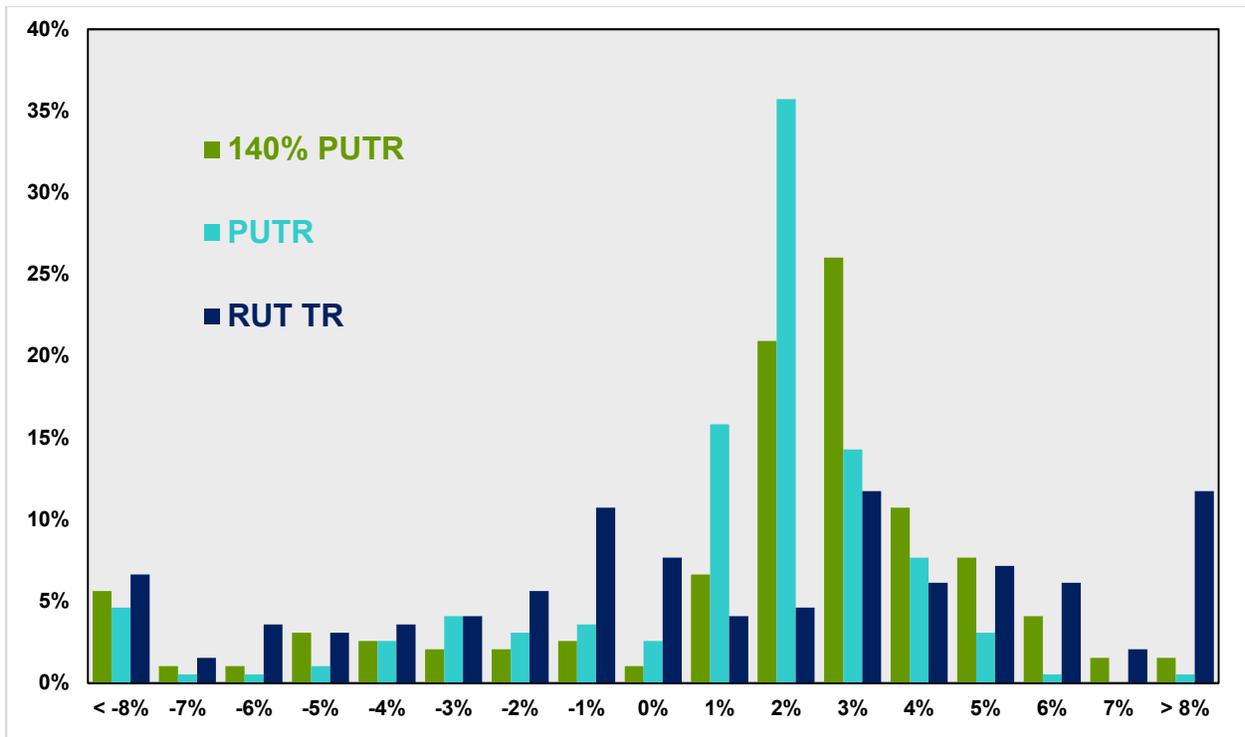
Figure 3 shows the growth of \$100 from February 2001 through June 2017. One hundred dollars invested in a portfolio that matched the total return of the Russell 2000 would be worth \$351. A portfolio that matched the unleveraged performance of PUTR would result in a value of \$382, while a portfolio that matched a 140% leveraged return of PUTR would be worth \$529.

Figure 3 – Growth of \$100 Invested in Russell 2000, PUTR, and 140% PUTR Portfolios



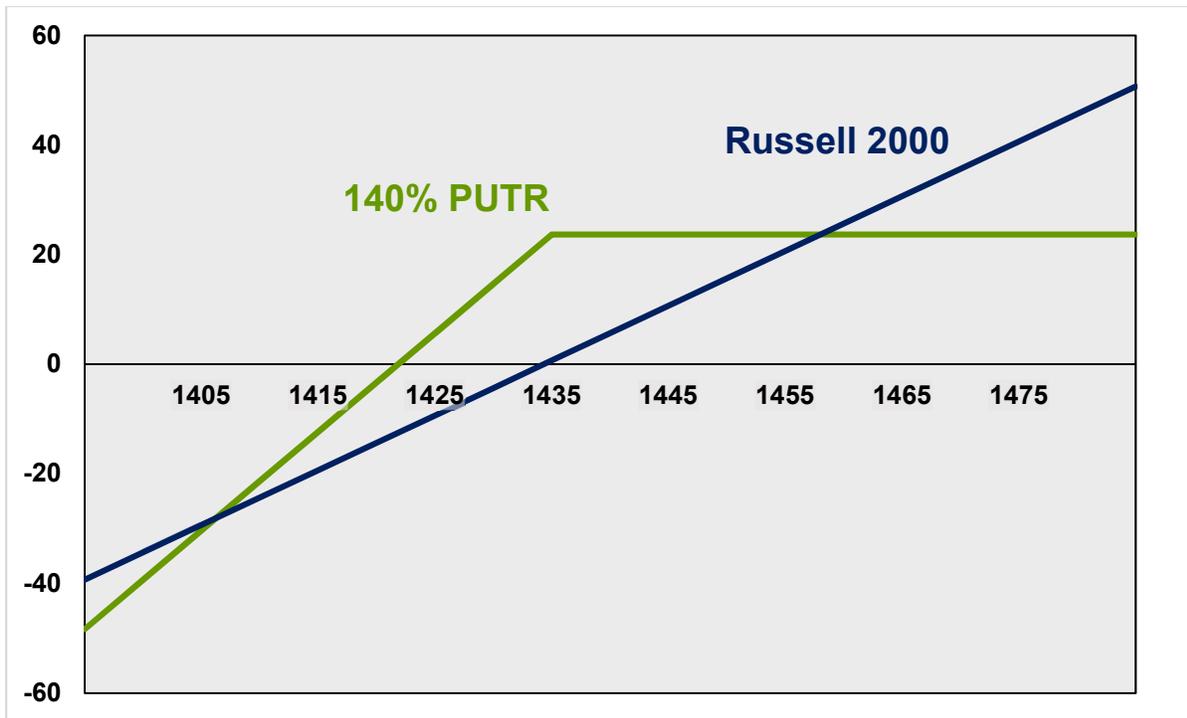
It is worth noting that the leveraged performance of PUTR resulted in very substantial losses during bear market periods. Specifically, during the great financial crisis period between September 2008 and February 2009 the 140% leveraged PUTR strategy was down about 52%. However, over this same time period the total return for the Russell 2000 was down about 45% while the unleveraged PUTR return experienced a loss of 39%. The histogram in Figure 4 shows the frequency of returns from roll date to roll date for the Russell 2000, PUTR, and 140% leveraged PUTR.

Figure 4 – Distribution of Expiration to Expiration Returns for Russell 2000, PUTR, and 140% PUTR



RUT put selling strategies are expected to underperform their underlying market during bullish periods. However, the 140% leveraged PUTR strategy also tends to underperform during bearish market periods. The payoff diagram in Figure 5 illustrates why the leveraged strategy performed poorly on a relative and absolute basis during bear market periods. Note this payoff diagram differs slightly from the one in Figure 1, which mirrored the unleveraged payoff for PUTR. The difference is that the leveraged PUTR strategy tended to underperform when the Russell 2000 moved significantly higher in a month and also when the Russell 2000 moved significantly lower.

Figure 5 – Payoff Diagram Comparing 140% Leveraged PUTR and Russell 2000



Replicating a Leveraged PUT Performance

When an equity put option is sold the seller receives a premium for taking on the obligation to purchase the underlying stock or exchange traded fund. Many money managers will sell put options on individual stocks with the intent of taking delivery. This strategy is referred to as a cash-secured put where the seller of the put option has the cash available to make good on the obligation to purchase shares, or the obligation is 'covered' by cash available in the account. The PUTR strategy is theoretically similar to a cash-secured put.

Replicating the performance of PUTR is a fairly simple process. RUT put options are sold against a cash portfolio based on the cash in the account and the notional value of the put option. The portfolio must have enough cash to cover the maximum potential loss associated with the short put positions. In the case of PUTR this would occur if the Russell 2000 were at zero on the settlement date. The notional value of the RUT Aug 1435 Put sold in the previous example would be \$143,500, applying the option multiplier of \$100 x the 1435 strike price. The premium received also figures into the equation, as those proceeds would be received when the option is sold. In the previous example the RUT Aug 1435 Put was sold for 16.90 or \$1,690 per contract, so the maximum potential loss for each put option sold would be \$141,810.

Consider if a \$1,000,000 portfolio were going to implement the PUTR strategy. The first step would involve depositing \$1,000,000 into an interest bearing account. Then an appropriate number of RUT put options would be sold against the cash portfolio. Since each option has a maximum potential loss of \$141,810, the portfolio manager would sell seven puts ($\$1,000,000 / \$141,810 = 7.05$).

To replicate the 140% leveraged PUTR approach the manager would follow the previous steps, but would sell a number of put options based on 140% of the cash value of the account. In the case of a \$1,000,000 account the manager would approach selling put options as if the account held \$1,400,000. If the portfolio manager chose to begin a program tracking the performance that matches the 140% leveraged PUT with a \$1,000,000 portfolio the following transactions would occur -

1. Deposit \$1,000,000 in an account returning the three month Treasury bill rate.
2. Based on the leveraged amount of \$1,400,000, the manager decides to sell ten options ($\$1,400,000 / \$141,810 = 9.87$)
3. The executed option trade sells 10 RUT Aug 1435 Puts at 16.90 – for net proceeds of \$16,900 (excluding commissions).
4. Deposit the proceeds from selling the options into an account that returns a Treasury bill rate.

The portfolio value is \$1,016,900, which is the combination of the original deposit of \$1,000,000 and \$16,900 received for selling the RUT put options. The portfolio also has the following two positions –

Cash \$1,016,900
Short 10 RUT Aug 1435 Puts at 16.90

On each roll date an appropriate number of the relevant RUT options would be sold based on 140% of the amount of cash in the account. At settlement if the short RUT put option position is in the money the account will incur a debit. The number of put options to be sold on the roll date will be determined with the amount of cash in the account dictating the position.

Conclusion Over the sixteen plus years analyzed, the CBOE Russell 2000 PutWrite Index has outperformed the total return that would be expected from passively holding a market portfolio. This outperformance occurred on both an absolute and risk-adjusted basis. Additionally, a strategy that mirrors the PUTR Index but sells RUT puts based on 140% of the cash value of an account has historically outperformed a buy and hold portfolio with lower annualized volatility.

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