

ACTIVE / PASSIVE BLENDING BASED ON THE LIQUIDITY PREMIUM: A practical study

Garrett H Brookes, CFA

ABSTRACT

The merits of active and passive investing have been explored extensively in volumes of academic research where the superiority of each approach has been debated at length. We acknowledge the advantages of each by preferring a blended portfolio approach which includes both active and passive strategies to achieve our objectives.

Our study is conducted from a practical perspective. It relies on widely available information, accessible real investments, and operationally feasible processes. We propose the liquidity premium described by the spread between the yield of US Treasury 10-Year and 3-Month securities as an indicator for allocating to active or passive strategies. Our proposal is tested by simulating an active/passive blended portfolio allocating regular, bimonthly new money contributions through a fourteen-year period of wealth accumulation. Our total blended portfolio includes a passive strategy represented by an unmanaged buy-and-hold portfolio of an equally weighted S&P 500 ETF, and an active strategy represented by a Cap Weighted S&P 500 ETF & Cash portfolio which tactically manages its equity allocation according to the NAAIM Exposure Index. Our proposed allocation method, the Liquidity Premium Blend, allocates its new money portfolio contributions to the active strategy in periods of low liquidity premium and to the passive strategy in periods of high liquidity premium. The intent is to achieve enhanced portfolio efficiency through risk management while minimizing its opportunity cost to returns. Investment performance presentation includes total returns with reinvested dividends. Our final analysis uses internal rate of return as its performance measure to evaluate alternative active/passive allocation sequences. We draw conclusions primarily based on risk adjusted portfolio efficiency.

As background for our strategy simulation, the study begins with a review of the US Treasury 10-Year Minus 3-Month spread data. We explore the performance of the S&P 500 through periods

of high and low liquidity premium. The chosen ETFs are also examined through these periods for perspective. Our active strategy is defined after a review of the NAAIM Exposure Index historical data.

Ultimately, the simulation results supported our proposal, suggesting liquidity premium serves as an effective indicator for efficiently blending active and passive management through portfolio contribution allocations. The rate of return for our Liquidity Premium Blend outperformed all other blended portfolio methods we tested. Its portfolio efficiency described by our modified Sharpe ratio was second only to the active strategy. It beat its comparable randomized allocation method's rate of return by 50bps and better efficiency. The most significant implications for wealth management and financial planning practitioners are:

1. In all simulations, blending the active strategy: NAAIM Tactical Risk Managed with the passive strategy improved portfolio efficiency and reduced drawdowns versus the passive-only methodologies.
2. Liquidity premium measured by the spread between the US Treasury 10-year and 3-Month serves as an effective indicator for efficiently allocating between the active and passive strategies.
3. This Liquidity Premium Blend method can be customized for client objectives and risk tolerance.

ACTIVE / PASSIVE BLENDING BASED ON THE LIQUIDITY PREMIUM: A practical study

Garrett H Brookes, CFA

INTRODUCTION

The merits of active and passive investing have been explored extensively in volumes of academic research where the superiority of each approach has been debated at length. We acknowledge the advantages of each by preferring a blended portfolio approach which includes both active and passive strategies to achieve our objectives.

In this paper we will explore liquidity premium as an indicator for blending active and passive strategies through allocations of regular, new money portfolio contributions. We will consider a passive strategy represented by an unmanaged buy-and-hold exposure to equity beta, and an active strategy represented by an equity/cash portfolio which tactically manages its equity beta level. Our proposed method, the Liquidity Premium Blend, allocates its new money portfolio contributions to the active strategy in periods of low liquidity premium and to the passive strategy in periods of high liquidity premium. The intent is to achieve enhanced portfolio efficiency through risk management while minimizing its opportunity cost to returns.

Our study is conducted from a practical perspective. It relies on widely available information, accessible real investments, and aims for operational feasibility. We will simulate our proposed blending method through a wealth accumulation pattern of regular, bimonthly contributions made by the typical investor saving for retirement. Investment performance presentation will account for total returns, including the compounding effect of reinvested dividends. Our final analysis uses internal rate of return as its performance measure to evaluate alternative active/passive allocation sequences. We draw conclusions primarily based on risk adjusted portfolio efficiency.

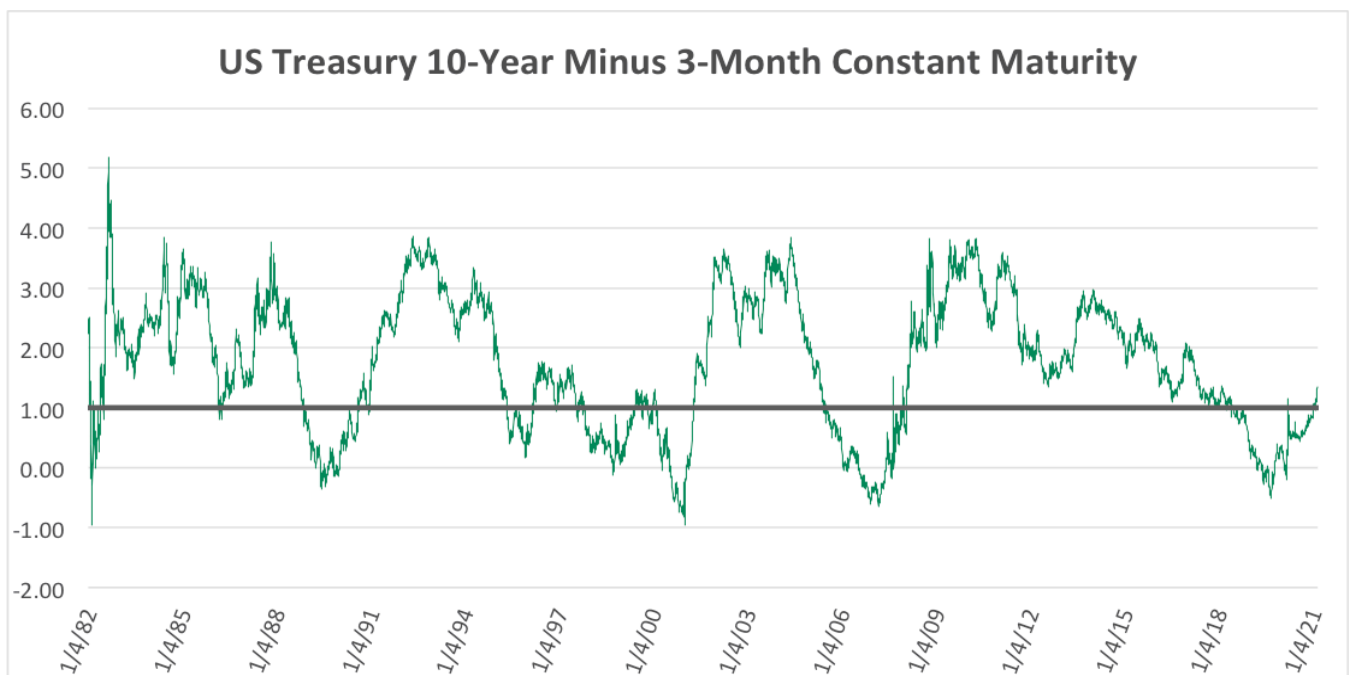
The liquidity premium occurred as a natural fit for our indicator owing in part to its pattern of cyclicity and our acceptance of The Liquidity Preference Theory^{1,2}. While there are many

measures of liquidity premium, some directly derived from US equity market data, we selected US Treasury yield spreads as our strategy's indicator. From a practical perspective yield spread data is readily available. From a philosophical perspective, as "risk free" assets we believe treasuries are a purer indication of broad liquidity premium and are less susceptible to "noise". We accept this broader measure of liquidity premium believing capital flows freely between public markets.

BACKGROUND

Studying the raw yield spread data: 1/4/1982 – 2/23/2021

In preparation for this study, we considered a variety of US Treasury yield spreads and settled on the 10-Year Minus 3-Month to define our liquidity premium periods. This spread was selected for its relatively smooth cycles over decades of our observation. This would allow our proposed methodology to be practical for real world implementation. Additionally, we felt these durations best match the durations of the assets included in the study; equities carrying a long duration while "cash" assets are fairly represented by the 3-Month maturity. This information is readily available on Federal Reserve Bank of St. Louis economic research website³, in a constant maturity format which is free and easy to access.



US Treasury 10-Year Minus 3-Month Constant Maturity Statistics

1/4/1982 - 2/23/2021	
Total observations	9787
Maximum Value	5.18
Minimum Value	-0.96
Average	1.74096761
Median	1.8
Mode	1.92
Standard Dev	1.120893684
Kurtosis	-0.957030843
Skew	-0.10971558
Days greater than .999	6986.00
Avg consecutive Days	136.98
Days Less than 1	2800.00
Average Consecutive Days	56.00

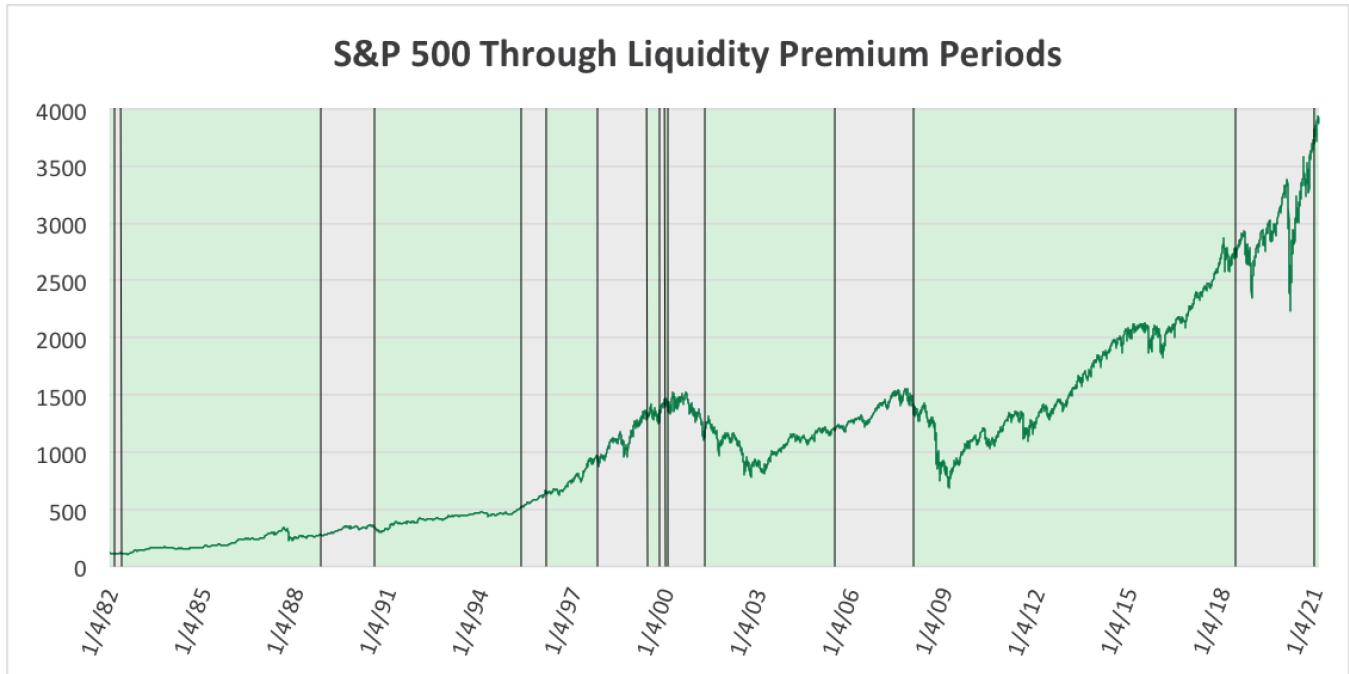
This data led us to designate 1% as the threshold to define periods of low liquidity risk premium and high liquidity risk premium which determine the active/passive allocation of new money contributions to our blended portfolio. We intentionally sought a level that led to longer high premium periods while avoiding frequent signal changes. This was because our Liquidity Premium Blend strategy is intended to be applied over long periods of wealth accumulation, and we believe that equity prices rise over time. The 1% level achieved both of these objectives, with days at or above 1% representing approximately 70% of observations, and days below 1% representing approximately 30% of all observations. After selecting the 1% level as our threshold we defined start and stop dates for high premium and low premium periods by requiring 15 consecutive days at a new level (above or below the 1% threshold) to confirm a period change. Fifteen days was chosen as the smoothing number because no transitional period exceeded this timeframe, and the study does not include new money contributions more frequently than 15 days.

Smoothed Liquidity Premium Periods

HIGH PREMIUM PERIODS: 1% +			LOW PREMIUM PERIODS: LESS THAN 1%		
Beginning Date	Ending Date	Number of Days	Beginning Date	Ending Date	Number of Days
1/8/21	2/23/21	31	6/15/18	1/7/21	640
1/22/08	6/14/18	2604	6/22/05	1/18/08	646
4/9/01	6/21/05	1049	1/31/00	4/6/01	299
12/28/99	1/28/00	23	10/29/99	12/27/99	39
6/1/99	10/28/99	105	10/22/97	5/28/99	401
2/20/96	10/21/97	421	5/5/95	2/16/96	198
8/6/90	5/4/95	1186	11/14/88	8/3/90	432
5/19/82	11/10/88	1619	3/2/82	5/18/82	55
1/4/82	3/1/82	39			
	Total	7046			2710
	Average Days in Period	880.75			338.75
	StD	917.5686			235.8812
	Percent of Time	72.22%			27.78%

S&P 500 THROUGH OUR DEFINED LIQUIDITY PREMIUM PERIODS

With Liquidity Premium Periods defined, we observed the S&P 500 through these timeframes to better understand how the broad equity market performed and anticipate any impact to our proposed methodology. This would provide an initial indication if the strategy could achieve its intended objectives and potentially explain future results. Cumulative returns for each liquidity premium period were annualized, along with standard deviation of daily returns. A weighted average was then applied to compare returns and price volatility between periods of high liquidity premium and low liquidity premium.



S&P 500 Performance by Liquidity Premium Periods

Liquidity Premium Environment	Period	Cumulative Return	Annualized Return	StDev of Daily Returns	Annualized StD of Daily Returns
Low	6/15/18 - 1/07/21	36.84%	19.59%	0.0152	0.2460
High	1/22/08 - 6/14/18	112.30%	11.13%	0.0128	0.2061
Low	6/22/05 - 1/18/08	9.17%	5.08%	0.0082	0.1328
High	4/09/01 - 6/21/05	6.68%	2.28%	0.0116	0.1875
Low	1/31/00 - 4/06/01	-19.08%	-22.77%	0.0145	0.2342
High	12/28/99 - 1/28/00	-6.69%	-66.67%	0.0142	0.2286
Low	10/29/99 - 12/27/99	6.91%	86.89%	0.0081	0.1303
High	6/01/99 - 10/28/99	3.72%	13.54%	0.0116	0.1871
Low	10/22/97 - 5/28/99	34.42%	30.90%	0.0132	0.2131
High	2/20/96 - 10/21/97	51.76%	43.57%	0.0087	0.1402
Low	5/05/95 - 2/16/96	24.58%	49.95%	0.0057	0.0917
High	8/06/90 - 5/04/95	55.65%	14.59%	0.0073	0.1177
Low	11/14/88 - 8/03/90	28.81%	23.85%	0.0081	0.1315
High	5/19/82 - 11/10/88	138.20%	21.61%	0.0116	0.1881
Low	3/02/82 - 5/18/82	2.80%	20.11%	0.0082	0.1319
High	1/04/82 - 3/01/82	7.14%	90.69%	0.0109	0.1754
		Avg Annualized Return		Avg Annualized StD of Daily Returns	
Average for Low Liquidity Premium Periods		17.01%		0.1793	
Average for High Liquidity Premium Periods		14.96%		0.1800	

The results were interesting and likely carry implications for additional research beyond the scope of this study. Risk, or price volatility was nearly identical for the high and low premium periods. Returns, on the other hand, were approximately 2% annualized higher in our low liquidity premium periods. Considering that low liquidity premium is typical in later stages of the business cycle, we assume this is the result of strong price momentum. This was interesting to observe because our Liquidity Premium Blend method will allocate new money contributions to the active strategy during these low premium periods when momentum is strong and likely to cause an increase in the passive strategy's proportional share of the total blended portfolio. The original motivation of our Liquidity Premium Blend was to have new money contributions actively allocated between equity and cash when there is little premium being paid for the illiquidity risk of long duration assets. This analysis of S&P 500 performance through our liquidity premium periods shows that our methodology should also strategically help maintain balance between active and passive allocations.

METHODS

Defining Investments and Their Performance Measures

For practicality, this study uses a couple of the largest and most tenured Exchange Traded Funds (ETFs) to simulate investment results. They are available on most no-transaction fee trading platforms and are increasingly available in fractional shares, adding to their accessibility. All performance presentation of investment results for our active and passive strategies including final simulations are calculated using the Total Return Price (Forward Adjusted) available through YCharts⁴. The Total Return Price (Forward Adjusted) allows us to simulate dividend reinvestment, a key component of long-term investing. Its formula is:

$$\text{Total Return Level} = \text{Actual Price} \times \text{Split Factor} \times \text{Dividend Adjustment Factor}$$

$$\text{Split factor} = 0.5 \text{ for a 2 for 1 split, } 0.33 \text{ for a 3 for 1 split, etc.}$$

$$\text{Dividend Adjustment Factor} = (1 + \text{Value of Dividend} / \text{Previous Day's Close Price})$$

Risk is presented as standard deviation of daily returns calculated as a weighted average of portfolio components' daily returns.

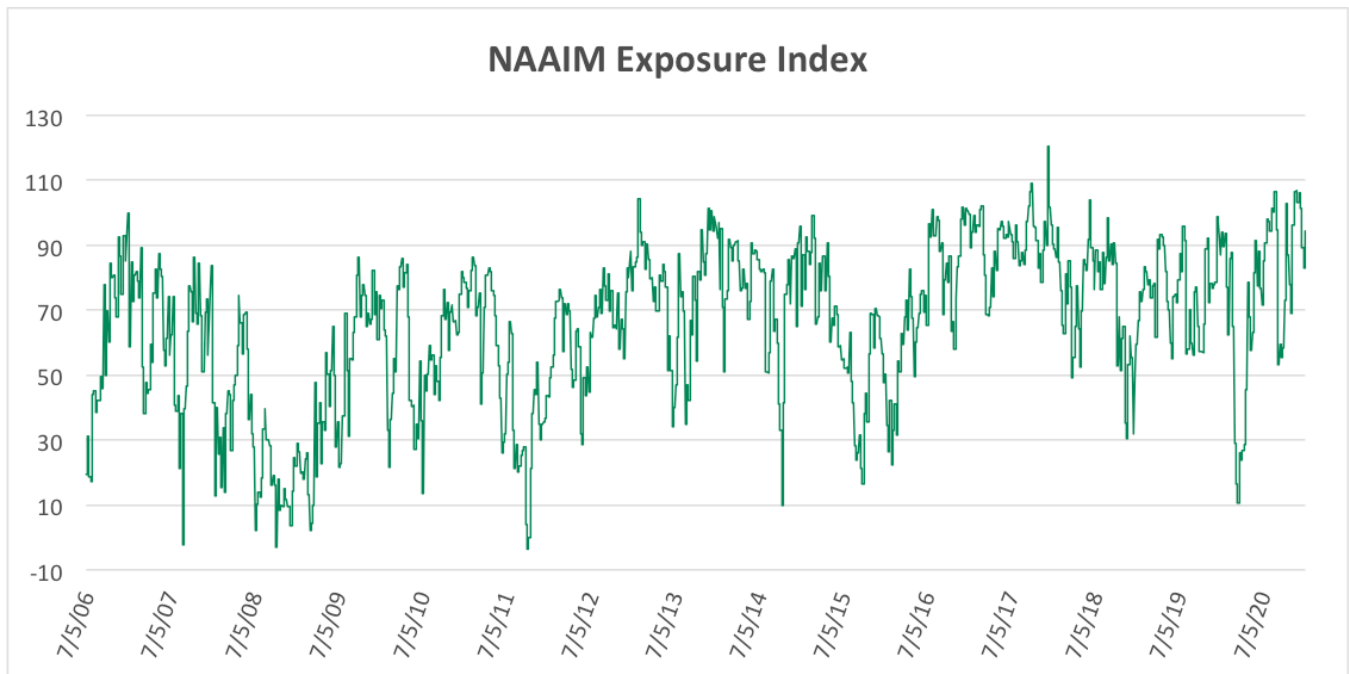
Transaction costs and taxes were intentionally omitted from the calculation, assuming no transaction fees for our ETF trading and a qualified account for wealth accumulation. Expense ratios of the ETFs are reflected in their performance, with no other hypothetical fees applied.

Active Strategy: NAAIM Tactical Risk Managed

The active strategy: NAAIM Tactical Risk Managed or NAAIM TRM, implements the National Association of Active Investment Manager's (NAAIM) Exposure Index⁵ as an equity/cash allocation strategy. This indicator represents the average level of exposure to US equity markets reported by the group's membership. The NAAIM Exposure Index is a very credible indication of professional risk manager's sentiment, widely cited by major financial press⁶⁻¹⁰. It provides over fourteen years of live data spanning four of our most recent liquidity premium periods.

"NAAIM member firms who are active money managers are asked each week to provide a number which represents their overall equity exposure at the market close on a specific day of the week, currently Wednesdays. Responses can vary widely as indicated below. Responses are tallied and averaged to provide the average long (or short) position of all NAAIM managers, as a group.

*Range of Responses: 200% Leveraged Short, 100% Fully Short, 0% (100% Cash or Hedged to Market Neutral), 100% Fully Invested, 200% Leveraged Long."*⁵



NAAIM Exposure Index Simple Statistics

Number of Observations	764	
Maximum Allocation	120.56	
Minimum Allocation	-3.56	
Mean	65.3270	
Median	69.665	
Mode	97.44	
Standard Deviation	24.2367	
Skew	-0.6016	
Kurtosis	-0.3224	
Number of Observations Above 100, percentage of total	28	3.66%
Number of Observations Below 0, percentage of total	3	0.39%

We modeled the NAAIM Tactical Risk Managed Portfolio by applying the Exposure Index numbers since its inception as a percentage of exposure to the daily performance of SPY - State Street SPDR S&P 500 ETF Trust. SPY was selected as the most common, longest tenured ETF available as broad representation of “the market”. Any unallocated cash received the daily yield of the 3-Month US Treasury. Exposure levels were not constrained, so market exposures less than 0% and greater than 100% were allowed. Although many practitioners are limited in their

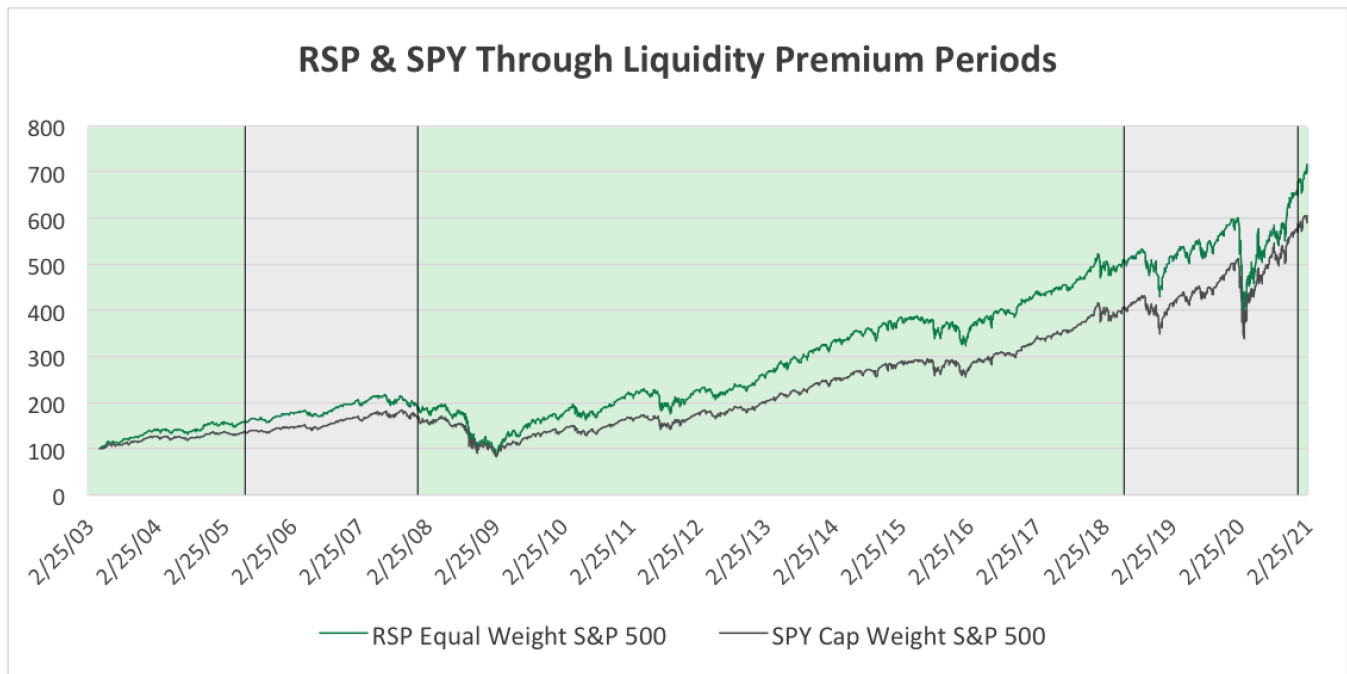
ability to implement leverage or short exposure especially in qualified accounts, these instances were not extreme with -4% being the “shortest” observation and 121% the most “levered”. We assume these levels could be creatively replicated with no observable impact, given the occurrences of “short” and “levered” observations were rare at 0.39% and 3.66% of total observations, respectively. The NAAIM TRM portfolio’s equity/cash allocation was held constant for each day between reported changes in the exposure number.

Passive Strategy

The passive strategy is represented as a buy-and-hold accumulation of RSP – Invesco S&P 500 Equal Weight ETF which holds the S&P 500 constituents in equal proportions and rebalances quarterly. While it can be fairly argued that quarterly rebalancing and annual reconstitution is not purely passive ownership, this investment was selected as our passive strategy for a few reasons. Our study includes regular contributions to the portfolio, and RSP’s quarterly rebalancing ensures contributions to the passive strategy will be made nearly equally among its stocks. Additionally, our proposed Liquidity Premium Blend is intended to be easily implemented for wealth management practitioners. As fiduciaries none would actually hold an investment completely unmanaged (even allowing it to fall to \$0.00). As a result, we felt RSP is as philosophically close to passive ownership as is practical.

Market Cap Weight versus Equal Weight

The decision to implement the active and passive strategies using investments which weigh the S&P 500 stocks differently was made for philosophical reasons, fully aware this results in tilting towards different factor risk premia. The SPY cap weighted index is expected to provide a higher exposure towards the momentum factor, whereas the equally weighted RSP tilts towards (small) size and value factors. Knowing these risk factors tend to be rewarded differently through the course of a business cycle, we observed performance of the cap weighted SPY and equal weight RSP through our periods of high and low liquidity premium.



RSP & SPY Performance Through Liquidity Premium Periods

Liquidity Premium	Period	Annualized Return		Annualized StD	
		SPY	RSP	SPY	RSP
Low	6/15/18 - 1/07/21	22.89%	17.56%	0.2421	0.2654
High	1/22/08 - 6/14/18	14.57%	16.10%	0.2057	0.2251
Low	6/22/05 - 1/18/08	7.55%	5.50%	0.1315	0.1400
High	4/30/03(inception) - 6/21/05	24.44%	37.28%	0.1196	0.1333

The equally weighted RSP is more volatile than the market cap weighted SPY through all periods, unsurprising given its tilts towards the (small) size and value factors. However, it was interesting to discover the cap weighted portfolio outperforms in our periods of low liquidity premium while the equally weighted portfolio outperformed in periods of high liquidity premium. This is noteworthy since our proposed Liquidity Premium Blend allocates its contributions to the active strategy using SPY in the low liquidity premium periods and to the passive RSP strategy in high liquidity, and is likely to have a favorable impact on performance while also potentially helping to maintain balance in our blended portfolio.

Simulation Methods

Simulations spanning 14.5 years were conducted to compare the effects of blending our active and passive strategies through allocations of regular, bimonthly, new money contributions to the portfolio. The intent is to replicate the typical wealth accumulation pattern of an average investor saving for retirement. The beginning date of 7/5/2006 coincides with the inception of the NAAIM Exposure Index while the end date of 1/7/2021 marks our most recent change of liquidity premium periods.

Each simulation begins with a total portfolio value of \$200,000. All active/passive blending methods begin with the total portfolio divided equally: \$100,000 allocated to active, and \$100,000 allocated to passive. The active NAAIM TRM Only, Passive Only, and SPY Only simulations begin with the full \$200,000 allocation to their respective single investment portfolios. Regular, bimonthly contributions of \$1,000 are made through the course of the study on the same dates in each method simulation.

Liquidity Premium Blend

Our proposed method for active/passive blending allocates its \$1,000 new money portfolio contributions to the active strategy in periods of low liquidity premium and to the passive strategy in periods of high liquidity premium.

Passive Only

Holds and allocates to RSP exclusively.

NAAIM TRM Only

Holds and allocates to the active strategy exclusively.

SPY Only

Holds and allocates to SPY exclusively.

50 – 50 Contribution

Equally divides each \$1,000 bimonthly contribution with \$500 allocated to the active strategy and \$500 to the passive strategy.

1:1 Random Contribution

Randomized contributions with a simulated “coin flip” determining the allocation of the \$1,000 contributions to the active or passive strategy.

Reverse Contribution

Reverse Contribution allocates the \$1,000 contribution to the active strategy in periods of high liquidity premium, and the passive strategy in periods of low liquidity premium. This is the opposite of our proposed Liquidity Premium Blend.

2:1 Random Contribution

Randomized allocation of the \$1,000 contribution to the passive strategy in 2/3 of instances, active in 1/3 of instances. This was intended to compare directly with our proposed Liquidity Premium Blend by approximating the historical amount of time in each liquidity regime.

Simulation Analysis

Because our study explores the effects of new money allocation sequences through a common timeframe, we chose to analyze the simulation results using their Internal Rate of Return. For each simulated method, the total annual new money contributions were subtracted from the gross change in portfolio value for each calendar year to represent net “cash flows”. For example:

$Cf_0 = -\$200,000$, $Cf_1 = (2006 \text{ ending value} - \$200,000 - 2006 \text{ contributions})$, $Cf_2 = (2007 \text{ ending value} - 2007 \text{ beginning value} - 2007 \text{ contributions})$, $Cf_3 = (2008 \text{ ending value} - 2008 \text{ beginning value} - 2008 \text{ contributions})$, etc.

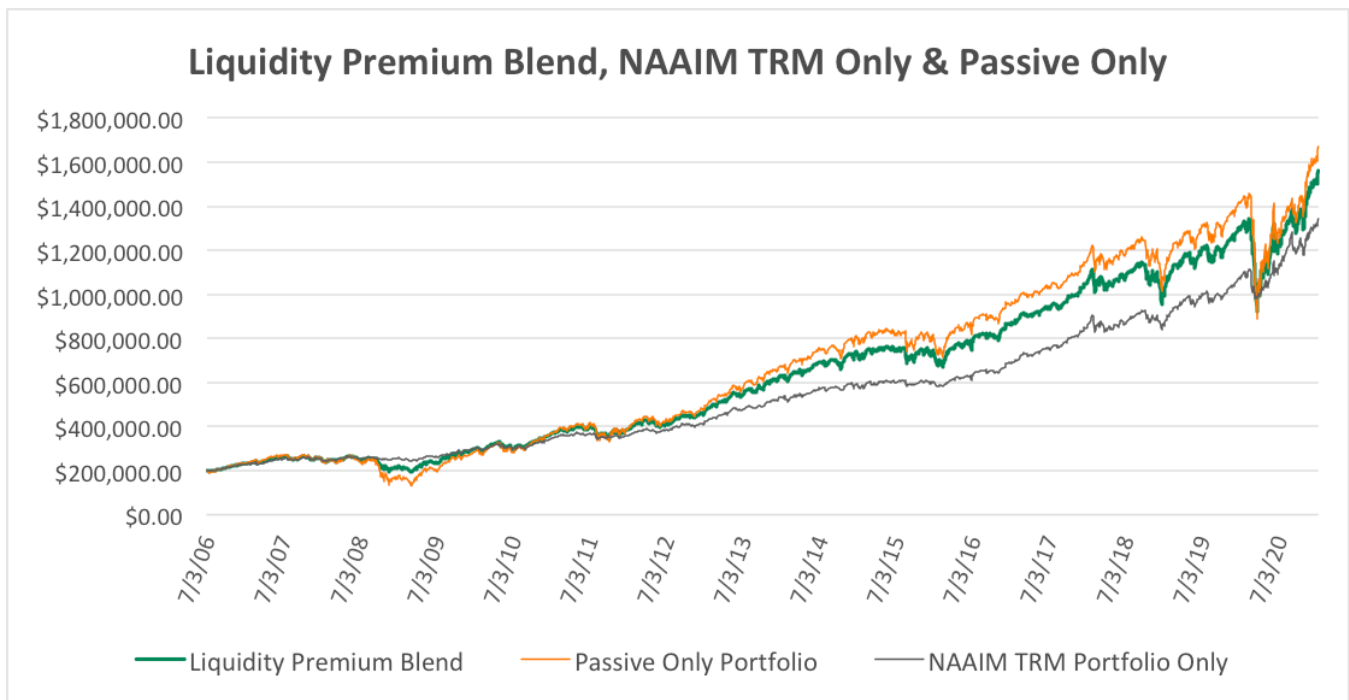
Portfolio efficiency is presented with a modified Sharpe ratio $(R_p - R_f) / StD_p$:

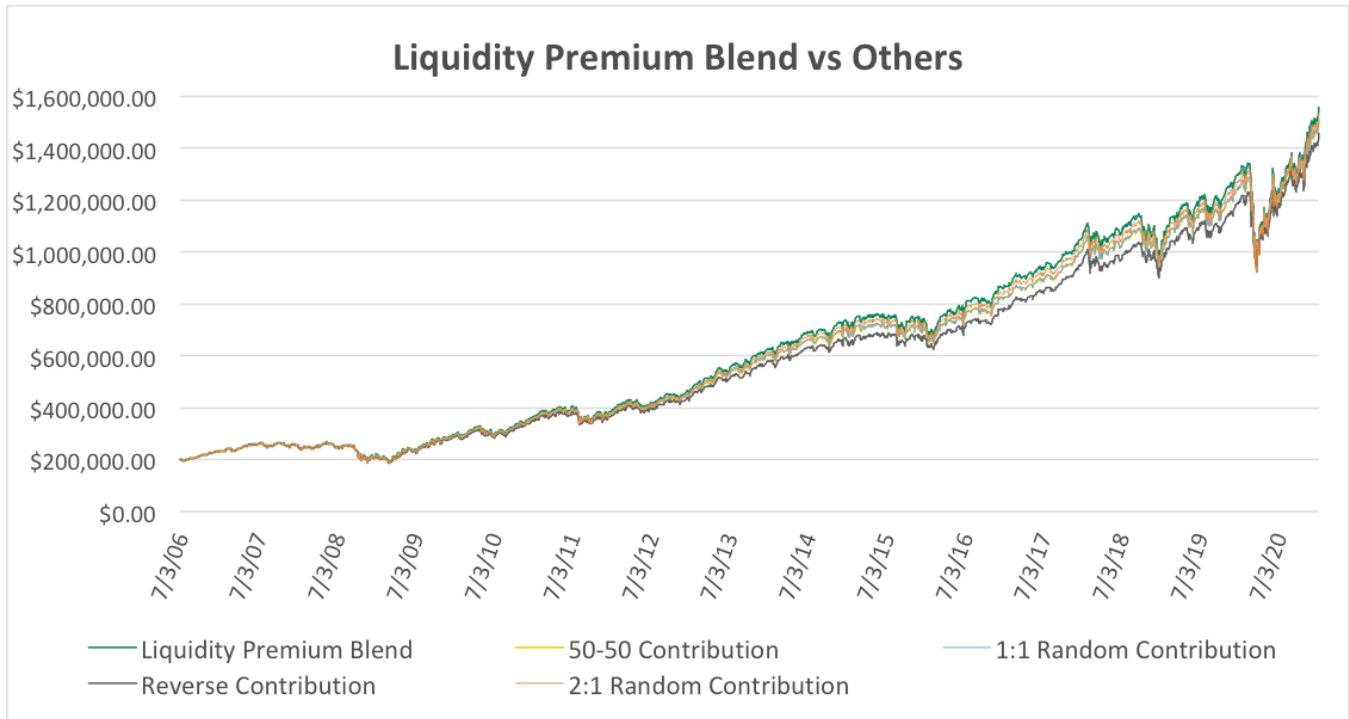
R_p = the portfolio's IRR

R_f = The 10 year US treasury Inflation-Indexed Security, Constant Maturity rate on our 7/5/2006 inception

StD = The portfolio's annualized standard deviation of daily returns

An analysis of annual drawdowns was calculated to determine the maximum drawdown for each simulation. All occurred through the 2008 - 2009 financial crisis. The 2020 drawdown was also included in the study's results as it was the second greatest drawdown for all simulations.





Final Simulation Results

Portfolio	Ending Portfolio Value	Internal Rate of Return	Annual-ized StD	Modified Sharpe	Max Drawdown: '08-'09	2020 Drawdown	% Contributions Passive	% Contributions Active
Liquidity Premium Blend	\$1,560,579.28	15.080%	0.1578	0.79	-30.83%	-30.09%	63.5%	36.5%
Passive Only	\$1,672,786.31	16.348%	0.2260	0.61	-55.19%	-38.43%	100.0%	0.0%
NAAIM TRM Only	\$1,344,154.47	11.744%	0.0956	0.95	-13.43%	-11.71%	0.0%	100.0%
SPY Only Portfolio	\$1,758,883.25	15.813%	0.2067	0.64	-52.66%	-30.43%	NA	NA
50-50 Contribution	\$1,508,470.39	14.197%	0.1502	0.77	-32.32%	-26.05%	50.0%	50.0%
1-1 Random Contribution	\$1,511,648.38	14.252%	0.1500	0.77	-32.19%	-25.71%	48.7%	51.3%
Reverse Contribution	\$1,420,104.33	13.298%	0.1434	0.74	-33.25%	-21.81%	36.5%	63.5%
2-1 Random Contribution	\$1,534,154.44	14.573%	0.1585	0.75	-33.60%	-28.61%	61.7%	38.3%

CONCLUSION

The Liquidity Premium Blend results support our proposal, suggesting liquidity premium serves as an effective indicator for efficiently blending active and passive management through portfolio contribution allocations. Our overall rate of return for the Liquidity Premium Blend was 15.08%, outperforming all other blended methods and the active-only strategy. Its portfolio efficiency described by our modified Sharpe ratio of 0.79, is second only to the active-only strategy.

The active-only strategy: NAAIM Tactical Risk Managed produced impressive portfolio efficiency, handily outperforming all other strategies with its modified Sharpe ratio of 0.95. Its max drawdown was less than 1/3 of the SPY Only Portfolio. However, its superior efficiency and downside protection comes at the expense of returns; nothing is free in this world. The purely passive strategies including SPY Only finished with the highest portfolio values and rates of return but were soundly worst from a risk-adjusted efficiency perspective.

In most blended portfolio methods, we observed an improvement in portfolio efficiency as more new money contributions were allocated to the risk managed active strategy. The significant exception is our Reverse Contribution methodology, which posted the worst modified Sharpe ratio of all active/passive blended portfolios despite allocating 64% of contributions to the active risk-managed strategy, more than any other blending method. The Reverse Contribution results support our proposal, indicating that allocating contributions between active and passive strategy according to the liquidity premium has significant impact on the blended portfolio's efficiency.

Further evidence is apparent when comparing the Liquidity Premium Blend to its 2:1 Random Contribution counterpart. These methods allocated roughly the same amount of new money to their active and passive strategies, but in different sequences. Our proposed Liquidity Premium Blend method prevailed with 50bps greater rate of return and superior portfolio efficiency.

IMPLICATIONS FOR PRACTITIONERS

Our proposed Liquidity Premium Blend strategy was designed for real world implementation. It relies on readily available information and includes widely accessible investments for operational feasibility. The most significant implications for wealth management and financial planning practitioners are:

1. In all simulations, blending the active strategy: NAAIM Tactical Risk Managed with the passive strategy improved portfolio efficiency and reduced drawdowns vs the passive-only methodologies.
2. Liquidity premium measured by the spread between the US Treasury 10-Year and 3-Month serves as an effective indicator for efficiently allocating between the active and passive strategies.
3. This Liquidity Premium Blend method can be customized for client objectives and risk tolerance.

RESOURCES AND REFERENCES

¹ Keynes, John Maynard. The General Theory of Employment, Interest and Money. 1936.

² Modigliani, Franco. “Liquidity Preference and the Theory of Interest and Money.” *Econometrica*, vol. 12, no. 1, 1944, pp. 45–88. JSTOR, www.jstor.org/stable/1905567. Accessed 8 Apr. 2021.

³ The Federal Reserve Bank of St. Louis economic research website (<https://fred.stlouisfed.org>)

⁴ YCharts (https://ycharts.com/glossary/terms/total_return_forward_adjusted_price)

⁵ National Association of Active Investment Manager’s (NAAIM) Exposure Index (<https://www.naaim.org/programs/naaim-exposure-index>)

⁶ Seeking Alpha (<https://seekingalpha.com/article/4411396-diana-ross-upside-down-stock-market>)

⁷ Bloomberg (<https://www.bloomberg.com/news/articles/2020-08-18/rallying-stock-market-is-forcing-everyone-to-become-a-believer>)

⁸ CNBC (<https://www.cnbc.com/2020/05/15/assessing-the-stock-market-after-one-of-the-fastest-declines-and-subsequent-comebacks-in-history.html>)

⁹ Wall Street Journal (<https://www.wsj.com/articles/one-reason-for-optimism-bearish-investors-1523006335>)

¹⁰ Barron’s (<https://www.barrons.com/articles/the-stock-market-is-bouncing-back-thank-you-chuck-norris-51583846070>)