rity price changes over time, (2) coupon income, and (3) reinvestment of periodic coupon income and principal. In the short run, the first has a measurable effect on total returns, but the longer the time frame, the greater the impact of the second two on total returns.

So the greatest risk to achieving reasonable returns in a laddered portfolio is not short-run price changes but reinvestment risk, because by neutralizing price risk via a ***hold to maturity*** strategy, the impact of income and reinvestment in the total return equation is elevated. Most laddered portfolios are biased towards short to intermediate maturities and the inherent rollover process maintains this bias over an extended period.

But short-term interest rates have historically been far more volatile than longer term rates, so the overall volatility of a laddered portfolio is significantly raised. Since the late '70s, the 30-year Treasury has exhibited just 47% of the yield volatility of the six-month Treasury bill. The downward slope of income volatility from short to long maturities demonstrates that laddered portfolios, biased toward shorter maturities, may actually produce much higher return volatility than portfolios with an extended maturity focus.

In evaluating laddered portfolios, the subtle differences among securities, their weighting within the portfolio, and the timing of portfolio cash flows, can render significantly different results. These key points are often overlooked.

To demonstrate this, our firm analyzed the performance of three laddered portfolios—constructed with zero-coupon, on-the-run and off-the-run Treasuries—over the course of several years. Each portfolio was laddered in two ways, first using a duration-weighted approach to match the duration of an equally weighted maturity portfolio of one- to five-year U.S. Treasury strip securities, and secondly through an equal dollar distribution of maturities approach to replicate the conventional approach used by most investors. The analysis included U.S. Treasury securities *exclusively* to eliminate the differences or risks attributable to credit quality or market liquidity.:

The table depicts the results of our analysis. Our observations:

- Despite virtually identical levels of credit quality and market liquidity within each portfolio, respective returns were materially different over most of the periods reviewed.
- In all time periods beyond one year, annualized portfolio return variations ranged from a low of 25 basis points to a high of 93 basis points, equivalent to 5.53% and 12.99%, respectively.
- The zero-coupon portfolio generated superior returns to either of the coupon bearing portfolios in almost all periods for both groups. Zeros do not have reinvestment risk.
- Zeros provided better gross returns than off-the-run portfolios, although the latter had the best risk-adjusted returns of the three. This is because duration is longest for zeros and shortest for off-the-run securities.
- The on-the-run portfolio achieved the least attractive results in both groups for all periods.
- The equally distributed portfolios achieved better performance results for all periods compared to duration-weighted portfolios.

Laddered portfolios can be a useful approach in addressing certain financial obstacles, but like any other investment discipline, an objective is required to measure its success. Investors should identify a measurement standard, one that reflects their risk tolerances as well as quality and liquidity requirements.

Our analyses of laddered portfolios indicate significant return disparities and higher volatilities are possible with only minor adjustments in the securities held or in their relative weightings. During a typical quarter, just a 9-10% performance differential could plunge a manager from a first quartile ranking to a third quartile placement, well below median.

Clearly, on-the-run laddered portfolios—favored by most investors when constructing laddered portfolios—offer little comparative advantage over zero-coupon and off-the-run portfolios in normal market environments. The attractiveness of the zero-coupon portfolio is further supported by the inherently lower transaction costs due to its minimal annual cashflows.

In summary, our firm hasn't uncovered any significant or distinct advantages of the laddered maturity portfolio over other investment techniques or styles. There were no benefits to the investor in terms of return or risk. Importantly, it fails to help investors define their objectives. We believe other investment approaches, active or defensive, are preferable because they facilitate the definition of investor objectives and risk parameters.

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GUEST COLUMN WHY PORTFOLIO LADDERING DOESN'T WORK

The unquestioned acceptance of laddered maturity portfolios—a passive investment approach where maturities are staggered along the curve to create a duration-neutral portfolio—as a low-risk approach to fixed-income investing, warrants investigation. Despite being widely touted by financial advisors as a conservative strategy, there is virtually no empirical evidence to support it. Unlike the popular concept of dollar cost averaging in an equity portfolio, little has been published in academic or professional literature regarding laddered portfolios. Rarely has a financial concept lacking rigorous historical analysis been so broadly embraced by the investment community. This unchallenged acceptance, combined with a lack of uniformity in creating and applying the methodology, represents a significant unrecognized risk to investors.

Typically, fixed-income investment programs have a stated objective, such as income generation, capital appreciation, or are structured to satisfy a specific liability while preserving capital. These objectives are generally represented either by market indices or specific cash flow requirements, with the investment assets competing to match or exceed the stated objectives. As such, the emphasis is the total return growth of the assets versus the objectives.

But the objective of a laddered maturity portfolio is ill-defined, since the objective is typically stated as "safety." While desirable, safety is inappropriate as a stand-alone objective; the portfolio's risk remains uncertain. And the greater the uncertainty or variability of total return patterns, the riskier the investment discipline. Since a laddered portfolio's total return is undetermined and changeable, it is inherently risky.

Most conventional laddered portfolios avoid the long end of the yield curve and are constructed along a rolling one- to five-year or one- to seven-year maturity horizon. The investor—driven by the desire to maintain principal by holding securities to maturity or unwilling to actively manage portfolio cashflows in changing markets—presumes laddering has created a dynamic yet passive portfolio that avoids loss of principal. But there are inherent contradictions in this approach.

If its purpose is to avoid principal risk by holding each security to maturity, laddering must be considered an intermediate to long-term investment approach. But this solitary focus ignores the fact that fixed-income total returns are comprised of (1) secu-

LADDERED MATURITY PORTFOLIO

Annualized Total Return Comparisons (9/30/89 - 9/30/96)

Period	Benchmark 3Yr U.S. Strips*	Duration-Weighted Portfolios (1) Zero Coupon	On-The-Run	Off-The-Run	Return Range (B.P.)
7 Years	8.36%	8.09%	7.16%	7.65%	93
5 Years	6.91%	6.76%	6.04%	6.54%	72
3 Years	4.69%	4.66%	4.23%	4.60%	43
1 Year	5.15%	5.04%	4.51%	4.78%	53
Characteristics					
Duration (Yrs)		3.00	3.00	3.00	
Maturity (Yrs)		3.00	3.67	3.74	
Coupon		0.00%	5.89%	7.02%	
YTM		5.94%	5.90%	5.91%	

Period	Benchmark 3Yr U.S. Strips*	Equally Distributed Portfolios (2) Zero Coupon	On-The-Run	Off-The-Run	Return Range (B.P.)
7 Years	8.36%	7.69%	6.98%	7.35%	71
5 Years	6.91%	6.39%	5.84%	6.18%	55
3 Years	4.69%	4.66%	4.52%	4.77%	25
1 Year	5.15%	5.05%	4.83%	5.20%	37
Characteristics					
Duration (Yrs)		2.62	2.26	2.21	
Maturity (Yrs)		2.62	2.63	2.63	
Coupon		0.00%	5.69%	6.49%	
YTM		5.75%	5.71%	5.73%	

Notes:

(1) Based on the duration achieved through an equally weighted portfolio of zero-coupon U.S. Treasury securities with maturities of 1-5 years. Coupon portfolios are weighted by maturity to match the duration of the strips portfolio using securities between six months to seven years.

(2) Equally-distributed portfolios are based on an equal 25% allocation of the portfolio to six-month Treasury bills, two-yr, three-yr, and five-yr maturity securities in each category.

* Single issue holding period return.