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ANNUALIZING EXCESS RETURNS

Excess return over term structure-matched Treasuries is a popular measure of relative performance in credit markets. We compute and report excess returns for all securities in the Lehman Brothers U.S. and Global Aggregate indices. Starting in 2001, we introduced a new technique to match the yield curve exposure of any single security.[1] Each bond's exposure is described by a set of six key rate durations (KRD). Then, a Treasury portfolio is created that matches this KRD profile. At the end of the period, the excess return for the security is calculated as the difference between its total return and the return on the Treasury portfolio.

Portfolio managers using excess returns often present their results on an annual basis. While annualizing total returns is a trivial compounding exercise, excess returns are arithmetic *differences* between two numbers and, as such, should not be compounded. Investors frequently ask what the appropriate method of aggregating excess returns is.

The "right" approach to annualizing excess returns depends on whether one deals with a cash portfolio of bonds, whose size changes every month, or with a constant-size hedging setting in which the credit portfolio is the long position and the term structure-matched Treasuries is the short position. If the hedging context can be assumed, the initial outlay is zero, return measures are undefined, and excess return is essentially a P&L number. In this context, the reasonable procedure for annualizing excess returns is simply to add them. In fact, many portfolio managers add monthly excess returns even in the traditional cash portfolio setting, to avoid the obviously flawed direct compounding.

Nevertheless, the compounding effect is undoubtedly present when a cash portfolio invests in assets that, for example, consistently outperform Treasuries. The challenge is to find a way to capture this effect correctly. We suggest a procedure for annualizing excess returns on indices and portfolios that we believe is both computationally valid and intuitively appealing. Let us assume that in a particular month we compute both total and excess returns for a portfolio. Now, what is the meaning of the difference between these two numbers? We can say that it is the total return on an implied term structure-matched Treasury portfolio. But total returns can be compounded. So if every month we compute total returns on these implied Treasury portfolios and annualize them, at the end of the year we can subtract the resulting annual return from the corresponding annual return on our portfolio. The result will be the annualized excess return.

Let us explain the technique using a simple example of two-period compounding for the Lehman Credit Index. We denote the total return of the implied term structure-matched Treasury portfolio as $TR_{ImpliedTreasuries}$. The two-month total return for the Credit index is

$$TwoMonths\_TR_{CreditIndex} = (1 + Month1\_ TR_{CreditIndex}) * (1+Month2\_ TR_{CreditIndex}) - 1$$

[1] *A New Method of Excess Return Computation; Index Conversion Probable in 2001*, Lehman Brothers, in *Global Relative Value*, September 2000.

Similarly, the two-month total return for the implied Treasury portfolios is

$$TwoMonths\_TR_{ImpliedTreasuries} = (1 + Month1\_\ TR_{ImpliedTreasuries}) * (1+Month2\_\ TR_{ImpliedTreasuries}) - 1.$$

Then, the compounded two-month *excess* return is simply

$$TwoMonths\_TR_{CreditIndex} - TwoMonths\_TR_{ImpliedTreasuries.}$$

We applied this technique to about twelve years worth of monthly excess returns of the Lehman Credit Index. In Figure 1, we show annualized excess returns obtained by the suggested compounding procedure, as well as by simple addition. While the average difference between the two happens to be almost zero over the whole period, this is no more than a chance. By breaking the time span in two parts, we make the magnifying effect of compounding clearly seen. In the early 1990s, credit product generally outperformed Treasuries. The positive differences are captured more strongly by the compounded annualized excess returns than by the added ones (average of 77 bp versus 67 bp per year for 1990-1995). The general lagging of credit in the late 1990s is likewise magnified by the compounded aggregation (average of -54 bp versus -44 bp per year for 1996-2001).

For most unleveraged bond portfolios, the compounding effect of excess returns over term structure-matched Treasuries is real and should be captured. We believe that many portfolio managers looking for the proper way of aggregating excess returns will find the simple technique we outlined here helpful and easy to implement.

Figure 1. **Annualized Excess Returns for the Lehman Brothers Credit Index: Compounding Using an Implied Treasury Portfolio versus Addition**

	Annualized Total Return (%)		Annualized Excess Return (%)		
	Credit Index	KRD-Matched Treasuries	Compounded	Added	Difference
1990	7.06	8.95	-1.89	-1.77	0.12
1991	18.52	15.84	2.68	2.30	-0.38
1992	8.69	7.65	1.04	0.96	-0.09
1993	12.16	11.25	0.91	0.82	-0.09
1994	-3.93	-4.46	0.53	0.57	0.04
1995	22.25	20.89	1.36	1.13	-0.23
1996	3.28	2.03	1.25	1.22	-0.03
1997	10.23	10.54	-0.30	-0.28	0.02
1998	8.57	10.95	-2.38	-2.20	0.18
1999	-1.95	-3.65	1.70	1.74	0.04
2000	9.39	14.01	-4.63	-4.17	0.46
2001*	12.14	11.01	1.13	1.03	-0.10
Mean (1990-1995)	**10.79**	**10.02**	**0.77**	**0.67**	**-0.10**
Mean (1996-2001)	**6.94**	**7.48**	**-0.54**	**-0.44**	**0.09**
Mean (1990-2001)	**8.87**	**8.75**	**0.12**	**0.11**	**0.00**

* Through October 31, 2001.

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