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A Framework for Corporate Treasury Performance Measurement

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If you cannot measure it, you cannot improve it.
—Lord Kelvin, 1824-1907

Today, practically all facets of a corporation's activities related to revenues and operating expenses are closely monitored and rigorously measured. In the area of liabilities, however, a similar discipline is often absent. In particular, a corporate treasury department's performance in managing debt is remarkably exempt from oversight.[1]

Of course, corporations do report standard financial statistics in their 10-Ks and 10-Qs, but the information contained in these filings can often be more misleading than informative. They report cash flow and accounting measures such as the amount of interest paid and the face amount of outstanding debt. What is missing, however, is the price the company would have to pay to repurchase its debt obligations today in the open market.

This critical piece of information should be of interest to shareholders for the simple reason that it affects shareholder value—the lower the market value of the debt, the greater is the value of the equity, other things equal. For that reason, shareholders should want to be kept informed about how well treasury is managing the corporation's debt.

A properly designed performance measurement framework, besides providing meaningful metrics to the shareholders, would also be useful to treasury. It would give context to the treasurer's choices among many alternative capital market transactions. The potential benefit of a contemplated transaction always comes with some risk. In the absence of a carefully constructed measurement system, an informed decision cannot be made, nor can it be evaluated after the fact.

Consider two typical transactions faced by a corporate treasury staff:

Proposal 1: Enter into a speculative interest rate swap. Investment banking proposals often advocate the use of various interest rate derivative products. Perhaps the most common recommendation is for a company to enter into a plain vanilla interest rate swap in order to *reduce the cost of debt*. When the yield curve slopes upward—as it has for the past several years—paying the floating rate side of a ten-year swap and receiving the higher fixed rate can synthetically reduce near-term interest payments. The obvious risk of this transaction is that the short-term (floating) rate can eventually exceed the fixed rate, possibly by a wide margin, and wipe out the initial benefits. The proposals normally acknowledge this, but argue that the potential benefits outweigh the risk.

The remarkable aspect of these proposals is that they completely disregard issuer-specific considerations. Regulated utilities, manufacturing companies, and financial institutions all receive the same "fixed-to-floating" proposal. Yet common sense tells us that, depending on the interest rate sensitivity of the company's operating revenues and expenses, the fixed-to-floating proposal may be completely inappropriate.

Proposal 2: Speculatively choose a new issue's maturity. A similar problem arises when companies try to save monthly interest payments by issuing lower-cost intermediate-term bonds rather than higher-cost long-term bonds (assuming the yield curve slopes upward). The deal seems good, but it works only if rates do not rise too high. Otherwise, intermediate-term bonds can turn out to be expensive enough to produce losses over the borrowing horizon. Of course, some treasurers argue that the right choice cannot be known with certainty until the shorter bond matures. But this is a dodge, designed to defer the final tally until long after the treasurer has moved on.

We have developed an approach that allows for meaningful periodic reporting of treasury's performance to investors and that also provides a framework for treasury to compare and choose among alternatives in the capital markets. The basic idea is to create a benchmark portfolio that provides

1. While largely missing in U.S. corporations, treasury performance management has been attempted by sovereign governments. Here, foreign exchange is an additional critical element. The optimal debt portfolio depends on anticipated export and import trade levels and related currency inflows and outflows. See Andrew Kalotay, Marwan Marshi, and C. Douglas Howard, "Empirical Global Optimization: Toward the Efficient Frontier," in *Salomon Research*, October 1988.

Using Structured Transactions to Beat the Benchmark

The treasury of a regional bank might be able to contribute to the bottom line by beating the benchmark in the following manner. Suppose that the bank's policy dictates that its liabilities consist only of floating rate instruments. In this case, the natural benchmark is a portfolio of short-term certificates of deposit (CDs). The CD market is extremely competitive: the return demanded by investors depends entirely on prevailing market conditions, and the bank cannot attract funds if it attempts to offer below-market rates. If the bank borrows only by selling CDs, its liability return will turn out to be the average CD rate during the period; the market value of a portfolio of short-term CDs is always at par. How then can treasury aspire to outperform the CD benchmark?

Surprisingly, the opportunity to borrow at a below-market rate may exist, but taking advantage of it is by no means a simple exercise. The process, a so-called "structured transaction," is initiated by an investment bank and consists of two deals executed simultaneously. In one of these deals, the regional bank issues a callable bond with a complex coupon structure. In the other deal, the regional bank converts the bond into a floater by entering into a mirror cancelable swap with the investment bank. The transaction is complicated, but the cost can be significantly lower than the rate at which the regional bank could borrow on its own. How is this possible? The answer lies in the inconsistent pricing of options across different markets. The bank can acquire an option at relatively low cost in the bond market and then synthetically sell the same option at a substantially higher price in the interest rate derivatives market.* By taking advantage of opportunities "outside the box," treasury has beaten the benchmark.

* The synthetic sale of an option (by selling a swaption) generally involves basis risk—the risk that the company's spread to LIBOR will have increased at the time the counterparty exercises the swaption. Here, we assume that the company's borrowing curve coincides with the swap curve (approximately true for government-sponsored enterprises in the housing area).

a cost reference and thus allows for periodic reporting of *relative* performance. The approach requires that both the corporation's debt and the benchmark portfolio be marked to market. In theory, of course, the optimal funding mix is determined by a host of factors such as the sensitivity of a company's earnings to interest rate movements, the nature of competition in its product markets, the duration of tangible assets, and so on. In some sense, then, strict asset-liability matching is the benchmark case. Corporate treasurers will deviate from the optimal policy for a variety of reasons, however, ranging from the simple economic reality that security offerings tend to be large and relatively infrequent to the fact that treasury wants to time its offerings to take advantage of perceived market opportunities. But there should nonetheless be some standard of accountability.

In the next section we introduce the notion of absolute liability return as well as relative liability return against a benchmark. We then show how performance against the benchmark can be converted into "real money" and close with an example of how the approach can be implemented.

Measurement Framework

Performance measurement today is an accepted, integral part of the management of financial assets. For example, mutual fund returns are tracked and reported regularly. Funds in similar categories, such as tax-exempt money market funds, are ranked in quartiles. Sophisticated plan sponsors also measure the performance of institutional money managers relative to accepted indexes, such as the S&P 500 for stocks or the Lehman Aggregate for bonds. Performance relative to an index may also serve as a basis for managerial compensation.

The analogous concept for treasurers is liability return, which is simply the market-based performance of the debt portfolio (including derivatives). It incorporates both interest expense and changes in market value and should be reported to top management and the board on a regular basis, preferably at least every quarter.

Let us give an example of how liability return is calculated. Consider a manufacturing company with various outstanding debt issues, including long-term fixed-coupon bonds and various short-term bank loans that are rolled over. The aggregate value of the company's debt is the sum of the market value of the bonds and the par value of the short-term loans.[2] The market value of the debt a year ago was $100 million and, because interest rates increased during the year, it is now $95 million. In addition, interest payments during the year amounted to $8 million. In this case, the

2. We note that if the debt consists of floating rate bank loans alone, its market value always equals the amount borrowed and does not vary with interest rates. In this case the liability return is simply the average interest rate paid during the period. As long as the fair value of the debt does not depend on interest rates, conventional accounting statements do provide the information needed to calculate the liability return.

liability return for the year would be reported as (8 + 95 – 100)/100, or 3%.

Liability return is by no means a novel concept. Insurance companies routinely use it to compare the performance of their liabilities and assets because the liabilities provide a natural benchmark for the assets. As long as the asset return exceeds the liability return, the insurance company is in good shape, because it is *relative* performance that matters.

The issue of benchmark selection is more complicated for nonfinancial corporations, of course, because of the nature of their assets and liabilities. But even nonfinancial corporations can make use of the liability return measure to evaluate treasury's performance and to get a better handle on debt management. Assume that treasury's performance is measured against a benchmark portfolio whose return during the same one-year period happened to be 5.5%. We would then report relative performance as 5.5% – 3%, or 2.5%. In the context of liabilities, good performance is signified by a return that is *lower* than that of the benchmark. The key, of course, is the selection of an appropriate benchmark, to which we turn next.

Benchmark Selection

The benchmark should be determined by strategic business considerations and tailored to the specific characteristics of the company. While the nature of financial assets makes this relatively straightforward for a financial institution such as a bank, it is a more daunting task for a manufacturing company or a utility. Normally, relevant factors would include the interest rate sensitivity of earnings and the degree of competition in the company's product markets—factors that determine the company's optimal mix of short- and long-term debt. To the extent that the treasurer chooses to deviate from the optimal mix, the benchmark is then useful in gauging his or her financial acumen.

It is important that the benchmark in no way represent management's view on the direction of interest rates; market opinion has no place in the realm of performance measurement. Market views can be incorporated later into the actual debt management policy without fogging up the benchmarking process. Superior market judgment will then be reflected in superior performance against the benchmark.

For a nonfinancial corporation, a convenient benchmark is the collective debt obligations of industry peers, on the assumption that on average the industry is financed optimally. This approach works well if the corporation can be easily classified as a member of a large industrial group, such as electric utilities. Most prospectuses and indeed 10-Ks contain statements about the structure of a company's industry and the nature of its competition. Financial information, with the possible exception of the peers' derivatives positions, is usually publicly available. In the example that follows, we build a benchmark along such lines.

Of course, credit ratings constitute an important consideration in constructing and measuring the performance of a benchmark portfolio. Suppose, for example, that the company in question is a single-A rated electric utility and that the ratings of the peer group range from AA to BBB. Comparing the performance of bonds with different ratings is inappropriate for measuring treasury's performance, because bond ratings are beyond treasury's control. The benchmark must be adjusted up or down to accommodate the difference in ratings.

The solution is to define the benchmark portfolio based on the bonds of the peer group but using the corporation's own yield curve instead of actual market prices to determine the performance of the benchmark. This allows for a true apples-to-apples comparison.[3] The performance of interest rate derivatives, if treasury uses any for hedging or for speculation, should obviously be market based. For example, a swap should be valued using the swap curve.

As mentioned earlier, some believe that the merit of a long-term financial decision can only be determined after a fairly long period of time. In fact, there is no justification for such thinking today, because the necessary information and the financial technology are readily available for comparing the performance of a managerial decision against the appropriate benchmark. The calculation is actually straightforward, because the required market information (the company's borrowing rates for the relevant dates) should be easy to obtain. Marking to market may require a fixed-income analytics system that offers option-based valuation, but such systems are fairly common.

As a final observation, the benchmark should receive approval at the very top of the management hierarchy, such as the board or the executive office. The technical nature of the benchmark will ultimately place responsibility for proposing alternatives upon the treasury officers. But this is where Wall Street can be helpful in offering consulting assistance to determine which benchmark would best suit the corporation's needs and would be mostly likely to win the approval of the directors.

Beating The Benchmark Is Real Money!

What is the significance of outperforming or underperforming the benchmark? In the realm of financial asset management, any reasonably sized portfolio can be liquidated at prevailing market prices, and any gain or loss against a benchmark or an index can thus be "monetized" or extracted in the form of

3. Two bonds of like duration but different coupons, when valued on the same yield curve, will have similar percentage changes in value for a given change in the yield curve. If we pretend that the benchmark (peer group) portfolio consists of bonds with the same credit as the company—that is, we value the benchmark portfolio's interest and principal payments (and any embedded options) using the company's own yield curve—then the differences in performance can be attributed largely to differences in duration.

Table 1 **Monetizing Excess Return at the End of Year 1**

Description	Cash Flow	
Swap #1 Term: 29 years Pays LIBOR, receives 8%	Premium received	**$5MM**
Swap #2 Term: 9 years Pays 7.5%, receives LIBOR	Premium paid	**($2MM)**
Bond interest paid in excess of benchmark	$8MM – $7.5MM	**($0.5MM)**
Excess return monetized	Net flow	**$2.5MM**

Table 2 **Synthetic Portfolio Replicates Benchmark**

Description	Years 2-10		Years 11-30	
Swap #1 cash flows	Pays Receives	(LIBOR) $8MM	Pays Receives	(LIBOR) $8MM
Swap #2 cash flows	Pays Receives	($7.5MM) LIBOR	Expired	
Bond interest	Pays	($8MM)	Pays	($8MM)
Net cash flow	Same as benchmark	**($7.5MM)**	Pays market rate after Year 10, same as benchmark	**(LIBOR)**

cash. In contrast, the notion of a treasury department repurchasing the corporation's outstanding liabilities is obviously unrealistic. What, then, is the significance of liability performance against a benchmark?

We will show that the relative performance of a liability portfolio can in fact be considered real money. If desired, the excess performance can be monetized—although by no means as easily as in the case of an asset portfolio—by using interest rate derivatives.

Assume, for the sake of simplicity, that both the corporation's debt portfolio and the benchmark consist of a single bond issue. The debt is a $100 million 30-year bond paying 8%, whose market value at the beginning of the one-year review period was $100 million. At the end of the period it was $95 million, so the liability return for the period is 3%.

The benchmark is a 7.5% ten-year bond, whose initial and terminal values were 100% and 98% of par, resulting in a return of (7.5 + (98 – 100)/100, or 5.5%.[4] (Note that the size of the benchmark bond is irrelevant in the calculation of relative performances.) Accordingly, treasury outperformed the benchmark by 5.5% – 3%, or 2.5%. Given that the initial value of the portfolio was $100 million, treasury's contribution to the bottom line was $2.5 million. But can this $2.5 million be realized as cash?

The answer is a definite yes, as shown in Table 1. The method entails the use of interest rate swaps, which enable us to construct a synthetic portfolio that will mirror the performance of the benchmark beyond the end of the review period. Creating this replicating portfolio will generate cash (or require cash outlays in the case of a negative liability return). But we also have to recognize the difference between the actual interest paid during the period and the interest that would have been paid on the benchmark portfolio. Treasury's contribution to the bottom line is thus the sum of the cash generated by creating this replicating portfolio, adjusted for the difference in interest payments during the period.

Let us demonstrate how this works with the example under consideration. To keep matters simple, we assume that the company's yield curve—that is, the cost of borrowing for various maturities—is the same as the swap curve. (This assumption could be relaxed).

Recall that the benchmark is a 7.5% bond that matures nine years from the end of the review period, and therefore the synthetic portfolio should have the same characteristics. But the actual portfolio is a $100 million 8% bond that matures in 29 years.

The transactions that create the replicating portfolio—that is, the portfolio whose future cash flows match those of the benchmark—are two interest rate swaps. The notional amount of each swap is $100 million. In one, the company pays 7.5% for nine years and receives LIBOR; in the other it pays LIBOR for 29 years and receives 8%. Let's consider the net result of overlaying these swaps on the corporation's outstanding debt, which is a 29-year $100 million 8% bond. As shown in Table 2, the company pays 7.5% interest on a notional amount of $100 million for the nine years (because the floating rate payments offset each other), then it pays LIBOR for the next 20 years (because the 8% fixed payments cancel), and at the end of 29 years it returns $100 million in principal to the holders of the 8% bond.

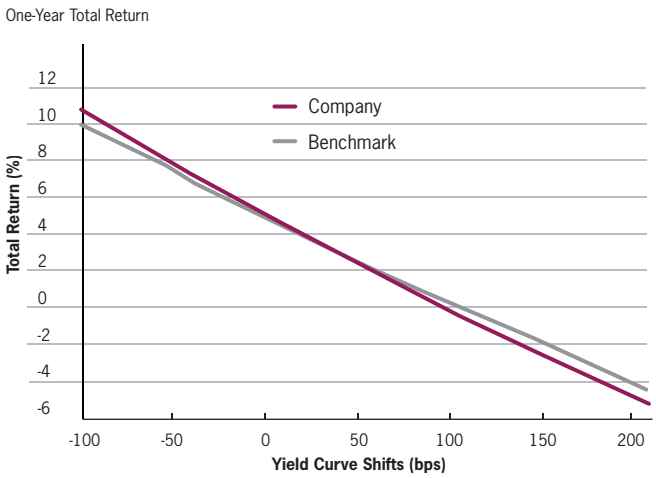
Compare this with the benchmark, namely the 7.5% bond that matures in nine years. During the initial nine years, both the corporation and the benchmark pay 7.5%.

4. We are using arbitrary single bond structures as analogs for the company's and the benchmark portfolios. It is conceivable for a company's portfolio to have a longer or shorter average maturity than that of the benchmark.

Table 3 **Portfolio Summary Statistics**

Description	Company	Benchmark
Number of issues	32	1,256
Average life (yrs)	9.85	9.37
Average coupon (%)	6.155	6.385
Effective duration (years)	6.31	5.82
Option value (as proportion of amount outstanding)	0.801%	0.418%

Figure 1 **Company Outperforms Benchmark When Rates Rise**



After nine years, the benchmark will have to be rolled over at prevailing market rates. If the refunding issue pays a floating rate—LIBOR under our assumptions—then the cash flows will be same as that of the synthetic portfolio. On the other hand, if the plan calls for issuing fixed rate bonds, the company can enter into a mirror fixed rate swap. In either case, the cash flows of the synthetic portfolio and the benchmark will be identical beyond the end of the review period.

Finally, we have to compare the economics of the synthetic strategy to that of the benchmark. Because we have assumed that the issuer's credit is represented by the swap curve, the value of the swap is the premium or discount to par of a like bond. From the company's perspective, then, the value of the 8% 29-year swap is $5 million, and that of a nine-year 7.5% swap is –$2 million, resulting in a net value of $3 million. But we also have to take into account that during the year the company paid $0.5 million excess interest. Therefore, the actual contribution of treasury was $3 million less $0.5 million, or $2.5 million. This establishes that outperforming the benchmark is real money.

Benchmark Selection and Scenario Analysis: An Example

We close with an example that demonstrates the implementation of the suggested approach. The company is a single-A electric utility, and the benchmark is the portfolio of the bonds of comparable utilities. As discussed above, both portfolios are valued using the company's own yield curve. Descriptive summary statistics of the company's debt portfolio and that of its combined peers are shown in Table 3.

The treasurer has clearly elected to go slightly long relative to the industry, as can be seen from the higher average duration of the company's bonds.[5] This enables it to outperform the benchmark when rates rise. Figure 1 shows the projected absolute performance of the company and the benchmark over a one-year period assuming various parallel shifts in the yield curve. The portfolios are valued at the start of the period and revalued at the end under each interest rate scenario. The change in value and the effect of any cash flows that occur during the period are captured in the total return. For example, if rates rise by 50 basis points over the next year, the company's debt will have a value of 95.277% of the face amount outstanding. Adding in the coupon and principal cash flows (5.901% and 9.606% of face amount, respectively) and the interest on these cash flows (0.273%), the total value at the end of the one-year performance period is 111.057% of face amount. Based on the initial value of 108.595% of face, the liability return is 2.254%.[6] The return on the peer portfolio, similarly calculated (but using the company's own yield curve to determine starting values and the company's scenario-adjusted yield curve to determine ending values), is 2.412%, so the company's relative return is around 16 basis points.

The company's projected return relative to the benchmark under different interest rate scenarios is displayed in Figure 2. For example, the company would outperform the benchmark by about six-tenths of a percent if rates rose by 150 basis points; it would underperform the benchmark if rates fell.

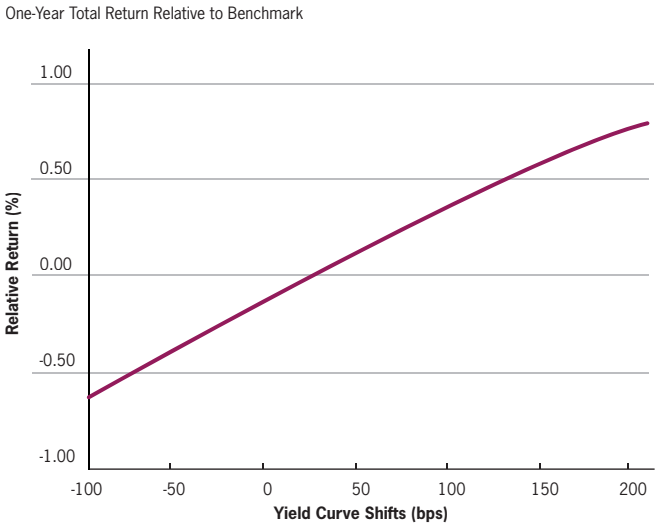
Conclusion

Treasury's performance in managing a corporation's debt has been surprisingly free of scrutiny, despite the obvious fact that shareholder value increases when the cost of debt is minimized. As a first step toward thinking about this issue, we have proposed a framework for measuring treasury's performance. The key idea is to focus on relative liability return against a strategically appropriate benchmark, which should be selected

5. Effective duration is the percent change in price per a 100 basis point shift in the yield curve.

6. Reported here in semi-annually compounding bond equivalent yield terms.

Figure 2 **Company Outperforms Benchmark by Over 50 Basis Points if Rates Rise 150 Basis Points**



independently of interest rate expectations. Superior predictions of interest rates would be manifested by treasury's beating the benchmark. An added benefit of this framework is that it provides context and accountability to the various tactical decisions undertaken by the treasury on its own initiative or in response to transactions proposed by investment banks.

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