

13 March 2000

Martin S. Fridson, CFA
Chief High Yield Strategist
(1) 212 449-8404
M. Christopher Garman
First Vice President
(44) 171 892-8932
Kathryn Okashima
Vice President--Strategy
(1) 212 449-3462

High Yield

Recovery Rates: The Search for Meaning

United States

The subject of recoveries on defaulted bonds¹ has been generating a lot of inquiry recently. Interest in the subject has been stimulated, no doubt, by 1999's unusually low average recovery. The weighted average price after default was just 28.66% of face value,² according to Altman (2000). That was well below the 1978-1999 average of 40.19%. Similarly, Moody's³ characterized 1999 recovery rates as below average, although within one standard deviation of the historical average. Surveying the evidence, portfolio managers wonder whether they should expect below-average recoveries in 2000, as well.

As we shall argue, annual variance in the recovery rate is a matter of little consequence to most high yield investors. Attempting to forecast the figure therefore represents a questionable use of their resources. Short-run fluctuations in the recovery rate have somewhat greater (but not vital) importance to investors in collateralized bond obligations (CBOs). Not even CBO buyers, however, should hang their hats on short-run forecasts of the recovery rate. The seemingly obvious, logical factors with which most pundits would attempt to explain fluctuations in the recovery rate may have less impact than plain, old-fashioned statistical noise.

Peashooter versus Rhino's Hide

Over the long run, the high yield sector's total return premium (over Treasuries) is largely a function of the yield-spread-over-Treasuries, less the default rate, plus the recovery rate. For example, in the period 1988-1999, the mean yield-to-maturity differential between the Merrill Lynch High Yield Master Index and ten-year Treasuries was 510 basis points. Altman's mean default rate for the period was

Note: Research assistance provided by Cecilia Fok. The authors also thank Meir Statman for his contributions, but retain full responsibility for the conclusions.

¹ This report focuses on "recoveries" in one of two senses in which the term is commonly used in connection with defaulting bonds. As indicated by the titles of several exhibits, our focus is the bond price shortly after default. For conventional high yield bond buyers, this is generally the percentage of claim recovered, because as income-oriented investors, they have no interest in lugging non-interest-paying instruments through two years (on average) of reorganization proceedings. An alternative definition of recovery is the value paid (in cash or securities) per bond when the issuer either emerges from bankruptcy or is liquidated. Such a definition is relevant primarily to vulture investors, who intentionally purchase bonds in default. They aim to earn their returns by buying the securities at a discount to the eventual proceeds of the reorganization or liquidation.

² See Altman (1999), Figure 5. In Figure 4, Altman shows the more widely reported figure of average weighted price after default as a *percent of par*, which was 27.9%. This compares with a 1978-1999 weighted average of 41.9%.

³ See Keenan, Hamilton, and Berthault (2000), p. 20.

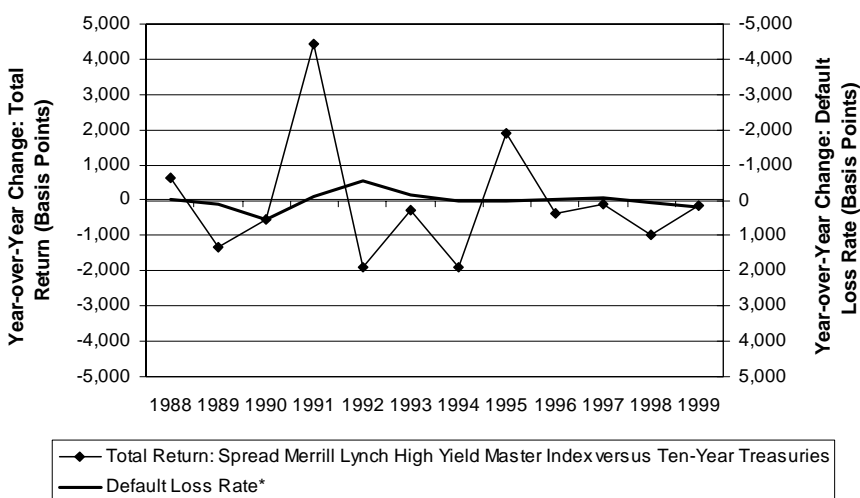
...but are comparatively insignificant in the short run.

3.62% (362 basis points), while his mean recovery rate was 41.49%. Subtracting the loss rate $[(100.00\% - 41.49\%) \times 3.62\% = 212 \text{ basis points}]$ from the spread (510 basis points) produces an estimated return premium of 298 basis points. That is not much different from the period's actual annual mean return premium of 311 basis points. Many other factors enter the actual equation, including upgrades, downgrades, and premature redemptions, but the long-run relevance of yield spread, default rates, and recovery rates to return premiums is indisputable.

The short run presents quite a different picture. **Exhibit 1** plots the annual year-over-year changes in the default loss rate and the return-spread-versus-Treasuries during 1988-1999. If these were electrocardiograms, it would be appropriate to prescribe a sedative for the patient represented by the return spread and begin administering last rites to the patient represented by the default loss rate changes. Swings in returns dwarf the fluctuations in the default loss rate. Moreover, even though the loss rate (plotted on an inverse scale) declined in 1992, a favorable development for high yield performance, the sector's return premium plummeted. Other influences simply overwhelmed the reduction in default losses.

Bear in mind, further, that the year-over-year change in the recovery rate (the main focus of this report) is merely a component of the change in the loss rate. That is, swings in average post-default prices are even less significant than Exhibit 1 suggests. In short, when portfolio managers plan their strategies for the coming twelve months, they have far more important things to think about than a potential rise or fall in the recovery rate. Trying to enhance total returns by anticipating that factor is likely to be as effective as attempting to fell a charging rhinoceros with a peashooter.

Exhibit 1: Year-over-Year Change: Default Loss Rate versus Total Return Spread, Annually, 1988 - 1999



* An increase in the default loss rate is plotted as a positive quantity on the inverted scale.
Sources: Edward I. Altman, New York University; Merrill Lynch & Co.

Aside from an apparent business cycle effect, fluctuation in the recovery rate are difficult to analyze

In the limited available historical observation period, troughs in recovery rates have coincided with the advent of recessions

The business cycle does not explain all fluctuations in recoveries

Default rates within seniority classes are unstable

Explaining Recovery Rates

Portfolio managers should be grateful that short-term variations in the recovery rate matter so little to their performance. Year-to-year changes in average post-default prices turn out to be devilishly difficult to explain. Unless they can explain the variation, investors can hardly hope to forecast it.⁴ Only over the full business cycle do fluctuations in the recovery rate appear to have some rhyme and reason.

Exhibit 2 documents the wide variation over time in the recovery rate. Average post-default prices peaked at 72.00% of face amount in 1981 (albeit with an extremely small sample size). The cyclical troughs were 21.67% in 1980, 24.66% in 1990, and 28.66% in 1999.

Moody's analysts attribute⁵ the lows of 1980 and 1990 to the commencement of business cycle contractions in 1981 and 1990. The rating agency does not explain why such a relationship should exist, perhaps deeming the answer self-evident. Plausible links immediately suggest themselves, however. To the extent that tighter monetary policy precipitates recessions, vulture investors may be capital-constrained, and therefore unaggressive in their bids, when the economy is about to head south. Additionally, expectations of future corporate earnings (and, by extension, of future asset values) probably decline when investors begin to foresee a recession. Tests of these hypotheses might overcome the obvious objection that Moody's proposed link between the business cycle and recovery rates is supported by evidence of just two cycles.⁶

If Moody's thesis is correct, then the 1999 decline in recovery rates (**Exhibit 2**) has ominous implications for the United States economy. Some investors may dismiss 1999's drop as a false signal, given still-strong forecasts for U.S. economic growth in 2000. In addition, average post-default prices have been falling since 1997 without correctly signaling a recession. Note, however, that Altman's recovery rate fell for *three* consecutive years (1988-1990) in advance of the last recession. If history is a guide, recovery rates may decline further in 2000, presaging a contraction in 2001.

While the business cycle may explain troughs in the recovery rate, it does not explain all fluctuations in the series. **Exhibit 2** shows that recessions have been less frequent than downturns in the average post-default price. No recession followed the decline of 1985-1986 or 1993; the jury remains out on the 1998-1999 drop.

One potential key to the snaggletoothed pattern of **Exhibit 2** is annual variance in the seniority mix of defaulting issues. **Exhibit 3** shows, for example, that the percentage of senior unsecured issues in the total has swung widely from year to year. Given that post-default prices vary with seniority, as financial theory predicts (**Exhibit 4**), we might reasonably expect the annual variance in overall recovery rates to be primarily a function of changes in the distribution of issues by seniority.

The catch is that the average recovery rates within each seniority class are not constant from year to year. (See **Exhibit 5**.) Using the senior unsecured issues as our illustrative class once again, we observe swings from as high as 72.02% in 1987 to as low as 29.02% in 1990. Therefore, annual variance in the overall recovery rate is not *purely* a function of variance in the seniority mix.

⁴ Wall Street pundits, we fully realize, routinely put the cart before the horse by forecasting the market's behavior before demonstrating that they can explain it. While this practice may meet the professional standards of astrologists and readers of tarot cards, it is inconsistent with the methods of any bona fide scientific field.

⁵ See Keenan, et al., p.19.

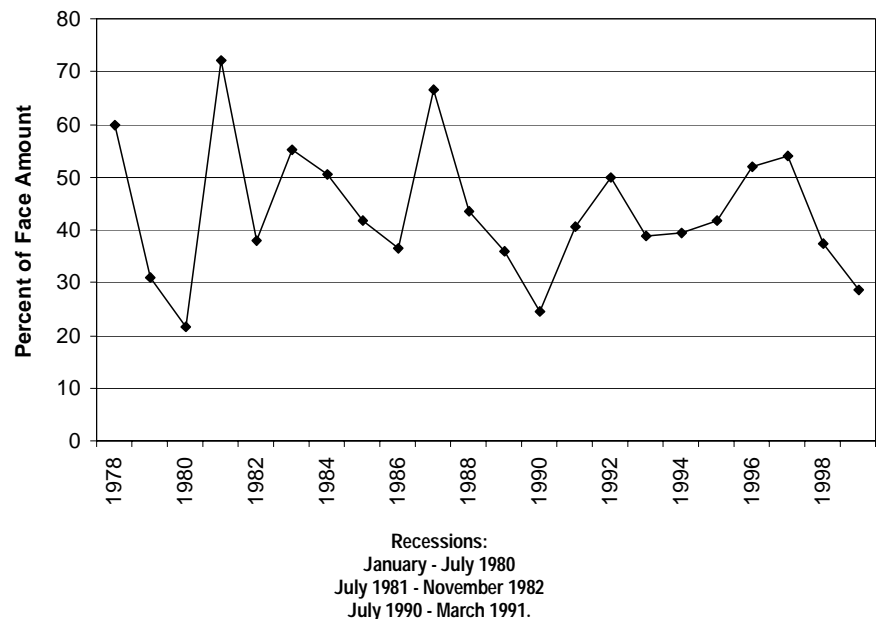
⁶ Keenan, et al. report default rates from 1920 forward but report recovery rates beginning only in 1980.

There is no obvious approach to forecasting the highly volatile seniority mix of defaulting issues

Purity, however, is not a realistic objective in financial analysis. Might it be that variance in the seniority mix explains *most* of the variance in the overall recovery rate? If so, we would be able to explain recovery rate variations as well as we can explain almost any other data series employed in the high yield analysis.

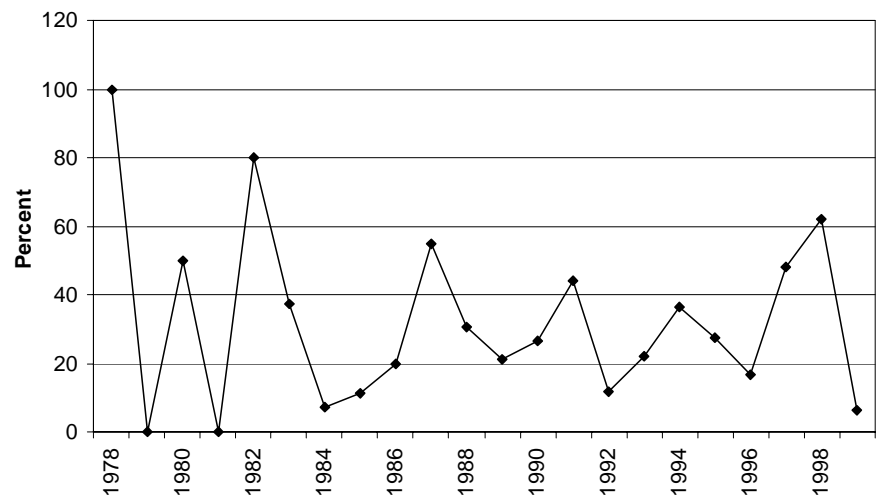
Predicting the series, to be sure, would remain a different matter. There is little reason to suppose that we could forecast year-to-year changes in the seniority mix of defaulting issuers with any accuracy. The seniority mix of the high yield universe changes over time, but not swiftly enough to explain changes in the seniority mix of the subset of bonds constituting the annual crop of defaults.

Exhibit 2: Weighted Average Post-Default Price:
All Seniorities, Annually, 1978-1999



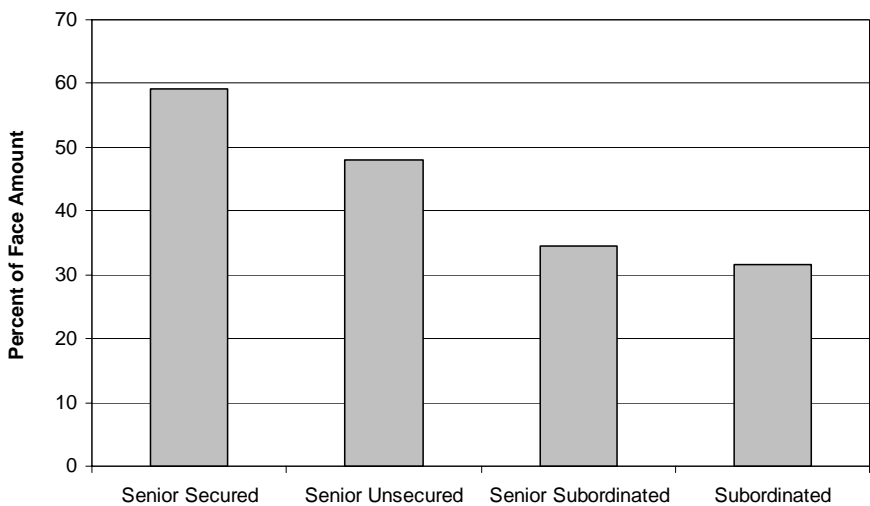
Source: Edward I. Altman, New York University.

Exhibit 3: Senior Unsecured Debt as a Percentage of Total Defaulting Debt: By Number of Issues, Annually, 1978-1999



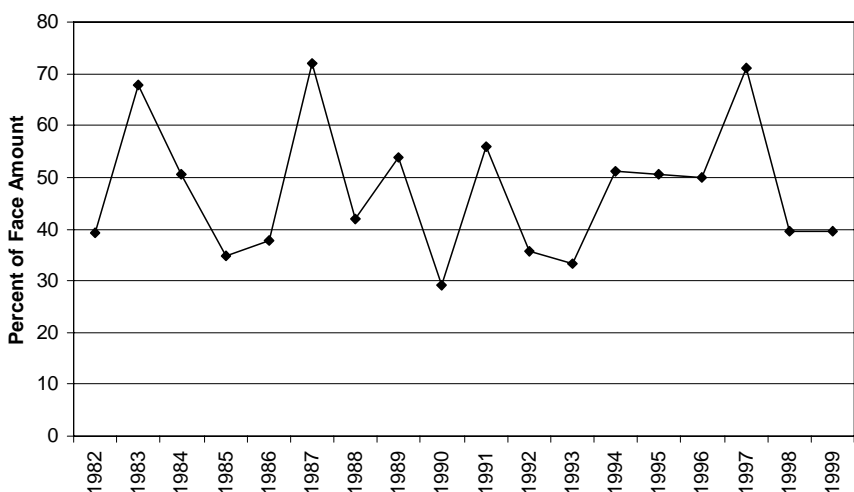
Source: Edward I. Altman, New York University.

**Exhibit 4: Weighted Average Post-Default Price:
By Seniority Class, 1978-1999**



Source: Edward I. Altman, New York University.

**Exhibit 5: Weighted Average Post-Default Price:
Senior Unsecured Debt, Annually, 1982-1999***



* A total of only three observations are available in 1978-1981.

Source: Edward I. Altman, New York University.

In any event, we can quantify the explanatory power of the seniority mix through the variance analysis summarized in **Exhibit 6**. Using Altman's data, we calculate each year's percentage distribution of defaulting issues by seniority class. We then estimate what the average recovery for all classes would have been, year-by-year, if recoveries *within each seniority class* had been constant (that is, equivalent to Altman's full-period average) throughout the period. This standard, accounting-style analysis isolates the impact of variance in the seniority mix.

The graph plots the actual and estimated default rates during 1978-1999. (As noted in the exhibit, the actual series varies somewhat from the average recoveries calculated by Altman on a face-amount basis.) The two series are highly volatile

Actual recovery rates vary more widely than predicted by the variance in seniority mix alone

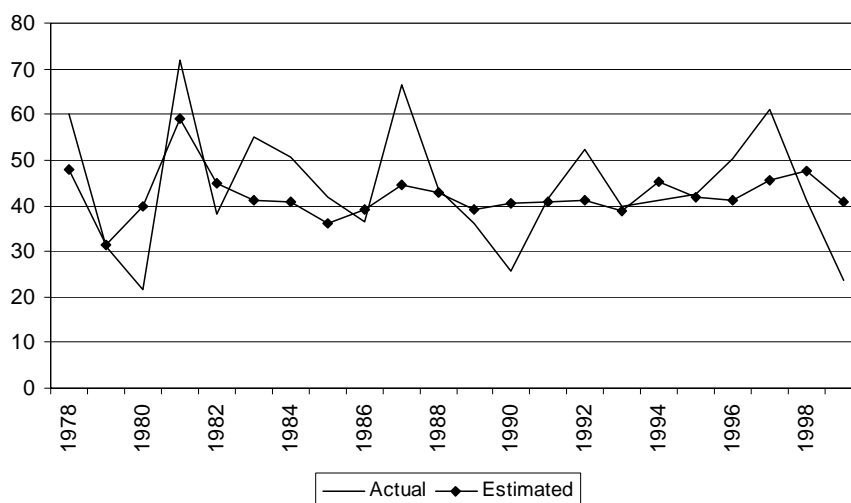
The volume of defaults and lenders quality standards explain even less than the seniority mix

and track closely in the early years, largely reflecting very small sample sizes of defaulting issues. From the mid-1980s forward, the estimate changes little from year to year, as changes in the seniority mix are overpowered by the assumption of constant recovery rates within seniority classes. The actual recovery rates, by contrast, fluctuate widely.

Notwithstanding some parallelism in the two series' fluctuations, the estimated series explains a slim 16.3% of the variance in the actual series during 1984-1999. (In statistical language, $R^2 = 0.163$.) A higher percentage-of-variance-explained (40.3%) results if we include the 1978-1983 period, but this is merely an artifact of the very small number of defaults in the early years.

As unimpressive as the seniority mix is in explaining the variance in recovery rates, certain other plausible-sounding variables perform still worse. For example, one might suppose that when default rates rise, recovery rates fall. High levels of defaults potentially strain the capacity of vulture funds to buy distressed merchandise. In addition, the bankruptcy courts may become overloaded, thereby stretching out the expected length of reorganization periods and reducing the present value of expected proceeds of bankruptcy settlements. When we regressed Altman's default rate against his recovery rates for the period 1978-1999, however, we found that the former explained only 7.3% of the variance in the latter. (The sign, at least, was as predicted, i.e., higher default rates were associated with lower recoveries.) A similarly low R^2 (7.1%) resulted from regressing the results of Federal Reserve's survey of senior loan officers' lending standards⁷ (available only for 1991-1999) against recoveries. Post-default prices, in other words, are not heavily influenced by banks' relative willingness to finance risky operations.

Exhibit 6: Average Post-Default Price: Actual and Estimated by Seniority Mix, Annually, 1978-1999



Source: Edward I. Altman, New York University.

Note: Figures do not correspond precisely to weighted-averaged price reported by Altman. Totals exclude original issue discount issues and are weighted by number of issues, rather than face amount.

In quest of a model to explain recoveries, we tested many other potential explanatory variables.⁸ These included:

- Number of defaults, in total and broken out by seniority class.
- Breadth of the industry mix of defaults.
- Log of the default rate.

⁷ See Martin S. Fridson, M. Christopher Garman, Kathryn Okashima, and Brian McManus, "Fed Survey: No Easing of Loan Standards," *This Week in High Yield* (January 7, 2000), p. 13.

⁸ Specific descriptions of the variables are available on request, along with the data.

Recovery-rate models constructed with seemingly pertinent variables are not robust in all periods

- Year-over-year change in the default rate and its log.
- Measures of industry concentration of defaults.
- High yield spread-versus-Treasuries.
- High yield new issue volume and year-over-year change.
- Total return of high yield bonds.
- Return on the Standard & Poor's 500 Index of common stocks.
- Gross Domestic Product.
- Industrial Production.
- Treasury yield curve.

Certain variables showed reasonable correlations with recovery rates, yet we found it infeasible to construct a valid multiple regression model. Combinations of variables that showed high explanatory power for a lengthy period lost most of their explanatory power when we altered the time frame even slightly. While a highly period-specific model may gull a few unsophisticated investors, it cannot meet the rigorous standard of best practice in the financial markets.

Conclusion

The bottom line in the search for meaning in recoveries is that post-default prices appear to contain a very large random factor. Some companies go belly-up with substantial residual asset value, while in other cases, little remains for creditors to salvage. These differences are not highly systematic, i.e., they are not invariably a function of industry,⁹ economic conditions, or the volume of defaults being resolved at the time.

The seniority mix provides insight, but is probably not susceptible to accurate forecasting

Seniority is a touchstone for those who prefer to see some rhyme or reason. Priority in the capital structure correlates with post-default prices. Within seniority classes, however, recoveries are highly unstable from year to year. Again, this reflects the random identities of companies that come a cropper in each twelve-month span. In any case, there is little basis for forecasting year-over-year changes in the distribution of defaulting issues within seniority classes.

Many portfolio managers resist the notion of unsystematic and consequently unpredictable factors influencing their performance. They are by no means unique in this respect. It is part of the human psychological makeup to see patterns where they do not exist. (See Kahneman and Tversky, 1973.) Recognizing this bias, investors must take care not to make faulty decisions based on unfounded predictions.

Unless portfolio managers expect a recession, they should make no assumption regarding recoveries other than an average rate

In summary, rational investors should expect below-average recoveries if they sense a recession coming on. Under all other circumstances, however, they should regard no forecast as superior to assuming average recoveries. Fortunately, there is little penalty for failing to forecast the year-ahead recovery rate. The recovery rate exerts a significant influence over long-run returns on high yield bonds, yet the impact of year-to-year variations in the rate is negligible, compared to other determinants of returns.

Bibliography

Altman, Edward I., with Naeem Hukkawala and Vellore Kishore. *Defaults & Returns on High Yield Bonds: Analysis through 1999 and Default Outlook for 2000-2002*. New York University Salomon Center, January 2000.

Edward I. Altman and Vellore M. Kishore, "Almost Everything You Wanted to Know about Recoveries on Defaulted Bonds," *Financial Analysts Journal* (November/December 1996), pp. 57-64.

⁹ Altman and Kishore (1996) find no statistically significant differences in recovery rates among industries, other than above-average recoveries for public utilities and for a broad classification encompassing chemicals, petroleum, and plastics manufacturers.

Kahneman, Daniel and Amos Tversky, "On the Psychology of Prediction," *Psychological Review* (July 1973), pp. 251-273.

Keenan, Sean C., David T. Hamilton, and Alexandra Berthault, *Historical Default Rates of Corporate Bond Issuers, 1920-1999*. Moody's Investors Service, January 2000.

Copyright 2000 Merrill Lynch, Pierce, Fenner & Smith Incorporated (MLPF&S). This report has been issued and approved for publication in the United Kingdom by Merrill Lynch, Pierce, Fenner & Smith Limited, which is regulated by SFA, and has been considered and issued in Australia by Merrill Lynch Equities (Australia) Limited (ACN 006 276 795), a licensed securities dealer under the Australian Corporations Law. The information herein was obtained from various sources; we do not guarantee its accuracy or completeness. Additional information available.

Neither the information nor any opinion expressed constitutes an offer, or an invitation to make an offer, to buy or sell any securities or any options, futures or other derivatives related to such securities ("related investments"). MLPF&S and its affiliates may trade for their own accounts as odd-lot dealer, market maker, block positioner, specialist and/or arbitrageur in any securities of this issuer(s) or in related investments, and may be on the opposite side of public orders. MLPF&S, its affiliates, directors, officers, employees and employee benefit programs may have a long or short position in any securities of this issuer(s) or in related investments. MLPF&S or its affiliates may from time to time perform investment banking or other services for, or solicit investment banking or other business from, any entity mentioned in this report.

This research report is prepared for general circulation and is circulated for general information only. It does not have regard to the specific investment objectives, financial situation and the particular needs of any specific person who may receive this report. Investors should seek financial advice regarding the appropriateness of investing in any securities or investment strategies discussed or recommended in this report and should understand that statements regarding future prospects may not be realized. Investors should note that income from such securities, if any, may fluctuate and that each security's price or value may rise or fall. Accordingly, investors may receive back less than originally invested. Past performance is not necessarily a guide to future performance.

The bonds of the company are traded over-the-counter. Retail sales and/or distribution of this report may be made only in states where these securities are exempt from registration or have been qualified for sale. MLPF&S usually makes a market in the bonds of this company.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or related investment mentioned in this report. In addition, investors in securities such as ADRs, whose values are influenced by the currency of the underlying security, effectively assume currency risk.