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## Rapidly Rising Corporate Debt: Are Firms Now Vulnerable to an Economic Slowdown?

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*The buildup of debt in the late 1990s has raised concerns about the U.S. nonfinancial corporate sector's health and its vulnerability to economic downturns. An analysis of the sector suggests that while small firms are experiencing some weakness, corporations as a group are in good financial shape.*

U.S. corporate debt has grown rapidly in recent years. Between 1995 and 1999, the outstanding debt of nonfinancial corporations rose a hefty 46 percent—a trend typified by last year's increase of 12 percent. Viewed as a share of GDP, such debt has now reached unprecedented heights (Chart 1).

This seemingly high level of debt has concerned some observers, who wonder whether it has made the nonfinancial corporate sector financially weak and vulnerable to economic downturns. Such concerns have gained credibility from the recent worsening of other gauges of corporate health, notably default rates and recovery rates on defaulted debt.

In this edition of *Current Issues*, we investigate whether concerns over the buildup of U.S. corporate debt are in fact justified. We examine the health of the nonfinancial corporate sector on a firm-by-firm basis, focusing chiefly on three key measures of health: leverage, liquidity, and overall solvency.<sup>1</sup> Our analysis suggests that the sector as a whole is in good shape, and that its financial health has actually improved during the late 1990s. Nonetheless, the health of small firms is not as robust as that of large ones, and small firms are continuing to experience a decline in health.

We also consider how the corporate sector might fare in the face of an economic challenge such as a major stock market correction or a large rise in interest rates.

We find that despite the sector's current high level of borrowing, leverage would remain manageable in the wake of a large market correction. A significant rise in interest rates, however, could push the sector's liquidity risk to the relatively high levels seen in the 1980s.

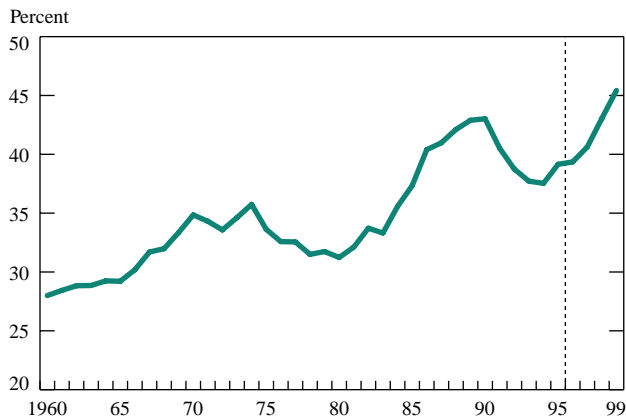
### **Corporate Indebtedness and Corporate Vulnerability**

The rapid growth in corporate debt during the late 1990s raises questions about the financial health of the sector and, indirectly, about the sensitivity of other sectors to economic troubles.

Heavily indebted firms are particularly vulnerable during economic downturns because their required debt service cannot be scaled back easily. If demand for such a firm's products falls off steeply, the firm may be forced to limit investments critical to its long-run viability or to reduce staff beyond efficient levels. Not only can these actions diminish the firm's, and the country's, overall productivity, they can also perpetuate the economic downturn as capital-goods orders drop and laid-off employees curtail purchases. If the firm's problems persist, default or even bankruptcy could result, with potentially large costs to creditors, employees, and other stakeholders.

To clarify the relationship between corporate indebtedness and corporate vulnerability, we examine the health of the nonfinancial corporate sector by using

**Chart 1**  
**Debt of U.S. Nonfinancial Firms as a Share of GDP**



Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts.

Note: Values for 1999 are through the third quarter.

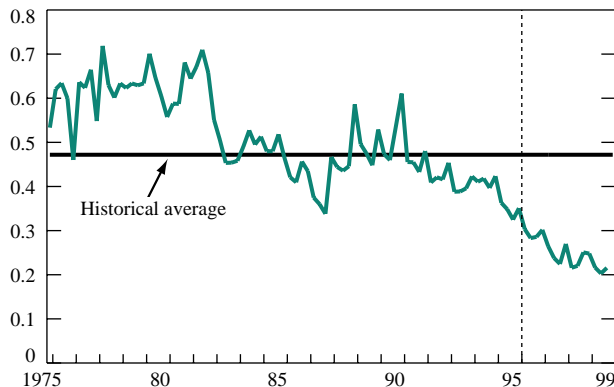
firm-level data—that is, we analyze it on a firm-by-firm basis. We focus on three specific measures of corporate health: leverage, liquidity, and overall solvency. Leverage can be thought of as the ratio of a corporation's debt to its long-run earnings capacity. Firms with high debt levels relative to earnings capacity can be vulnerable to the economic troubles described above. Liquidity refers to a company's ability to meet its debt service obligations; if interest rates are high, even those firms with low debt relative to their long-run earnings capacity could encounter difficulties servicing that debt. Finally, overall firm solvency is a composite indicator of corporate health that encompasses sales, earnings, and capital as well as leverage and liquidity.

### Leverage

There are many ways to calculate corporate leverage. As our central measure, we use a firm's long- plus short-term debt as a share of its stock market value. To aggregate individual firms' leverage ratios into a sectorwide average, we weight firms by their stock market values. Computed in this way, average leverage for nonfinancial firms declined fairly steadily—from 0.35 in late 1995 to 0.22 in September 1999—despite the concurrent rise in overall debt. In essence, nonfinancial corporations in September 1999 on average had debt liabilities with a face value only slightly more than one-fifth the value of their outstanding equity. Moreover, average corporate leverage for the nonfinancial sector was rather low relative to the post-1974 average of 0.47 (Chart 2).<sup>2</sup>

Not only has borrowing by the nonfinancial corporate sector been moderate relative to equity growth, but the borrowed funds seem to have been employed efficiently. Capital expenditures of nonfinancial firms

**Chart 2**  
**Average Leverage of U.S. Nonfinancial Firms**  
 Weighted by Stock Market Value



Source: Compustat.

Notes: The chart depicts the ratio of the long- plus short-term debt of nonfinancial firms to the firms' stock market value. For example, in the third quarter of 1999 (the most recent quarter plotted), firms on average had debt outstanding equal to approximately 22 percent of their outstanding equity.

began a period of extremely rapid growth in the mid-1990s, roughly concurrent with the surge in debt. Evidence that the investment has been productive can be found in the fact that since 1995, output per hour at nonfinancial firms has grown on average 2.6 percent per year—a growth rate that easily exceeds the 1.9 percent rate over 1975-95.

Of course, one could argue that these results are unique to our particular measure of corporate leverage. To explore that possibility, we also look at other leverage indicators.

### Alternative Measures of Borrowing

A measure of borrowing narrower than ours, such as long-term debt, may be useful if one is interested primarily in leverage as an indicator of long-run solvency, because firms typically associate long-term borrowing with long-term growth prospects. Conversely, a broader measure of borrowing, such as total liabilities, may be useful if one's interests extend beyond long-run solvency, because many nondebt liabilities, such as accounts payable, tend to grow during times of financial distress. Nevertheless, when we employ either alternative measure of borrowing, we reach the same conclusion as we did when we used our central measure of leverage: on average, the leverage of U.S. nonfinancial corporations was low and falling in the late 1990s.

### Composition of Firms in the Sectorwide Average

Our central measure of leverage could be distorted by the inclusion of high-tech firms in the sectorwide average. Leverage for these firms tends to be quite low, and until

very recently, the firms' stock prices had risen particularly rapidly. Thus, the improvement in average leverage could have been driven primarily by the high-tech sector, which we define to include biotech and communication firms as well as firms directly engaged in the design and construction of computer hardware and software. As these firms' weight in the overall average grows each year, their low leverage could pull the sectorwide average down further.

To evaluate this possibility, we excluded high-tech firms from the average (once again, measuring borrowing as short- plus long-term debt). The average leverage ratio in 1999 then becomes 0.30, somewhat higher than the level of 0.22 obtained when high-tech firms are included. Nevertheless, even after high-tech firms are excluded, leverage of the nonfinancial corporate sector remains below its post-1974 average of 0.50 and shows a decline since 1995.

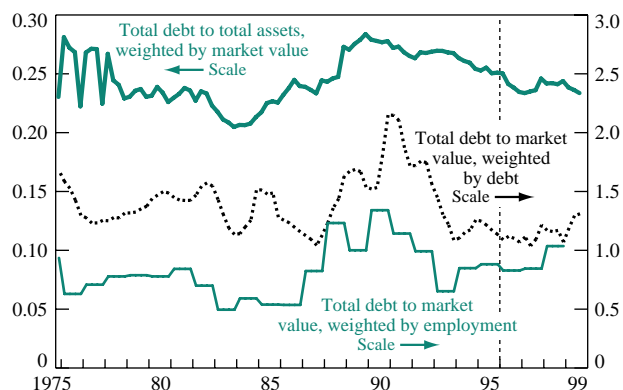
#### Alternative Measures of Earnings Capacity

If the market value of equity is inflated by speculative forces, then a firm's stock market value may not be a reliable measure of earnings capacity. Speculation-induced overvaluation in the stock market could make our measure of leverage unrealistically low and overstate its decline in the late 1990s.

As an alternative to using stock market value to determine earnings capacity, we can use the accounting value of total assets. This measure is largely exempt from overvaluation caused by speculative forces and thus could prove especially useful in times of undue optimism in the stock market. However, a firm's reported asset value reflects only historical investment costs; the value typically is unresponsive to either inflation or expectations of future economic developments. When prices are rising, the value of assets tends to be too low to provide a good gauge of future earnings capacity, because that value includes assets purchased years ago at prices below current prices. Total asset value could also be too low relative to true future earnings capacity if high stock market values reflect genuinely favorable economic prospects rather than undue optimism.

With these caveats in mind, we turn to a measure of average corporate leverage that uses asset values to determine earnings capacity (Chart 3, top line). By this measure, the average leverage ratio declined modestly during the late 1990s and—at 0.23 in September 1999—was still slightly below its historical average of 0.25. Although this measure has fallen less dramatically than our central measure and remains closer to its own historical average, it nonetheless suggests that the leverage of the nonfinancial corporate sector is not high.

**Chart 3**  
**Alternative Leverage Measures**  
Average for U.S. Nonfinancial Firms



Source: Compustat.

Notes: The leverage measure represented by a dashed line is a moving average. The following example illustrates how the leverage measures should be interpreted: in the third quarter of 1999 (the most recent quarter plotted), firms on average had total debt outstanding equal to roughly 23 percent of their total assets.

#### Alternative Weighting Schemes

Our results could also be affected by the way in which we aggregate individual firm leverage values into a sectorwide average. Thus, we substitute debt weights for market values as weights in the aggregation—an approach that could be useful if the object is to assess the vulnerability of creditors to corporate distress. When debt weights are used, firms with high market value and low debt have less influence on the overall average than they do when market value weights are used. However, by using debt weights, we still obtain a result similar to that derived from our central leverage measure: average leverage remains below the post-1974 average (Chart 3, middle line).

We also use firms' employment weights as an alternative to market values (Chart 3, bottom line). This approach could be particularly helpful in evaluating the vulnerability of aggregate employment to corporate distress. For example, consider the fact that some low-leverage firms, such as Internet companies, have very large market values but relatively few employees. These firms would have a strong downward influence on an average weighted by market value but a more muted influence on one weighted by employment.

With regard to corporate health, an employment-weighted measure yields the least optimistic result thus far: average leverage actually rose in the late 1990s—from 0.88 in December 1995 to 1.04 in December 1998—and was above the post-1974 average of 0.83.<sup>3</sup> Nonetheless, leverage according to this measure is still well below the all-time high of 1.34.

**Liquidity**

The various leverage measures we have examined suggest that the nonfinancial corporate sector as a whole is in good shape. Do liquidity measures present a similarly positive picture?

The recent growth in corporate debt reasonably gives rise to concerns about heightened liquidity risk, defined as the likelihood that a viable firm will be forced into bankruptcy by a temporary inability to meet cash obligations. Firms can minimize liquidity risk by maintaining substantial liquid assets or plentiful cash flows.

Current liabilities, interest expense, liquid assets, and cash flows are key components of a firm’s liquidity; hence liquidity risk is often measured by ratios incorporating some of these elements. We focus on three common liquidity ratios: interest expense to current or readily available assets, interest expense to cash flow, and current liabilities to current assets.<sup>4</sup> To aggregate individual firm measures into an overall average, we again weight firms by their stock market value.

Despite differences in the liquidity ratios, all three confirm that the liquidity risk of the nonfinancial corporate sector has not risen sharply during the late 1990s (Chart 4). In addition, the ratios suggest that the sector’s liquidity risk presently is not very high.

**Overall Solvency**

To measure solvency, economists typically compute a summary measure of corporate health called a Z-score. This score is a combination of five accounting ratios

that assess leverage, liquidity, sales, working capital, and retained earnings. The first and most familiar Z-score was published by Altman (1968). More recently, alternatives have been offered by Begley, Ming, and Watts (1996) and Shumway (1999). To calculate Z-scores, one multiplies each ratio by a number—for example (in the case of Altman’s Z-score), 1.00 for the sales ratio, 3.30 for the retained earnings ratio—and sums the resulting products.

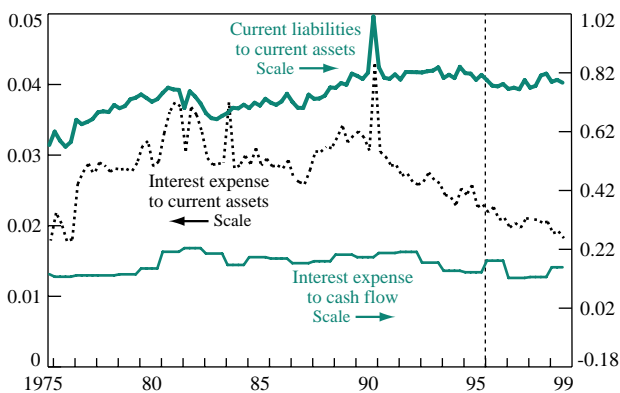
Since Z-scores measure solvency, a higher score indicates a lower risk of bankruptcy. Three Z-scores for the U.S. nonfinancial corporate sector, computed using the methods of the researchers cited above, show that the likelihood of bankruptcy in this sector declined on average in the late 1990s (Chart 5).

**Firm Health: Size Matters**

Some other measures of a firm’s financial health, such as default rates and ratings changes, paint a less encouraging picture of the corporate sector than the Z-scores and the leverage and liquidity measures. From December 1995 to September 1999, the number of speculative corporate bond issuers in default rose from 3.2 to 5.2 percent, while the average value recovered from defaulted debt fell from 45 to 32 percent of par value. Likewise, the ratio of Standard and Poor’s corporate ratings downgrades to upgrades doubled from 1.25 to 2.5.

To reconcile these divergent measures of corporate health, we first note that default rates and ratings changes give equal weight to all firms, while leverage,

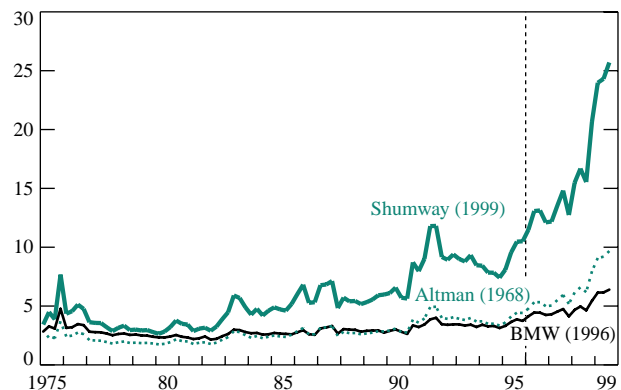
**Chart 4**  
**Average Liquidity of U.S. Nonfinancial Firms**  
Weighted by Stock Market Value



Source: Compustat.

Notes: The following example illustrates how the liquidity measures should be interpreted: in the third quarter of 1999 (the most recent quarter plotted), firms on average had current liabilities outstanding equal to approximately 79 percent of their current assets. The ratio of interest expense to cash flow is based on annual data.

**Chart 5**  
**Average Z-Scores of U.S. Nonfinancial Firms**  
Weighted by Stock Market Value



Source: Compustat.

Notes: The chart shows a rise in firms’ Z-scores (a measure of corporate solvency) during the late 1990s, suggesting that the sector’s financial health improved over the period. The increasing divergence of the three scores in 1996-99 primarily reflects their differing responses to stock market movements. These movements enter through the leverage component of the Z-score.

BMW is Begley, Ming, and Watts. Values for 1999 are through the third quarter.

liquidity, and Z-scores give greater weight to larger firms. This difference in the structure of the measures invites us to look closely at the relationship between firm size and firm health. A deterioration in small firms' financial health during the late 1990s might have shown up in sectorwide measures such as default rates, which give small and large firms equal weight, even though that deterioration was not noticeable in such measures as leverage, which assigns firms a weight commensurate with their size.

As we see from Chart 6, the financial health of small firms did indeed worsen during the late 1990s. Leverage ratios for the smallest 20 percent of firms (ranked by market value) rose sharply after 1995 and are now fairly high by historical standards. Liquidity measures confirm that the decline in health is concentrated in the smallest firms, as do solvency measures such as Altman's Z-score. This sizable deterioration can explain why measures such as default rates rose in the late 1990s, even as overall leverage declined.

Small firms' financial weakness certainly merits monitoring as we go forward, especially since these firms contribute disproportionately to the creation of new jobs. Nevertheless, the smallest 20 percent of these firms account for only about 1/10 of 1 percent of total market value, 1/2 of 1 percent of all debt, and 1 percent of all employment. Therefore, any difficulties experienced

by small firms will likely have limited near-term effects on aggregate macroeconomic activity.<sup>5</sup>

### Vulnerability to Financial Shocks

As a final check, we consider how a steep plunge in the stock market or a sharp rise in interest rates might affect the health of the nonfinancial corporate sector.

#### A Major Market Correction

Suppose that the stock market declined dramatically from its level in late 1999, when our most recent figures were compiled. How would corporate leverage be affected? We begin by assuming that prices return to late 1995 values; this benchmark offers the advantage of imposing the largest price declines on the firms that experienced the most dramatic price rises during the late 1990s. The average stock price decline implied by this scenario, relative to September 1999, is a sizable 57 percent.

Our findings suggest that corporate leverage would remain manageable in the event of a major market correction. In our scenario, the face value of outstanding debt as a share of outstanding equity at nonfinancial corporations would rise to an average of 0.42. Although well above the late 1999 value of 0.22, the value would still be below the historical average of 0.47, despite the magnitude of the price declines. Note, too, that the firms whose share prices would likely tumble the most—that is, high-tech firms—tend to have low leverage.

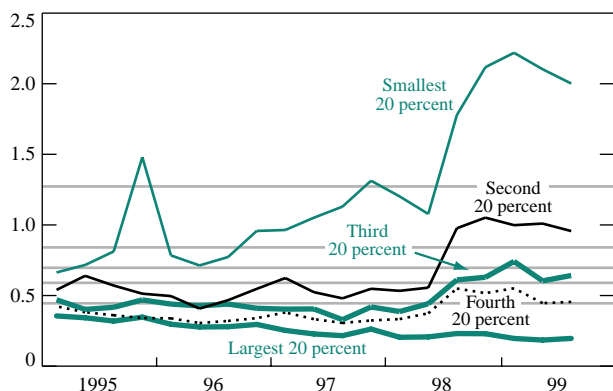
Corporate solvency, too, would remain comfortably above its historical average after a major stock market correction. As measured by Altman's Z-score, solvency at 1995 prices would be 7.2—a value below September 1999's value of 9.7 but still more than double the historical average of 3.3.

#### A Large Rise in Interest Rates

If interest rates were to increase sharply, how would corporate liquidity fare, say, after one year? First, we assume that interest rates rise by the same amount that they rose, on average, during the four quarters before each of the previous four recessions. Increases of roughly 400 basis points in the prime rate and 200 basis points in the Baa bond yield would result.

Next, we consider how these interest rate increases would affect total interest expense, since this measure would be directly affected by an elevation in rates. To provide an accurate estimate of the change in interest expense, we need to know how much of the outstanding corporate debt would "reprice," or bear a higher interest rate, after a year. Fortunately, this information is available. We also need to know the amount by which interest on that debt would rise. Unfortunately, this information is unavailable. Finally, it would help to know the extent to

**Chart 6**  
**U.S. Nonfinancial Firms' Average Ratio of Total Debt to Stock Market Value, by Firm Size**  
 Weighted by Stock Market Value



Source: Compustat.

Notes: The chart illustrates the decline in small firms' health in the late 1990s. For example, in the third quarter of 1999 (the most recent quarter plotted), the smallest 20 percent of firms on average had total debt outstanding equal to roughly 2.00 times the amount of their total assets, compared with the historical average of 1.27. The gray lines represent the post-1975 averages for the five size percentiles. The top gray line refers to the smallest 20 percent; the gray line below refers to the second 20 percent, and so forth.



which each firm has hedged its exposure to interest rate changes. Again, this information is unavailable.

To compensate for these data limitations, we construct two estimates of the effect of a rise in interest rates on total interest expense: one that should exceed the actual outcome and one that should fall short of it. In particular, we assume that the debt exposed to interest rate changes in one year all reprices at the prime rate; next, we assume that this debt all reprices at the long-term bond yield. Our first assumption almost certainly overstates the true increase in interest expense, our second surely understates it.

This procedure reveals that after a large interest rate rise, the liquidity risk of the nonfinancial corporate sector—measured by the ratio of interest expense to current assets—would lie between 0.176 and 0.193.<sup>6</sup> This ratio is higher than the post-1974 average of 0.167, suggesting potential liquidity problems for the sector. Even more noteworthy is the possibility that the ratio would approach the 1980s average of 0.190; corporate liquidity during this decade was a source of widespread concern.

### Conclusion

Despite rapid debt growth in recent years, the nonfinancial corporate sector is in good financial health. Some weakness, however, exists among the sector's smallest firms. The sector as a whole would likely withstand a major stock market correction without a huge disruption, but a large rise in interest rates could bring the sector's liquidity risk back to the relatively high levels common in the 1980s.

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### Notes

1. In this article, we examine only nonfinancial firms. Financial firms, by their nature, borrow heavily, so their leverage is generally extremely high. By excluding financial firms from our analysis, we avoid distortionary comparisons. In addition, except where noted, 1999 data were available only through the third quarter.

2. Corporate finance theory currently cannot prescribe a "correct" level of borrowing for individual firms, and thus it cannot define an absolute level of leverage that would be safe or appropriate for the economy as a whole. For this reason, we examine leverage relative to its own historical values.

3. December 1995 to December 1998 is the most recent period for which we have reasonably comprehensive employment data. However, these data are not universally available in the Compustat database (our source), so a measure based on employment weights must be interpreted with care.

4. Current liabilities are primarily notes payable, debt due in one year, accounts payable, income taxes payable, and accrued expenses. Current assets are mainly cash and short-term deposits, accounts receivable, inventories, and prepaid expenses. Interest expense is reported in the aggregate for each firm. Cash flow is operating income before depreciation. By excluding capital expenditures from our measure of cash flow, we do not change our overall conclusions.

5. Further examination of the firm-by-firm data suggests that there are no noticeable patterns of change across industries aside from those related to size.

6. Our assessment of the impact of an interest rate rise makes no allowance for likely negative effects on business activity, so the actual increase in liquidity risk would likely be even higher than these figures suggest.

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### References

- Altman, E. I. 1968. "Financial Ratios, Discriminant Analysis, and the Prediction of Corporate Bankruptcy." *Journal of Finance* 23, no. 4: 589-609.
- Begley, J., J. Ming, and S. Watts. 1996. "Bankruptcy Classification Errors in the 1980s: An Empirical Analysis of Altman's and Ohlson's Models." *Review of Accounting Studies* 1, no. 4: 267-84.
- Shumway, Tyler. 1999. "Forecasting Bankruptcy More Accurately: A Simple Hazard Model." Unpublished paper, University of Michigan-Ann Arbor Business School, July.

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