Volume Title: Financial Markets and Financial Crises

Volume Author/Editor: R. Glenn Hubbard, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-35588-8

Volume URL: http://www.nber.org/books/glen91-1

Conference Date: March 22-24,1990

Publication Date: January 1991

Chapter Title: Is There a Corporate Debt Crisis? Another Look

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Chapter URL: http://www.nber.org/chapters/c11486

Chapter pages in book: (p. 207 - 230)

6 Is There a Corporate Debt Crisis? Another Look

Mark J. Warshawsky

Many have expressed concern about the financial stability of the U.S. corporate sector. This concern stems, in part, from the increased leverage involved in a steady stream of well-publicized mergers, leveraged buyouts, and other corporate restructurings and, in part, from recent defaults. Indeed, aggregate statistics indicate significant increases over the 1980s in net equity retirements and issuance of debt securities. Aggregate ratios of debt outstanding to assets and of interest expense to operating cash flow, computed on the basis of book-value statistics, also have risen steadily for the nonfinancial corporate sector. In a paper published in 1988, "Is There a Corporate Debt Crisis?," Ben S. Bernanke and John Y. Campbell examine these and several other indicators of the financial stability of U.S. nonfinancial corporations in great detail. Bernanke and Campbell rely on samples culled from the COMPUSTAT files, which contain historical data on the balance sheets and income statements of individual large nonfinancial corporations. They also adjust book values to market values, whenever appropriate and possible. Their sample period extends from 1969 through 1986.

This paper expands on the work by Bernanke and Campbell in several ways. First, the sample period is extended through 1988, and thus incorporates the massive restructuring of balance sheets done in 1987 and 1988. Second, the sample is enlarged to include small corporations and corporations that have disappeared over the years owing to mergers, private buyouts, and

The analysis and conclusions of this paper are those of the author and do not indicate concurrence by other members of the research staff, by the Board of Governors, or by the Federal Reserve Banks. Able research assistance was provided by Peter Oberkircher. Helpful insights into the techniques used by Ben Bernanke and John Campbell in their paper were provided by Toni Whited. Helpful comments and suggestions were made by Tom Simpson, Pat Parkinson, John Rea, and Anil Kashyap.

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bankruptcy. Third, a measure of financial stability not reported by Bernanke and Campbell, the median bond rating, is examined here. Finally, a simpler and more accurate method of converting the book value into the market value of debt than employed by Bernanke and Campbell is used in this paper. In other respects, including the primary measures examined and the primary methodologies used, however, this paper follows the work by Bernanke and Campbell rather closely.[1]

6.1 Summary of Paper by Bernanke and Campbell

Instead of relying on aggregate statistics based on book values, Bernanke and Campbell compute indicators, based on market values, for samples of large nonfinancial corporations culled from the COMPUSTAT files. They address, in particular, the question of how the mean and the upper tail of the distribution of the debt-asset ratio, at market value, has evolved over the period 1969–86. The upper tail of this distribution is thought to be more relevant to concerns about bankruptcy risk than average measures based on broad book-value aggregates.

Bernanke and Campbell also examine other measures of the financial health of the corporate sector. The distributions of indicators of liquidity, such as the ratios of interest expense to operating cash flow and of interest expense to current assets, are computed for the samples. The authors investigate the degree to which changes in aggregate debt are related to changes in industry composition to ascertain whether industry effects have been an important part of recent aggregate financial behavior. They also estimate a formal model of the determinants of debt-asset ratios to determine whether recent patterns of debt issuance fit the estimated relationship or whether debt issuance has been unusual relative to model expectations. Finally, the authors study how recessions such as those of 1973–74 and 1981–82 would affect the financial structures of the sample of firms if such recessions took place after 1986.

Although the evidence is decidedly mixed, Bernanke and Campbell choose to emphasize two pieces of evidence suggesting that it is appropriate to be concerned about trends in corporate finance during the 1980s. Measures of corporate liquidity, in particular, the ratio of interest expense to operating cash flow, have deteriorated. And, more significantly, a simulation shows that a recession like that of 1973–74 would lead to debt-asset ratios of unprecedented levels, implying bankruptcy for more than 10 percent of the sample of firms. In contrast, however, other evidence suggests a less negative view of recent corporate financial behavior. In the sample of firms examined for 1969–86, there is little upward trend in the mean ratio of debt to assets, whether measured at book or market values. The upper percentiles of distribution of this ratio also do not seem to indicate any significant deterioration in financial structure. In particular, the large increases in equity values during the 1980s led to increases in the denominator of the debt-asset ratio; increases

in debt outstanding were therefore supported fully by increased asset values. The stability in debt-asset ratios holds true, whether the industrial composition of the sample is allowed to change or is fixed at 1969–74 or 1986 values, or whether oil-related industries are included or excluded. Furthermore, the model of the determinants of debt indicates that the growth in debt over the 1980s is well explained by the economic variables in the model and has not been unusual in that sense.

6.2 Methodological Contributions of the Bernanke-Campbell Paper

The main contributions of the paper by Bernanke and Campbell are the extensive use of a segment of the COMPUSTAT data base, the calculation of market values of debt, and simulations of the impact of recession on corporate financial structure. Using the "Industrial" COMPUSTAT file, and after eliminating financial corporations and firms with missing essential data, Bernanke and Campbell produce a sample that starts with about 650 firms in 1969 and grows to some 1,400 firms by 1986. They call this sample, which excludes firms that were later acquired or went bankrupt or private, the "growing sample." Data for the initial 650 firms were available consistently throughout the sample period; this "fixed sample" thus excludes firms that came into existence over the period as well as those that were acquired or went bankrupt or private. In general, Bernanke and Campbell report results based on the growing sample, although they indicate that there is little difference if the results are based on the fixed sample. There is some question about how representative are the corporations in either the fixed or growing samples. The Industrial file includes only large well-capitalized corporations whose stock is traded on the NYSE or AMEX and, hence, excludes smaller firms. Furthermore, owing to the exclusion of firms that were acquired or went bankrupt or private, the samples might exhibit a survivorship bias that could lead to an understatement of debt-asset ratios.

The second contribution of the paper is the computation of the market value of debt for a large sample of firms over a substantial period of time. Bernanke and Campbell claim that it is the market value of debt that is significant to evaluating the riskiness of financial structure, because "firms can always refinance existing debt at current interest rates, thereby effectively redeeming their outstanding debt at the market value" (p. 97).

Bernanke and Campbell employ an algorithm first created by William Brainard, John Shoven, and Lawrence Weiss (1980) to calculate the market value of debt. It is assumed that the market value of short-term debt and other current liabilities equals the book value. The algorithm also assumes that, at the starting date of the analysis, the maturity distribution of each firm's long-term debt equals the aggregate average distribution of long-term debt in the corporate sector for that date. The aggregate average distribution is computed from historical statistics on past debt issuance in the corporate sector, using

the assumption that bonds with 20-year maturities were issued exclusively. After the starting year, the maturity distribution for each firm is updated under the assumption that, if net issuance for the firm is positive, new issues have a 20-year maturity and that, if net issuance is negative, net retirements apply to all outstanding issues proportionately. Net issuance for each firm is obtained as the change in the total book value of long-term debt, adjusted for maturing issues. The impact of calls, conversions, and other early retirements on the maturity distribution is ignored.

The authors modify the basic algorithm to use information available after 1974 for some firms on the COMPUSTAT files concerning the maturity distribution of long-term debt out to five years' maturity. They replace the first five years of the maturity distribution produced by the basic algorithm with the COMPUSTAT numbers, scaling the remainder of the distribution produced by the basic algorithm up or down in proportion to remain consistent with the COMPUSTAT number on total long-term debt. The modified distribution is then carried forward to the next year and updated by the modified algorithm.

Once the maturity distribution of long-term debt for each firm is obtained, the algorithm assumes that each issue has a coupon rate equal to the Baa rate at the time of issue and a yield to maturity equal to the current Baa rate. The last assumption is equivalent to a market value given by a simple present-value calculation and to assuming that the yield curve is flat. The effects of upgrading or downgrading of bond ratings over time, the actual debt rating when bonds were issued, and of convertibility into stock are ignored.

The impact of call provisions on market prices of bonds also are ignored by Bernanke and Campbell. Utilities are generally constrained by covenants from calling bonds prior to the fifth year after issuance. Industrial firms typically are constrained for ten years. In the sixth (or eleventh) year, however, firms can call bonds at or slightly above par value. Hence, when current interest rates are lower than coupon rates, the issuer is likely to call older bonds, thereby limiting prices of these bonds to the call price. Therefore, the "market" value of debt produced by Bernanke and Campbell using a simple present-value computation likely exaggerates the "up-side" changes in the true market value of newly issued and, certainly, of older bonds when interest rates decline.

The third main contribution of the Bernanke and Campbell paper is to calculate the effect of simulated recessions on current debt-asset ratios, valued at market. For each firm that existed in the base years, 1972 or 1980, Bernanke and Campbell computed the percentage changes in the total market value of the firm (debt and equity) that were observed (in the market or by algorithm) over the two succeeding years. They applied these changes to the denominator of the debt-asset ratio extant in 1986. Instead of applying percentage changes to the numerator, however, Bernanke and Campbell employed a more elaborate technique to simulate the market value of debt in hypothetical recession

years following 1986. They assumed that the book value of debt will change by the amount it changed in 1973–74 or 1981–82, and then adjusted the change for growth in corporate assets through 1986. They also simulated the maturity structure of the firm's debt over the hypothetical recession years, using the Bernanke-Campbell algorithm discussed above. Employing the historical percentage changes in interest rates from the appropriate recession, the market value of debt was calculated for each firm in two hypothetical years following 1986. Combining these simulations of market values of debt and of assets, debt-asset ratios were created.

A very dramatic deterioration in debt-asset ratios occurs in the simulation of the 1973–74 recession. During 1973–74, the total market value of COMPUSTAT firms dropped sharply. For the simulation, 10 percent of the firms in the sample have debt-asset ratios exceeding unity, indicating financial trouble. In 1986, firms have higher debt-asset ratios than they had in 1972, and hence are more severely affected by a given drop in total market value than they were in 1973–74. In the 1981–82 recession, by contrast, the stock market was relatively stable and interest rates were high, leading to little deterioration in simulated debt-asset ratios. The very severe results of the 1973–74 simulation, to some extent, come directly from the methodology employed; the denominator of the ratio is changed in simple percentage terms, while the numerator is altered by an elaborately computed change.

Simulations of the ratios of interest expense to operating cash flow and of interest expense to current assets also were done for the two recession scenarios. Bernanke and Campbell took observed changes in earnings and current assets from the historical recessions and scaled them up by the book value of the firm's assets. They used the book-into-market algorithm to estimate interest expenses. In both simulated recessions, the liquidity measures deteriorate; in some instances, the measures deteriorate sharply.

6.3 Improvements Presented in This Paper

Although the paper by Bernanke and Campbell represents a significant advance over other empirical papers in the corporate finance literature, I believe that improvements can be made in the sample and the algorithm used for computing market values of debt. Furthermore, information about average Standard and Poor's (S&P) bond ratings is available and can be used and shown. These improvements might lead to broader applicability and greater realism in the results, although it is difficult to know a priori whether they would tend to buttress or weaken the conclusions drawn by Bernanke and Campbell.

Regarding the sample, COMPUSTAT files for 1987 and 1988 are now available, enabling analysis on the impact of additional restructuring activity. In addition, the "Full Coverage" and "Research" COMPUSTAT files are available, enabling the analysis to include, respectively, smaller corporations whose

stocks are traded on the NASDAQ and regional exchanges, and corporations which disappeared by being acquired or by going bankrupt or private. In particular, the issue of survivorship bias can be studied.

Initially I also thought that significant improvements could be made to the market-value-of-debt algorithm used by Bemanke and Campbell by making several adjustments. Foremost among the adjustments was the utilization of information available on COMPUSTAT for years after 1978 on representative S&P bond ratings. For the years prior to 1978 it was assumed that each new bond issue has a coupon rate equal to the rate prevailing at the time of issue on a bond with the corporation's 1978 bond rating. After 1978 the rate at the time of issue on a bond with the corporation's then-current bond rating was used. Also, a rough modification of the simple present-value calculation of market value was made to account for the existence of call provisions in bond covenants. The pricing effect of call provisions was proxied by placing an upper limit of \$115 on bond prices produced by the algorithm. Another improvement attempted was the use of firm-specific information in 1988 on the actual maturity distribution of long-term debt; preliminary experimentation with this information, however, did not show significant differences from the results of Bemanke and Campbell, who used the average aggregate maturity distribution in 1969 as initial values in their algorithm.

The extent of the improvement that can be made by these adjustments in the Bemanke-Campbell book-into-market algorithm is shown in table 6.1. For the period 1979–87, the book values of long-term debt of Woolworth and Alcoa reported in Standard and Poor's *Bond Guide* are shown. Also given are the actual market values of the long-term debt for these companies reported in the *Bond Guide*, and estimated market values computed under (a) the adjusted algorithm and (b) the original algorithm used by Bemanke and Campbell.[2] The estimates using the adjusted algorithm of the market values of bonds for these companies are closer to the actual market values than Bemanke and Campbell's estimates. This improvement primarily owes, at least in the cases of Woolworth and Alcoa, to the placement of an upper limit on bond prices. Nevertheless, neither set of estimates captures fully the steep decline in bond prices in 1981; moreover, neither algorithm can capture the depressed market value of Alcoa's convertible bonds over the 1979–87 period resulting from a depressed price for Alcoa's shares. More generally, no simple book-into-market algorithm can replicate changing maturity distributions or value effectively convertible debt or other debt contracts with equity features; at some point, a more accurate research approach may be to simply obtain information on the actual market value of individual bonds.

In the absence of complete historical data on the market value of individual bonds (which, in any case, would not be available for privately placed bonds), however, another simple approach can be employed and compared to the adjusted algorithm. This simple approach entails the application to each company's long-term debt of the ratio of market to par value of all corporate bonds

Table 6.1 **Comparison of Calculations of Market Value of Debt (in millions of dollars)**

Year	Standard and Poor's *Bond Guide*		Estimated Market Value	
	Book Value	Market Value	Adjusted Algorithm	Bernanke-Campbell Algorithm
F. W. Woolworth Co.				
1979	231	176	191	192
1980	219	144	163	160
1981	217	115	139	145
1982	206	143	159	164
1983	182	126	141	146
1984	182	134	147	152
1985	182	163	166	171
1986	179	177	179	181
1987	169	159	161	162
Alcoa				
1979	574	458	476	476
1980	483	338	370	352
1981	1,161	702	920	1,001
1982	1,389	1,108	1,320	1,434
1983	1,381	1,076	1,287	1,415
1984	1,322	1,070	1,264	1,392
1985	1,322	1,204	1,323	1,578
1986	1,172	1,115	1,232	1,524
1987	855	714	835	1,029

Source: Standard and Poor's *Bond Guide* and author's calculations.

traded on the NYSE.[3] At year-end 1988, a total of 2,259 U.S. corporate debt issues were listed on the NYSE by 793 issuers. The par value of these domestic corporate bonds totaled $294.5 billion and the market value was $243.6 billion. The advantages of this simple aggregate approach are the utilization of actual, not simulated, market values, and the ability to track exactly broad macroeconomic trends. The main drawback, of course, is the discarding of information specific to each individual company's debt structure and bond rating.

The accuracy of the adjusted algorithm and the simple aggregate approach are compared in table 6.2. (A fortiori, the accuracy of the original Bernanke-Campbell algorithm is also being compared.) The mean squared error of estimates of market values of bonds calculated under the adjusted algorithm and the aggregate approach are shown for twelve companies for the years 1979 through 1988. The mean squared error was smaller for the adjusted algorithm

Table 6.2 **Comparison of Adjusted Algorithm and Aggregate Approach to Calculating the Market Value of Debt, 1979–1988**

Company	Mean Squared Error	
	Adjusted Algorithm	Aggregate Approach
Abbott	.04233	.13031
Alcoa	.17520	.01814
AT&T	.19984	.04808
Atlantic Richfield	.01806	.07850
Bethlehem Steel	.51670	.43861
Caterpillar	.09010	.00984
Chrysler	.30205	.28967
Du Pont	.42377	.01402
General Electric	.13434	.06549
Owens-Corning	.10119	.07014
Procter & Gamble	.19326	.07584
TRW	.03154	.06051
Mean for 12 companies	.01860	.01080

Source: Author's calculations.

in only three of the twelve cases; over all companies, the mean squared error is smaller for the aggregate approach than for the adjusted algorithm. Hence, the aggregate approach will be used exclusively in the calculations of the ratio of debt to assets, at market value, reported below.[4] The historical ratio of market to par value of NYSE-listed bonds is shown in figure 6.1.

6.4 Construction of the Samples

As Bernanke and Campbell did, I created two samples of corporations listed on the COMPUSTAT files. The first *fixed* sample consists of 828 domestic nonfinancial corporations for which data are available for *each* year from 1969 through 1988. Of the 828 corporations, 701 come from the Industrial COMPUSTAT file and 127 from the Full Coverage file. The second *fluctuating* sample consists of all corporations for which data on key variables were available for *any* year from 1969 through 1988. The total number of corporations grew from 2,468 in 1969 to 5,120 in 1987. Of the 5,120 corporations in 1987, 1,676 appeared on the Industrial file, 2,908 on the Full Coverage file, and 536 on the Research file. The number of companies dropped to 4,523 in 1988, owing mainly to fewer companies listed on the Research file. Also, I used the September 1989 COMPUSTAT tapes; because some corporations' fiscal years end later than December 31 and because from the end of the fiscal year to the time COMPUSTAT enters annual statement variables as much as eight months can elapse, fewer companies are listed on the Industrial and Full Coverage files in 1988 than in 1987.[5] The number of corporations listed in the Full

Coverage files grew particularly quickly over the 1969 through 1988 period, consistent with the growth in listings on the NASDAQ over the period. The number of corporations listed on the Research file grew slowly through 1976 and then declined through 1988. Because historical data on a disappeared company can be included on the Research file only up to the year of the company's disappearance, it is sensible that the number of companies for which data appear on the Research file declines rapidly in recent years as the active history of the companies disappearing since 1969 recedes in time.

6.5 Distribution of Debt-Asset Ratios

Various perspectives on the debt-asset ratios for 1969–88 in various samples are shown in the next three tables. The ratios are calculated using the aggregate approach to calculating the market value of debt as described above, actual market values of common equity, and the approach used by Bernanke and Campbell to evaluate preferred equity. Assets equal the sum of debt and equity.

Debt-asset ratios for the fixed sample, shown in table 6.3, are calculated, as well, for the Industrial and Full Coverage subsamples. Three different statistics of the distribution for each year are shown: the weighted average, the

Fig. 6.1. The ratio of market to par value of NYSE-listed corporate bonds
Source: NYSE *Fact Book.*

Table 6.3 **Debt-Asset Ratio[a], Fixed Sample**

	Industrial (701 companies)			Full Coverage (127 companies)			Combined (828 companies)		
Year	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile
1969	.2622	.2967	.5560	.3148	.3297	.5624	.2637	.3006	.5564
1970	.3023	.3542	.6451	.3581	.3662	.6858	.3038	.3562	.6494
1971	.2947	.3401	.6332	.3187	.3315	.6552	.2954	.3373	.6340
1972	.2735	.3590	.6485	.3143	.3475	.6844	.2746	.3587	.6504
1973	.3285	.5096	.7818	.4456	.5424	.7863	.3314	.5162	.7820
1974	.4361	.6085	.8495	.5623	.6437	.8677	.4392	.6157	.8505
1975	.3886	.5193	.7832	.4762	.5880	.8030	.3908	.5313	.7878
1976	.3797	.4652	.7406	.4533	.5200	.7682	.3815	.4743	.7433
1977	.4201	.4758	.7343	.4785	.5150	.7599	.4216	.4833	.7376
1978	.4343	.4911	.7346	.5058	.5154	.7618	.4362	.4939	.7386
1979	.4299	.4577	.7120	.5021	.5054	.7589	.4318	.4636	.7239
1980	.3860	.4211	.6989	.4769	.4509	.7657	.3884	.4309	.7163
1981	.4205	.4412	.7151	.4949	.4572	.7597	.4227	.4434	.7239
1982	.4085	.4188	.7089	.4339	.4489	.7439	.4093	.4202	.7145
1983	.3692	.3677	.6093	.4070	.3742	.6984	.3703	.3687	.6205
1984	.3954	.4019	.6683	.4297	.4326	.7604	.3966	.4049	.6769
1985	.3810	.3934	.6652	.4047	.4035	.7272	.3815	.3959	.6767
1986	.3701	.4041	.6650	.4270	.4065	.7478	.3721	.4044	.6787
1987	.3667	.4247	.7170	.4467	.4570	.7928	.3694	.4279	.7299
1988	.4005	.4083	.7030	.6107	.4741	.9076	.4071	.4158	.7212

Source: COMPUSTAT and author's calculations.
[a]At market values.

median, and the ninetieth percentile. Over the entire period, for all statistics and all subsamples, the debt-asset ratio rose. Companies on the Full Coverage file exhibit consistently higher debt-asset ratios than companies on the Industrial file. The former companies experienced a particularly notable increase in the ratio in 1988, owing largely to the restructuring of a few companies in the subsample. While the significant increases in debt-asset ratios in 1973 and 1974 are due primarily to the large drop in equity prices that occurred over that period, and the steady decline in the ratios through 1983 results from increases in equity prices, the small climb in the ratios since 1983 occurred despite further significant increases in equity prices. Because the ratio of market to par value for bonds in 1988 was nearly identical to the market-par ratio in 1983, the overall rise in the debt-asset ratio since 1983 must have been caused by the considerable issuance of debt and retirement of equity securities through 1988. The statistic on ninetieth percentile indicates that some companies, particularly those in the 1988 Full Coverage subsample, are operating very close to "market value insolvency," which would occur when the ratio equals one.

The same perspectives on debt-asset ratios are offered in table 6.4 for the

Table 6.4 **Debt-Asset Ratio[a], Fluctuating Sample**

	Industrial				Full Coverage				Research				Combined			
Year	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile
1969	837	.2584	.2874	.5510	259	.3729	.3333	.5928	1,372	.3203	.3177	.6075	2,468	.2810	.3098	.5884
1970	869	.2873	.3318	.6456	307	.4151	.3791	.6784	1,376	.3311	.3283	.6174	2,552	.3070	.3342	.6344
1971	917	.2803	.3199	.6216	357	.3985	.3493	.6623	1,545	.3862	.4154	.7120	2,819	.3111	.3704	.6865
1972	953	.2620	.3322	.6411	422	.3900	.3340	.6803	1,611	.3586	.3672	.6737	2,986	.2911	.3533	.6647
1973	1,133	.3572	.5269	.7744	460	.4826	.4932	.7965	1,720	.3488	.3663	.6908	3,313	.3647	.4344	.7395
1974	1,154	.4687	.6244	.8482	507	.5784	.6229	.8831	1,739	.4479	.5439	.8216	3,400	.4730	.5882	.8417
1975	1,170	.4202	.5453	.7799	535	.5059	.5450	.8245	1,745	.5853	.6642	.8899	3,450	.4539	.5995	.8592
1976	1,184	.4101	.4955	.7397	574	.4792	.4972	.7917	1,686	.5167	.5668	.8414	3,444	.4330	.5251	.8072
1977	1,198	.4458	.4962	.7288	610	.4990	.5046	.8032	1,649	.4796	.5224	.8071	3,457	.4563	.5099	.7813
1978	1,216	.4588	.5066	.7272	703	.5258	.4971	.7851	1,545	.4964	.5186	.8042	3,464	.4708	.5104	.7765
1979	1,243	.4538	.4720	.7152	880	.5019	.4406	.7819	1,490	.5110	.5287	.8085	3,613	.4669	.4915	.7720
1980	1,282	.4119	.4329	.7003	1,012	.4355	.3311	.7504	1,495	.4581	.4963	.7989	3,789	.4212	.4371	.7576
1981	1,317	.4446	.4498	.7149	1,364	.4499	.3539	.7675	1,458	.3941	.4247	.7745	4,139	.4364	.4134	.7511
1982	1,339	.4299	.4313	.7089	1,486	.4270	.3150	.7629	1,663	.4740	.4536	.8140	4,488	.4358	.4079	.7616
1983	1,409	.3912	.3709	.6241	1,805	.3563	.2457	.6641	1,492	.4721	.4419	.7984	4,706	.3968	.3471	.7097
1984	1,463	.4181	.4136	.6684	2,019	.4057	.3128	.7121	1,402	.4003	.3586	.7427	4,884	.4146	.3623	.7037
1985	1,512	.4014	.3981	.6652	2,238	.3945	.2867	.6996	1,168	.4520	.4337	.7676	4,918	.4045	.3613	.7068
1986	1,600	.3848	.3966	.6508	2,626	.4167	.2922	.7108	837	.4439	.4222	.7530	5,063	.3917	.3569	.7006
1987	1,676	.3875	.4318	.7097	2,908	.4327	.3494	.7422	536	.4163	.4032	.7634	5,120	.3935	.3873	.7319
1988	1,658	.3990	.4169	.6935	2,622	.4204	.3253	.7227	243	.5316	.4291	.7536	4,523	.4037	.3695	.7155

Source: COMPUSTAT and author's calculations.
[a]At market values.

fluctuating sample. This second sample includes growing subsamples from the Industrial and Full Coverage files and a shrinking subsample from the Research file. The results are similar in a broad way to those in table 6.3. The debt-asset ratio for the fluctuating sample rose during 1969–88, although less significantly than in the fixed sample. The climb in the ratio from 1983 through 1988, in particular, is less noticeable than in the fixed sample. The Full Coverage growing subsample has a lower debt-asset ratio than its fixed subsample counterpart. Apparently, newly listed small companies have lower debt-asset ratios than well-established small companies. By contrast, disappeared companies tend to have slightly higher debt-asset ratios than existing companies, perhaps owing to bankruptcy as one of the causes of disappearance. The survivorship bias, however, does not seem particularly significant.

Debt-asset ratios by industry for selected years are shown in table 6.5. The ratios vary widely by industry, with chemicals, mining, and printing and publishing showing consistently low debt-asset ratios, and petroleum and natural

Table 6.5 **Debt-Asset Ratio: Fluctuating Sample by Industry, Selected Years[a]**

Industry	1969	1974	1979	1984	1985	1986	1987	1988
Laboratory equipment	.251	.611	.399	.233	.238	.227	.281	.283
Printing and publishing	.212	.526	.420	.258	.250	.266	.294	.273
Electronics	.275	.546	.356	.264	.280	.287	.358	.338
Paper	.288	.499	.445	.363	.377	.331	.340	.336
Chemicals	.177	.392	.343	.246	.231	.196	.240	.210
Petroleum and natural gas	.512	.646	.581	.532	.505	.451	.481	.484
Petroleum refining	.287	.499	.466	.523	.587	.484	.467	.432
Mining	.161	.218	.256	.222	.189	.142	.162	.156
Food and tobacco	.314	.546	.496	.403	.359	.321	.341	.306
Retail	.376	.673	.640	.451	.430	.427	.496	.461
Lumber and furniture	.234	.600	.489	.351	.398	.392	.431	.508
Machinery	.291	.566	.398	.274	.281	.292	.349	.339
Glass and concrete	.315	.553	.503	.462	.482	.483	.476	.447
Vehicles	.391	.626	.511	.398	.385	.427	.489	.473
Apparel	.327	.671	.593	.452	.379	.362	.411	.418
Metal products	.318	.577	.470	.398	.412	.422	.487	.443
Rubber and plastics	.342	.578	.540	.374	.364	.315	.346	.335
Construction	.489	.758	.658	.546	.523	.489	.495	.492
Wholesale	.382	.692	.618	.474	.456	.477	.511	.489
Textiles	.365	.694	.562	.488	.486	.446	.487	.438
Steel refining	.418	.574	.527	.546	.504	.518	.496	.427
Transportation	.522	.647	.654	.516	.552	.476	.533	.544
Utilities	.512	.646	.581	.532	.505	.451	.481	.484
Communication	.383	.626	.424	.440	.399	.396	.425	.398

Source: COMPUSTAT and author's calculations.

[a]Debt-asset ratio shown is the median of the distribution, calculated at market values. The sample does not match that in table 6.4 exactly, owing to the omission of a few small industries.

gas, construction, transportation, and utilities showing consistently high ratios. The industries exhibiting the largest increase in debt-asset ratios over the period include petroleum refining, retail, lumber and furniture, glass and concrete, apparel, and metal products. Petroleum refining and retail industries have been prominently involved in merger, restructuring, and buyout activity.

The widely asked question about the relationship between the cyclical risk and the leverage of an industry can be answered by regressing the debt-asset ratio on the variability of detrended industry profits. If the coefficient on the variability factor in such an equation is negative, the intuitive result is implied: lower cyclical risk allows higher leverage. If, however, a counterintuitive zero or positive coefficient is discovered, it would seem that leverage is influenced by other factors more significant than cyclical risk, including, perhaps, tax and regulatory structures, typical company size in the industry, and agency considerations. The dependent variable for a simple cross-section equation which I estimated is the debt-asset ratio, averaged over the three-year period, 1984–86, for each of the twenty-four industries shown in table 6.5. The independent variables are a constant and 1 less than the R^2 computed for profit equations estimated separately for the twenty-four industries over the years 1969–86. The only variable included in these industry profit equations is a simple time trend. The equation estimated over the cross section of the industries, where the t-statistics are in parentheses, follows:

$$\underset{}{X} = \underset{(12.789)}{.388} + \underset{(.296)}{.0237}\ Y \qquad R^2 = .0040$$

As is evident, the coefficient on the Y variable measuring the unexplained variability of detrended industry profits is not significantly different from zero. The debt-asset ratio in various industries, the X variable, is apparently not influenced, in any significant way, by cyclical risk.[6]

It is worthwhile to compare table 6.4 with tables 4 and 5 presented in Bernanke and Campbell. In general, the statistics shown in table 6.4, whether weighted average, median, or ninetieth percentile, are higher, particularly toward the end of the period, than the ratios exhibited in Bernanke and Campbell. Furthermore, the positive difference cannot be ascribed to the addition of companies from the Full Coverage and Research files; comparing the Industrial subsample in table 6.4 to the tables in Bernanke and Campbell reveals the same positive differences. Hence, it must be concluded that the reason for differences is the use of the aggregate approach, as opposed to an algorithm, for computing the market value of debt.

6.6 Distributions of the Ratio of Interest Expense to Cash Flow

The next three tables exhibit information about the distribution of the ratio of interest expense to operating cash flow for the various samples and subsamples.[7] As shown in table 6.6, the interest expense–cash flow ratio for the fixed

Table 6.6 **Ratio of Interest Expense to Cash Flow, Fixed Sample**[a]

Year	Industrial			Full Coverage			Combined		
	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile
1969	.0925	.0927	.2895	.1241	.0882	.3254	.0933	.0924	.2897
1970	.1161	.1302	.4381	.1601	.1161	.8598	.1173	.1281	.4598
1971	.1165	.1256	.4001	.1355	.1166	.4032	.1170	.1247	.3954
1972	.1081	.1095	.3297	.1130	.0883	.3242	.1082	.1070	.3285
1973	.1039	.1179	.3257	.1260	.0961	.2831	.1045	.1147	.3220
1974	.1067	.1400	.4686	.1567	.1435	.5531	.1079	.1405	.4704
1975	.1173	.1410	.4410	.1396	.1319	.5428	.1178	.1389	.4422
1976	.1077	.1108	.3276	.1188	.0997	.3188	.1079	.1096	.3257
1977	.1066	.1088	.3566	.1185	.1123	.3404	.1069	.1106	.3541
1978	.1083	.1141	.3411	.1296	.1359	.4071	.1088	.1164	.3513
1979	.1088	.1248	.3586	.1529	.1424	.4487	.1098	.1280	.3678
1980	.1250	.1462	.4418	.1838	.1762	.6076	.1265	.1491	.4591
1981	.1438	.1537	.4983	.2444	.1666	1.1413	.1461	.1538	.5350
1982	.1669	.1684	1.0214	.2439	.1819	2.4044	.1689	.1708	1.0696
1983	.1513	.1419	.8152	.1855	.1654	.9024	.1522	.1442	.8297
1984	.1446	.1379	.6338	.1782	.1560	9.3768	.1456	.1404	.7027
1985	.1614	.1648	1.4149	.1924	.1714	1.9100	.1623	.1665	1.4364
1986	.1812	.1760	2.3426	.1999	.1562	4.7486	.1819	.1753	2.3869
1987	.1579	.1672	1.2041	.2171	.1861	1.9904	.1598	.1686	1.2082
1988	.1725	.1688	0.9035	.3804	.1999	1.4014	.1781	.1720	.9804

Source: COMPUSTAT and author's calculations.

[a]Cash flow is defined as the sum of before-tax eranings, depreciation, and interest expense. Negative values of the ratio are considered as $+\infty$.

sample nearly doubled, whether calculated as a weighted average or a median, over the years 1969–88. The ratio rose, in particular, since 1979. The ninetieth percentile of the distribution more than tripled over the entire period. According to table 6.6, corporate financial conditions worsened noticeably in the 1981–82, not the 1973–74, recession, and worsened again in 1985 and 1986, when many oil-drilling-equipment and steel companies were experiencing severe difficulties.

A still more somber picture of worsening financial conditions is evident for the larger fluctuating sample shown in table 6.7. In particular, since 1981, for more than 10 percent of the companies on the Full Coverage and Research files, cash flow was negative. For nearly all years, interest expense–cash flow ratios for companies on the Full Coverage and Research files exceed ratios for the larger established companies on the Industrial file. The general trend toward higher interest expense–cash flow ratios also is evident in the industry breakdown shown in table 6.8. Only two industries, laboratory equipment and apparel, exhibited declining ratios, while the ratios for the electronics, glass and concrete, and construction industries tripled over the period of study.

Table 6.7 **Ratio of Interest Expense to Cash Flow, Fluctuating Sample[a]**

	Industrial				Full Coverage				Research				Combined			
Year	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile	No. of Companies	Weighted Average	Median	90th Percentile
1969	837	.0908	.0911	.2942	259	.1329	.1060	.3483	1,372	.1151	.1041	.4597	2,468	.1001	.0990	.3840
1970	869	.1102	.1277	.4393	307	.1707	.1265	.5754	1,376	.1146	.1035	.4592	2,552	.1165	.1145	.4606
1971	917	.1057	.1200	.4019	357	.1649	.1393	.5449	1,545	.1491	.1493	1.9987	2,819	.1199	.1348	.8201
1972	953	.0988	.1031	.3282	422	.1564	.1017	.3740	1,612	.1377	.1270	.7816	2,897	.1117	.1151	.4792
1973	1,133	.1197	.1316	.3528	460	.1651	.1086	.3846	1,720	.1216	.1087	.4237	3,313	.1237	.1167	.3771
1974	1,154	.1339	.1681	.4847	507	.1855	.1561	.8602	1,739	.1271	.1188	.4354	3,400	.1368	.1396	.4860
1975	1,170	.1421	.1595	.4421	535	.1744	.1547	.8728	1,745	.1382	.1545	.6990	3,450	.1438	.1571	.6257
1976	1,184	.1269	.1246	.3412	574	.1478	.1233	.5512	1,686	.1456	.1450	.8090	3,444	.1321	.1349	.5564
1977	1,198	.1239	.1265	.3600	610	.1452	.1246	.6021	1,649	.1328	.1256	.5767	3,457	.1273	.1256	.4687
1978	1,216	.1255	.1337	.3632	703	.1564	.1389	.5520	1,545	.1373	.1274	.5513	3,464	.1301	.1318	.4598
1979	1,243	.1300	.1473	.3922	880	.1692	.1664	1.1502	1,490	.1455	.1493	.6732	3,613	.1365	.1518	.5689
1980	1,282	.1515	.1685	.4724	1,012	.1982	.1829	1.5751	1,495	.1448	.1797	2.1825	3,789	.1549	.1762	.9667
1981	1,317	.1708	.1761	.5112	1,364	.2276	.2019	∞	1,456	.1517	.2065	∞	4,137	.1729	.1951	2.6561
1982	1,339	.1931	.1930	.8517	1,486	.2410	.2499	∞	1,663	.1880	.2457	∞	4,488	.1966	.2258	∞
1983	1,409	.1708	.1635	.7743	1,804	.2026	.2015	∞	1,490	.2345	.2990	∞	4,703	.1811	.2099	∞
1984	1,463	.1633	.1593	.6575	2,017	.2046	.2267	∞	1,402	.2055	.2532	∞	4,882	.1713	.2024	∞
1985	1,512	.1748	.1795	1.3265	2,237	.2229	.2721	∞	1,168	.2246	.2684	∞	4,917	.1829	.2283	∞
1986	1,600	.1875	.1875	2.3597	2,625	.2832	.2804	∞	837	.2775	.3074	∞	5,062	.1999	.2390	∞
1987	1,676	.1704	.1822	1.1704	2,906	.2949	.2993	∞	536	.3443	.3067	∞	5,118	.1837	.2329	∞
1988	1,658	.1868	.1960	1.2076	2,620	.2917	.2656	∞	242	.2456	.1913	∞	4,520	.1952	.2198	∞

Source: COMPUSTAT and author's computations.

[a]Cash flow is defined as the sum of before-tax earnings, depreciation, and interest expense. Negative values of the ratio are considered as $+\infty$.

Table 6.8 **Ratio of Interest Expense to Cash Flow: Fluctuating Sample by Industry, Selected Years[a]**

Industry	1969	1974	1979	1984	1985	1986	1987	1988
Laboratory equipment	.166	.184	.135	.123	.127	.110	.121	.106
Printing and publishing	.069	.098	.076	.077	.082	.089	.122	.103
Electronics	.093	.133	.092	.116	.138	.150	.132	.274
Paper	.084	.089	.088	.149	.166	.153	.126	.117
Chemicals	.067	.080	.194	.136	.153	.159	.128	.105
Petroleum and natural gas	.259	.293	.271	.261	.271	.273	.275	.291
Petroleum refining	.071	.044	.064	.127	.142	.186	.181	.146
Mining	.082	.087	.180	.212	.433	.149	.095	.122
Food and tobacco	.089	.129	.125	.145	.145	.166	.148	.151
Retail	.134	.236	.212	.181	.185	.180	.177	.222
Lumber and furniture	.076	.134	.099	.145	.149	.153	.124	.188
Machinery	.088	.128	.102	.124	.129	.147	.136	.204
Glass and concrete	.074	.130	.120	.170	.202	.182	.224	.218
Vehicles	.099	.156	.114	.110	.109	.124	.128	.262
Apparel	.180	.241	.153	.132	.146	.110	.136	.171
Metal products	.086	.116	.126	.176	.193	.210	.187	.161
Rubber and plastics	.124	.157	.235	.210	.194	.199	.170	.178
Construction	.150	.249	.195	.262	.847	.322	.431	.555
Wholesale	.121	.167	.181	.220	.237	.253	.253	.255
Textiles	.123	.175	.152	.239	.259	.225	.295	.271
Steel refining	.129	.124	.143	.529	1.119	1.236	.241	.157
Transportation	.196	.194	.203	.216	.234	.321	.254	.254
Utilities	.259	.293	.271	.261	.271	.273	.275	.291
Communication	.110	.196	.177	.180	.169	.168	.170	.191

Source: COMPUSTAT and author's calculations.

[a]The ratio shown is the median of the distribution. The sample here does not match the sample in table 6.7 exactly, owing to the omission of a few small industries.

The increase in the interest expense–cash flow ratio over the sample period can be caused by higher interest rates, higher debt outstanding, or relatively lower cash flow. As shown in figure 6.2, the median, for the fluctuating sample, of the ratio of interest expense to debt outstanding (book value), that is, the effective interest rate, climbed rapidly through 1981 to nearly 12 percent, reflecting rising market interest rates. After 1982, however, the effective interest rate declined to about 10 percent by 1988. Hence, through 1982, increases in the ratio of interest expense to cash flow can be attributed, in part, to rising interest rates. Since 1982, however, because cash flow grew rapidly in the economic expansion, the sole culprit for the increasing interest expense–cash flow ratio must be the rapid increase in debt outstanding.

Comparing the results for the fluctuating sample in tables 6.4 and 6.7, the question naturally arises why the interest expense–cash flow ratio increased from 1982 to 1988, while the debt-asset ratio remained relatively stable. The

simple arithmetic answer is that the ratio of asset prices (primarily through equity prices) to cash flow rose rapidly over the period. This increase perhaps reflects the view of stock market participants that future strong growth in earnings and lower interest rates would justify fully a very rapid increase in equity prices. If the view of the stock market is realized, clearly there need be little concern about current levels of corporate debt outstanding. If, however, earnings growth were to slow significantly or interest rates were to remain stable, concerns about debt levels would be warranted.

6.7 Average Ratings of Corporate Bonds Outstanding

Figures 6.3 and 6.4 show average ratings of corporate bonds outstanding for 1978–88. Four different measures of average bond rating were computed using the COMPUSTAT files. The average rating fell about a grade and a third over the period, regardless of which of the four measures is used for analysis.

The first two measures (fig. 6.3) are the median and weighted average of the representative Standard and Poor's bond rating for each company in the fixed sample of nonfinancial corporations.[8] The median rating in this sample declined from A in 1978 to BBB in 1988. The average rating, weighted by long-term debt outstanding, declined from AA to just slightly better than A −.

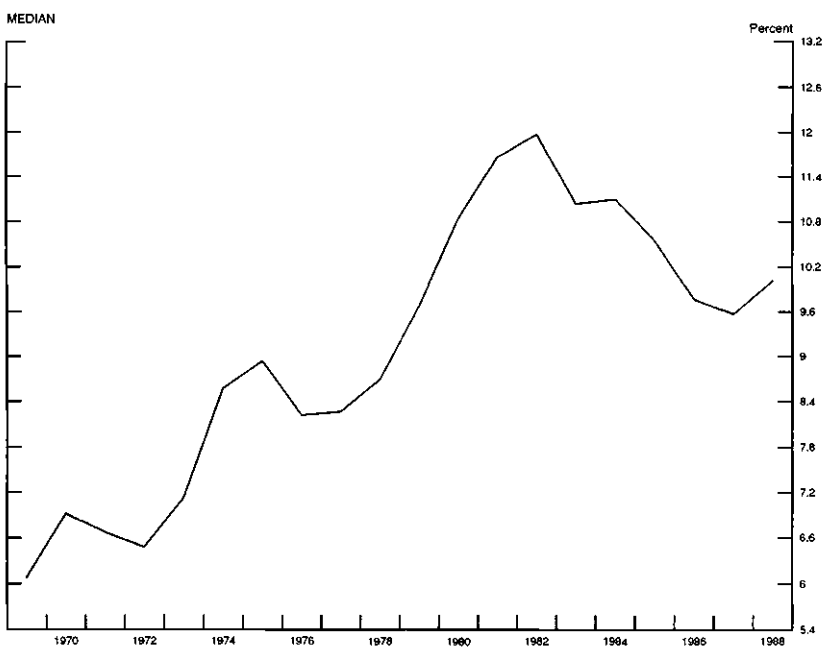

Fig. 6.2 Ratio of interest expense to debt outstanding (book value), fluctuating sample

Source: COMPUSTAT and author's calculations.

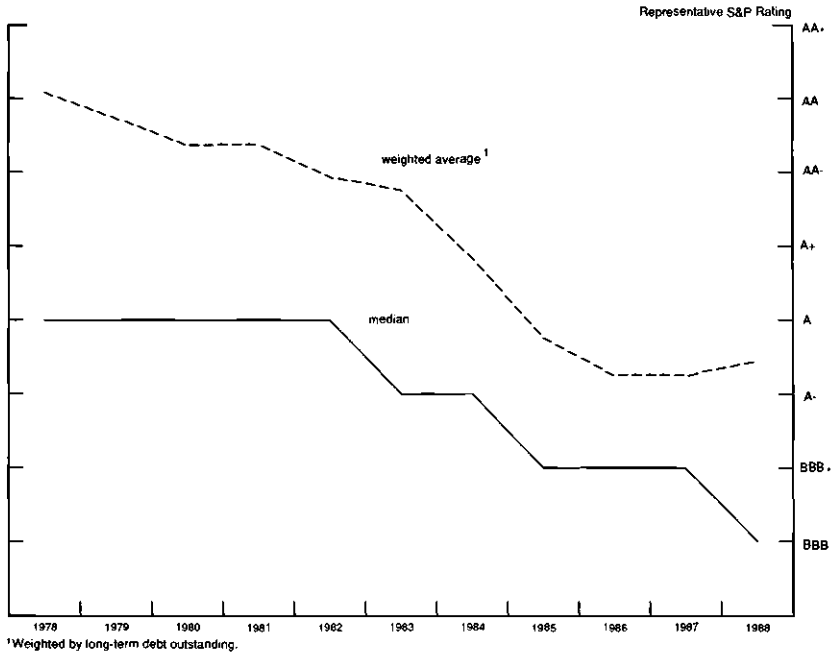

Fig. 6.3 Average rating of corporate bonds outstanding, fixed sample of nonfinancial issuers

Source: COMPUSTAT and author's calculations

Downgradings associated with restructurings and increased access to the junk bond market by many issuers would seem to be the primary explanations for the drop in ratings. The average rating is higher than the median, owing to the existence of a few large issuers with superior bond ratings.

The third and fourth measures (fig. 6.4) are the median and weighted average of the S&P rating for the fluctuating sample. The median rating for this sample declined from A in 1978 to BBB− in 1988. The weighted average rating declined from AA+ to slightly better than A over the period.

6.8 Simulations of Recessions

As did Bernanke and Campbell, to get a sense of the potential effects of a recession on corporate financial structure, I simulated the effects of recessions like those of 1973–74 and 1981–82. For each firm that existed in the base year, 1972 or 1980, and in 1988, I computed the percentage changes in the total market value of the firm (equity and debt) that were observed over the two years succeeding the base year, denoted recession year 1 and recession year 2. I also computed the nominal changes in the book value of the firm's debt and applied these changes, scaled up by the book value of the firm's assets, to the level of debt outstanding in 1988. In addition, I applied the

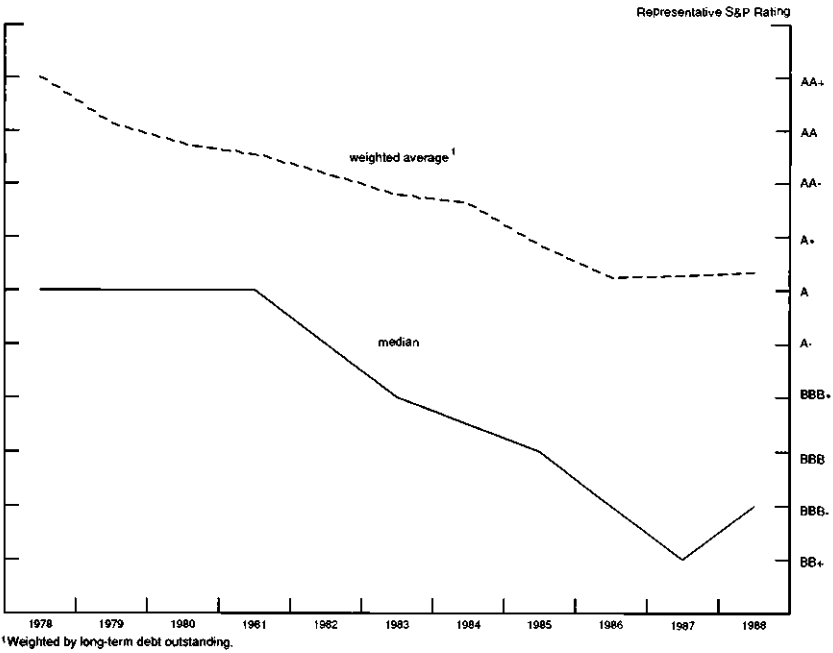

Fig. 6.4 Average rating of corporate bonds outstanding, fluctuating sample of non-financial issuers.
Source: COMPUSTAT and author's calculations

changes in the market-to-par ratios of 1973, 1974, 1981, and 1982 to the market-to-par ratio in 1988. I then used the simulated market-to-par ratio to compute the market value of long-term debt outstanding in the post-1988 recession years. Combining the simulations of market values of debt and assets, it was possible to calculate simulated debt-asset ratios for each firm in two hypothetical recession years after 1988.

In a similar way, I took the observed change in cash flow (excluding interest expense) over the recession years, scaled it up by the book value of the firm's assets, and applied these changes to cash flow (excluding interest expense) in 1988. Simulated interest expense was computed by multiplying the simulated level of debt outstanding (book value) by a simulated effective interest rate for each firm in the recession years.[9] In such a manner, it was possible to construct simulated ratios of interest expense to cash flow. The simulations were done for the fluctuating sample of nonfinancial corporations in the Industrial and Full Coverage files. The results are reported in table 6.9 for the two years of the two simulated recessions.

Even more striking than the results reported by Bernanke and Campbell, the results shown in table 6.9 indicate a significant deterioration in financial conditions if a recession were to hit. More specifically, as shown in the upper panel, a repetition of the 1973–74 recession, when the market values of firms

Table 6.9 **Simulations of the Impact of 1973–74 and 1981–82 Recessions on Corporate Financial Structure Extant in 1988**

	1973–74 Recession[a]			1981–82 Recession[b]		
	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile
Debt-asset ratio						
Base year (1988)	.3972	.4083	.7315	.4096	.4186	.7230
Recession year 1	.4920	.5587	1.1106	.4328	.4521	.8782
Recession year 2	.6375	.6834	1.4503	.3939	.4185	.9178
Ratio of interest expense to cash flow						
Base year (1988)	.1817	.1722	1.3508	.1975	.1991	22.9530
Recession year 1	.1707	.1818	1.5675	.2010	.2362	∞
Recession year 2	.1767	.2162	72.5834	.2260	.2737	∞

Source: COMPUSTAT and author's calculations.
Note: Also see tables 6.4 and 6.7. Negative values are considered as $+\infty$.
[a]Sample consists of 1,173 corporations that reported data in 1972 and 1988.
[b]Sample consists of 1,925 corporations that reported data in 1980 and 1988.

plummeted, would push the median debt-asset ratio, at market value, from .41 to .56 in the first recession year and to an unprecedented level of .68 in the second recession year. Nearly 25 percent of corporations in the sample would have debt-asset ratios exceeding one by the second recession year, indicating severe financial troubles. About 22 percent of companies in the Industrial subsample would have debt-asset ratios exceeding one, while about 31 percent of companies in the Full Coverage subsample would have debt-asset ratios exceeding one. Around 16 percent of total corporate assets would be in the category of debt-asset ratio exceeding one. A repetition of the 1981–82 recession, when the stock market was fairly robust, would also lead to increases in debt-asset ratios, although the increases would be much less severe than in a 1973–74 recession scenario. Nevertheless, nearly 8 percent of corporations in the sample would have debt-asset ratios exceeding one in the 1981–82 scenario. For the samples used in the simulations, the actual impact of the 1973–74 and 1981–82 recessions on corporate financial structure are shown in table 6.10. Except for the weighted-average ratio for the 1981–82 recession, the simulated debt-asset ratios after 1988 shown in the upper panel of table 6.9 are higher than the actual ratios after 1972 and 1980, shown in the upper panel of table 6.10.

The simulated ratios of interest expense to cash flow are shown in the bottom panel of table 6.9. For the simulation of the 1973–74 recession, the weighted-average ratio actually declines as the effective interest rate declines. The median ratio, however, increases slightly, and the ratio in the ninetieth percentile increases significantly. About 4 percent of the corporations would have negative cash flow *and* a debt-asset ratio exceeding one. For the simulation of the 1981–82 recession, the ratio of interest expense to cash flow, com-

puted either as a weighted average or median, increases noticeably in the recession years. The ratio in the ninetieth percentile is denoted as infinity, as more than 10 percent of the corporations have negative ratios, owing to negative cash flows. Again, comparing with the bottom panel in table 6.10, the simulated interest expense–cash flow ratios after 1988 are uniformly higher than the actual ratios after 1972 and 1980.

Finally, in table 6.11, the prevalence of corporations with interest expense exceeding cash flow is indicated, as a percentage of the number of firms in the sample and as a percentage of total assets. The upper panel shows actual experience, while the lower panel shows simulations of 1973–74 and 1981–82 recessions based on 1988 data and on the samples available for simulation, as indicated in table 6.9. As shown in the upper panel, the prevalence of corporations with interest expense exceeding cash flow has grown significantly, although it is smaller corporations that are predominantly in this category. In the lower panel, simulations show that both 1973–74 and 1981–82 recessions would at least double the percentage of assets represented by corporations with interest expense exceeding cash flow from 1988 levels. By the second year of a 1981–82 recession, almost 27 percent of corporations, with 6 percent of corporate assets, would have interest expense exceeding cash flow.

6.9 Conclusions

The findings here tend to support, and even strengthen, the disturbing conclusions reached by Bernanke and Campbell. The ratios of debt to assets, at market value, increased over the period for most samples, subsamples, industry groupings, and statistical measures, although the highs reached in 1974 remain unsurpassed. The ratio of interest expense to cash flow increased sig-

Table 6.10 **Actual Experience of the Impact of 1973–74 and 1981–82 Recessions on Corporate Financial Structure, Samples Used in Simulations[a]**

	1973–74 Recession			1981–82 Recession		
	Weighted Average	Median	90th Percentile	Weighted Average	Median	90th Percentile
Debt-asset ratio						
Base year (1972 or 1980)	.2695	.3287	.6472	.4044	.3909	.7034
Recession year 1	.3290	.4998	.7837	.4366	.4254	.7220
Recession year 2	.4405	.6106	.8669	.4233	.4027	.7191
Ratio of interest expense to cash flow						
Base year (1972 or 1980)	.1098	.0977	.3334	.1520	.1654	.5705
Recession year 1	.1077	.1081	.3473	.1722	.1751	.6535
Recession year 2	.1127	.1251	.4219	.1938	.1960	1.8180

Source: COMPUSTAT and author's calculations.
[a]See table 6.9.

Table 6.11 Corporations with Interest Expense Exceeding Cash Flow

Year	Percentage of Number in Sample[a]	Percentage of Total Assets
Actual experience		
1972	3.7	0.50
1973	2.6	0.23
1974	7.0	1.21
1980	7.8	2.55
1981	11.2	1.73
1982	17.0	3.56
1988	23.7	3.40
Simulations based on 1988 data[b]		
1973–74 Recession		
Base year (1988)	11.3	2.54
Recession year 1	12.1	2.04
Recession year 2	15.0	6.65
1981–82 Recession		
Base year (1988)	13.9	2.60
Recession year 1	20.8	4.02
Recession year 2	26.7	6.15

Source: COMPUSTAT and author's calculations.
[a]See table 6.7 for sample sizes.
[b]See table 6.9 for description of simulation samples.

nificantly, owing to higher effective interest rates through 1982 and increased levels of debt outstanding through 1988. The current interest expense–cash flow ratio is at or near the highs reached in 1982 and 1986. Small corporations tend to have higher ratios, and hence weaker financial conditions, than large corporations. The median bond rating declined from about A in 1978 to BBB− in 1988. If a severe recession were to hit, as many as 25 percent of corporations, corresponding to as much as 16 percent of total corporate assets, would be placed in severe financial straits, judged by the criterion of simulated debt-asset ratios exceeding one and given the financial structure extant in 1988. Judged by the criterion of simulated interest expense exceeding simulated cash flow, as many as 27 percent of corporations, corresponding to more than 6 percent of corporate assets, would be placed in severe financial straits in a future severe recession.

Bernanke and Campbell examined the possibility that off-balance-sheet considerations give corporations the ability to support higher debt burdens. In particular, they cited arguments advanced by others concerning the emergence of the junk bond market and of corporate pension overfunding. The junk bond argument is that these bonds, owing largely to the dominance of certain underwriters, allow issuers and investors to costlessly renegotiate terms rather than incur the heavy costs of bankruptcy in the event of financial difficulties.

The pension fund argument is that high levels of overfunding may have given corporations the flexibility needed to support heavier debt burdens.

On closer examination, however, these arguments provide little comfort. Recent defaults by large issuers of junk bonds indicate that bankruptcy is still a possibility when financial difficulties are encountered. Furthermore, one of the key arguments used by proponents of corporate restructuring—higher debt levels force corporate managers to focus on improving efficiency—relies on the assumption that default is costly and, hence, to be avoided (Jensen 1988). Yet it is also claimed, with little concern for logical consistency, that insolvency can be handled in a costless manner. And while it is true that the funding of pension liabilities, in the aggregate, has improved considerably, many companies still have underfunded pension liabilities (Warshawsky 1989a). Indeed, the 1980s has witnessed the development of another retiree benefit problem: the rapid rise in unfunded liabilities for retiree health benefits (Warshawsky 1991). Finally, an explanation sometimes given for the increased leverage of U.S. corporations since 1986 is that tax reform provides increased private incentives for higher leverage (Warshawsky 1989b). These private incentives, however, may conflict with the social desire for financial stability. Hence, available evidence and logical considerations indicate that some degree of concern about the financial health of the U.S. nonfinancial corporate sector is appropriate.

Notes

1. Bernanke, Campbell, and Whited (1990) also updated their analysis; they report few changes in results or conclusions from their earlier paper. They, however, did not expand their sample, include any new measures of financial health, or reexamine the book-to-market-value algorithm. In addition, they do not report fully the results of simulations using 1988 data. The samples in their 1988 and 1990 papers do not match exactly, owing to the exclusion of those companies from the later paper's sample which did not restate data to a basis consistent with the new FASB rule requiring consolidation of finance subsidiaries after 1987. In the paper here, I did not use restated data, and hence there may be a slight inconsistency between data reported before 1988 and data reported in 1988. The two large companies most affected by the change in the accounting rule, General Motors and Ford, however, are not included in the fixed sample nor in the flexible sample in 1988 reported in this paper. More generally, only 44 of the 1,931 companies listed on the COMPUSTAT Industrial file in 1987 had a difference greater than 10 percent between historical and restated data for long-term debt.

2. The adjusted algorithm was developed initially by Leland Crabbe; further small revisions were made by Peter Oberkircher.

3. The ratio is calculated based on information reported in successive annual issues of the New York Stock Exchange *Fact Book*.

4. This methodological point also has implications for calculations of q ratios for individual companies.

5. Because observations are entered on a fiscal-year basis and the par-to-market

adjustment using the aggregate approach is done at the end of the calendar year, for those corporations whose fiscal year is not the calendar year, a mismatch occurs.

6. The same exercise was done using R^2's computed from industry profit equations estimated over the period 1977 through 1986; the results did not differ significantly.

7. Operating cash flow is defined as the sum of after-tax earnings, taxes, depreciation, and interest expense.

8. The S&P rating system is an ordinal ranking. For the purpose of computations, the system was enumerated linearly, starting with AAA equal to 2, AA+ equal to 4, AA equal to 5, and so on.

9. The simulated effective interest rates are computed as the effective interest rate extant in 1988, adjusted by the nominal changes in effective interest rates over the recession years.

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