Understanding International Differences in Leverage Trends

After a remarkable period of stability in the ratio of aggregate debt to economic activity in the United States, this ratio and various other measures of leverage rose in the 1980s. In earlier decades, trends in public and private sector debt had tended to offset each other; over the past several years, however, both forms of debt have increased [1] Observers have responded to these developments with apprehension. Some worry that high leverage in the corporate sector would restrict the ability of firms to adjust to adverse developments and thus would heighten macroeconomic instability.[2] Others suggest that in a sharp downturn the higher levels of debt could lead first to a wave of bankruptcies and then to a general liquidity crisis.[3]

Researchers who follow international developments have noted that other major market economies have not experienced a similar rise in leverage.[4] Yet these economies have been riding the current business cycle roughly in tandem with the United States. Moreover, other factors that might influence leverage, such as interest rates and stock prices, have also been correlated across countries.

This article investigates why leverage trends in the United States have differed from those in other countries. Distinguishing the developments underlying the U.S experience from developments abroad may help clarify the extent to which high leverage is a problem. If leverage has risen in the United States only because investment has so exceeded internal funds that much debt financing has been required, then the situation might not be cause for concern. As long as the funds have been invested well and no adverse shocks arise, the investment should generate cash flows in the future to bring leverage back down.

The data presented here show that declines in leverage abroad have tended to be associated with reductions of short-term debt. An analysis of firm-level data suggests that this pattern is consistent with the so-called pecking-order hypothesis, which links a decline in leverage to strong internal cash flows relative to investment. In Germany and France, leverage among large firms has fallen sharply, precisely because they have had very favorable cash flows. In Japan, aggregate leverage has declined because cash-rich firms have been scrupulously retiring debt. The puzzle is why leverage has risen for large U.S. firms, which have had reasonably strong cash flows relative to investment.

This article stresses the finding that much of the rise in U.S. leverage has been due to a buildup of long-term debt, particularly by firms that have been borrowing heavily in order to buy back their own common stock.

[1] Benjamin M Friedman, "Increasing Indebtedness and Financial Stability in the United States," in *Debt, Financial Stability and Public Policy*, Federal Reserve Bank of Kansas City, 1986, E P Davis, *Rising Sectoral Debt/Income Ratios A Cause for Concern?* BIS Economic Papers, no 20, June 1987

[2] See, for example, Henry Kaufman, "Debt The Threat to Economic and Financial Stability," in *Debt, Financial Stability and Public Policy*

[3] See, for example, Ben S Bernanke and John Y Campbell, "Is There a Corporate Debt Crisis?" *Brookings Papers on Economic Activity*, 1 1988

[4] See Claudio E V Borio, "Leverage and Financing of Nonfinancial Companies An International Perspective," Paper presented at the Eighteenth MSG Conference on Financial Markets and Policy, Brasenose College, Oxford, September 19-21 1989

Reacting, perhaps, to perceived threats of takeover, some firms have been raising their leverage sharply through stock buybacks.

The article begins with a fuller description of recent international trends in leverage. The next section provides a brief discussion of existing theories of leverage The third section presents estimates of leverage-target behavior to assess the degree to which taxes, interest rates, or stock prices can explain the recent trends A direct test of the pecking-order hypothesis follows; the object of this section is to evaluate whether strength of cash flows can account for the differences in leverage trends The article concludes with a brief interpretation of the results.

Global patterns of leverage

The familiar ratios

Table 1 reports book-value debt-to-asset ratios familiar to researchers who have tried to compare leverage in different countries.[5] The ratios reported here are based on data from the Banque de Comptes Harmonisées (BACH) database maintained by the European Commission in Brussels, but they tend to be very close to ratios based on the usual OECD financial statistics and the various official flow-of-funds statistics.[6] The computation of these ratios follows OECD convention in including accounts payable in the definition of debt, along with short-term and long-term debt The argument for this inclusion is the importance of accounts payable on balance sheets in such countries as France, Italy, and Japan.[7]

The ratios confirm the common distinction between low-leverage and high-leverage countries. France, Germany, Italy, and Japan have higher leverage, while the United Kingdom and the United States have lower leverage. The Netherlands seems to belong in the middle These differences appear to be due to differences in financial practices, not to differences in the mix of industries within a country.[8]

Of greater interest, however, are the trends in leverage and, in particular, the emergence of the United States as the only country with consistently rising leverage Leverage in France was initially rising but has been declining since 1984. Leverage in the United Kingdom has stayed within a fairly narrow range. In Germany, Italy, Japan, and the Netherlands, leverage has clearly been falling. The trends indicate some convergence between high-leverage and low-leverage countries. However, while Japan, Italy, and France have had the highest leverage ratios, Germany's ratio has declined the fastest

Publicly traded industrial companies

The representation of leverage trends in Chart 1 is based on Global Vantage data on publicly traded

[5]The analysis here explains leverage in terms of the book values of debt and assets instead of market values This approach is justified on two counts First, survey evidence shows that most corporate financial executives use book values for setting leverage targets see A Stonehill and others, "Financial Goals and Debt Ratio Determinants A Survey of Practice in Five Countries," *Financial Management*, Autumn 1977, pp 27-41 Second, other researchers have found that it makes little difference whether market or book values are used see Paul Marsh, "The Choice Between Equity and Debt An Empirical Study," *Journal of Finance*, March 1982, pp 121-44, and Robert A Taggart, "A Model of Corporate Financing Decisions," *Journal of Finance*, December 1977, pp 1467-84

[6]See, for example, Janette Rutterford, "An International Perspective on the Capital Structure Puzzle," in J M Stern and D H Chew, eds , *New Developments in Corporate Finance* (Oxford Basil Blackwell, 1988), pp 194-207

[7]For this sample of companies, accounts payable are on the order of 30 percent of assets for France, Italy, and Japan In the sample of larger companies represented in Chart 1, accounts payable on average amount to 15 percent of assets for France and 20 percent for Japan

[8]For a discussion of differences in financial systems, see Robert N McCauley and Steven Zimmer, "Explaining International Differences in the Cost of Capital," Federal Reserve Bank of New York *Quarterly Review*, Summer 1989, pp 7-28 For a study showing that differences in leverage are not due to differences in industrial mix, see Joelle Laudy and Daniel Szpiro, "Des Entreprises Industrielles Plus Endettées en France que dans les Autres Pays Européens," *Economie et Statistique*, no 217/218 (1989)

Table 1

Book-Value Debt-Asset Ratios of Nonfinancial Firms

(Percent)

	1982	1983	1984	1985	1986	1987
France	69 2	70 7	76 6	73 3	71 0	70 2
Germany	62 0	60 9	59 7	58 6	57 1	
Italy	70 4	68 2	67 5	67 0	67 3	66 9
Japan	73 4	73 2	72 6	71 5	70 5	70 1
Netherlands	55 4	55 2	53 9	54 3	52 4	52 3
United Kingdom	47 9	47 6	48 1	47 6	46 6	
United States		39 4	40 6	42 2	43 3	44 3

Source Banque de Comptes Harmonisées (data collected by the European Commission from official sources and "harmonized" to correct for differences in data collection and to make comparisons possible)

Note The composition of each country's sample is as follows
France — Firms with 500 or more employees, unconsolidated
Germany — Over 70,000 corporations, sole proprietorships, and partnerships, unconsolidated
Italy — Mostly industrial firms and a few construction firms, unconsolidated
Japan — All nonfinancial firms, unconsolidated
Netherlands — Nonfinancial firms, consolidated
United Kingdom — Large firms, consolidated
United States — All nonfinancial firms, excluding construction and services, consolidated

industrial companies.[9] The analyses below rely on these data for information at the firm level. Use of these data, instead of the official flow-of-funds statistics, makes it possible to focus on larger firms, which can be more readily compared across countries because of their similar degree of access to capital markets. The leverage ratios shown in the chart are computed with accounts payable included in the definition of debt, as in Table 1, but also with provisions for pension liabilities subtracted from assets, because these provisions are not reported on balance sheets in the United States.[10] The firms selected for analysis are limited to those for which a complete set of observations is available to construct the cash flow estimates used later, although use of larger samples from Global Vantage will produce the same leverage patterns

A comparison of the figures in Table 1 with those in Chart 1 shows substantial differences in leverage levels between samples, but the trends in leverage remain basically the same. The generally lower leverage ratios in Chart 1 suggest that large firms are much less

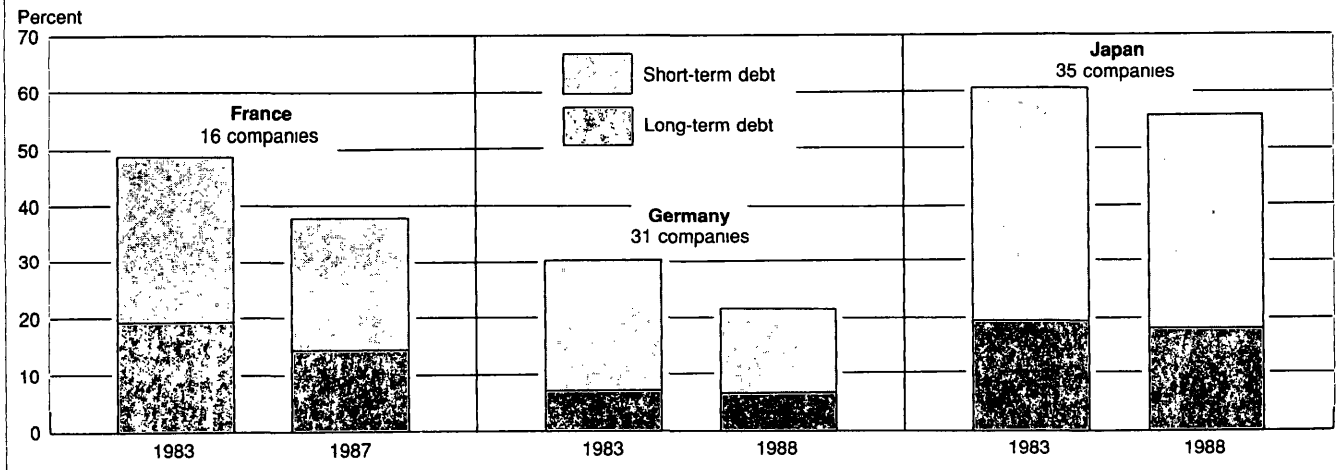
[9]Global Vantage (Standard and Poor's international version of Compustat) draws data from financial statements of publicly traded industrial companies

[10]Provisions for pension liabilities are most significant for German firms the item amounts to an average of 15 percent of firm assets

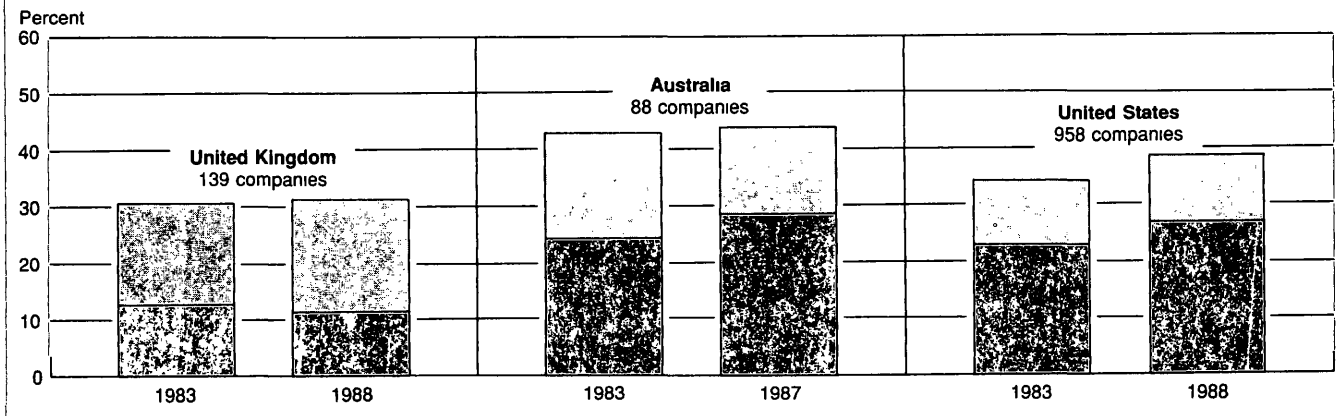
Chart 1

Ratios of Debt to Assets for Publicly Traded Industrial Companies

Short-term debt has accounted for much of the decline in leverage in some countries, . . .



while long-term debt has accounted for much of the rise in leverage in Australia and the United States.



Source Basic data are drawn from Standard and Poor's Global Vantage

leveraged than small firms in a given country. Indeed, the Global Vantage data now show large German firms to have lower leverage ratios than large U.S. firms. The chart includes leverage ratios for Australia, and these show higher leverage than the ratios for France or Germany. In spite of the differences between the two data sets, the trends persist and in fact become more striking with the Global Vantage data. The United Kingdom and Australia both show a slight rise in leverage, but the United States still stands apart because of the marked rise in its leverage. Note that this rise in U S leverage cannot be attributed directly to leveraged buyouts (LBOs), since Global Vantage data include only firms that have remained public. France and Germany show sharper declines in leverage than before.

Short-term and long-term debt

Chart 1 also divides the leverage ratios into short-term debt and long-term debt components. In France and Germany, large firms have achieved a sharp decline in total leverage mainly by reducing short-term debt as a ratio to assets. In Japan, the decline in total leverage has been more modest, but the reduction in short-term debt has been just as apparent. In the United Kingdom, total leverage has remained essentially unchanged, while the ratio of short-term debt to assets has risen slightly. In Australia and the United States, a rise in leverage has been associated with a rise in long-term debt.

The broad pattern appears to be that in countries with falling leverage, the decline can be attributed to short-term debt, while in countries with rising leverage, the increase can be traced to long-term debt

Theories of capital structure

Can existing theories of capital structure explain differences in leverage behavior across countries? Can the theories explain the association of falling leverage with short-term debt and rising leverage with long-term debt? It is useful to distinguish two approaches to analyzing how firms determine leverage. One approach sees firms as trying to achieve a leverage target or an optimal capital structure. The other approach sees a firm's capital structure as a byproduct of a history of financing decisions, in which the firm has in every period matched its uses of funds with the cheapest sources it could find. The two approaches are discussed in greater detail below.

The leverage-target approach

Under the first approach, the optimal capital structure or leverage target depends on such factors as conditions in capital and credit markets, the tax treatment of returns on different assets, the riskiness of the firm's earnings, the costs of financial distress, and various agency problems associated with debt and equity[11] The costs of financial distress include the loss of flexibility experienced by a firm having difficulty servicing its debt, as well as the trustee and legal fees and reorganization costs incurred if the situation deteriorates into bankruptcy Agency problems with debt arise when firms have an incentive to choose riskier projects against the interest of creditors, while agency problems with equity occur when firms have an incentive to spend on managerial perquisites against the interest of shareholders.

Indirect evidence for the existence of leverage targets is provided by the finding that average leverage ratios for broad industry groups tend to be consistent over time[12] Direct evidence for particular models remains hard to find, however, perhaps because unobservable agency costs are critical explanatory variables.[13] For example, efforts to explain differences in leverage across countries in terms of tax differences alone have largely failed. In general, there is little correlation between the ranking of countries according to the relative tax advantage of debt over equity and their ranking according to leverage.[14] Hence explanations often turn to special institutional factors — for example, the system of universal banking in Germany or the organization of *keiretsus* (groups of companies with cross-holding of shares) in Japan — which somehow provide more effective ways of dealing with financial distress or agency problems of debt

The pecking-order approach

Under the second approach, the determination of leverage hinges on the strength of cash flows The formal statement of this approach is the so-called pecking-order hypothesis developed by Myers and Majluf.[15] The theory assumes that managers know more about the firm than do outside investors. Since managers are less likely to issue new stock if they regard existing shares as undervalued than if they regard the shares

[11]For a summary of this literature, see Colin Mayer, "New Issues in Corporate Finance," *European Economic Review,* vol 32 (1988), pp 1167-89

[12]Ezra Solomon, *The Theory of Financial Management* (New York Columbia University Press, 1963), pp 91-106

[13]This lack of evidence led Stewart Myers to the subject of his presidential address to the American Finance Association, "The Capital Structure Puzzle," *Journal of Finance,* vol 39 (July 1984), pp 575-92

[14]See Mayer, "New Issues", Rutterford, "An International Perspective", and Borio, "Leverage and Financing "

[15]Stewart C Myers and Nicholas S Majluf, "Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics,* vol 13 (1984), pp 187-221

as overpriced, investors will regard a decision to issue stock as a sign of possible "bad" news. Thus, firms can only issue equity at a discount, and cash flows will normally be a cheaper source of funds than external equity. The asymmetry of information will also make debt financing cheaper than external equity, simply because debt contracts are safer in that they limit the possible ways by which holders could lose Hence, to finance investment, firms will first use cash flows as the cheapest source, then debt financing, and finally outside equity financing (see Box 1 for an illustration). In short, the stronger the cash flows relative to investment, the less likely the firms will turn to debt and the more likely leverage will fall.

Thus far the evidence for the pecking-order theory, like the evidence for leverage targets, has been indirect only. For example, the finding that cash flow is a significant determinant of investment indicates that there is indeed an important distinction between internal and external finance.[16] Another form of indirect evidence is the strong inverse correlation between profitability and leverage.[17] If profitability is correlated with cash flow, then this result indicates that firms with strong cash flow avoid borrowing, consistent with pecking-order behavior

The two approaches together

In practice, firms must decide on capital structure and financing at the same time. One can imagine firms to be constantly seeking their optimal capital structure but often finding themselves bumped away by shocks to cash flow. Unexpectedly good earnings would put a firm below its leverage target, and the firm would then try to raise its debt ratio over time, perhaps by making investment plans that would require much debt financing. An adverse shock to cash flow would put the firm above its target, to reduce leverage, the firm might then postpone large investments.

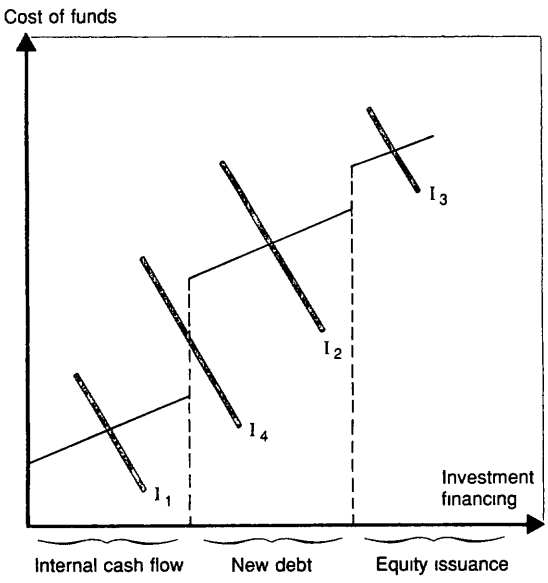
The empirical results reported in the next two sections suggest somewhat more subtle behavior Analysis of Global Vantage data for four major countries in the 1980s indicates that leverage-target considerations determine the ratio of long-term debt to assets, while pecking-order considerations determine the ratio of total debt to assets [18] Together, these results mean that firms manage their long-term debt to achieve an opti-

Box 1: A Graphical Exposition

The chart below illustrates pecking-order behavior for different levels of investment demand. Abstracting from dividend payments, a firm with the weak investment demand I_1 would finance investment entirely with internal funds and use the remaining cash flow to retire debt. With the stronger investment demand I_2, the firm would invest all its cash flow and then turn to debt financing With the still stronger investment demand I_3, the firm would use internal funds, debt financing, and outside equity, although the cases in which firms actually turn to outside equity are considered relatively uncommon. The interesting case occurs when investment demand happens to be I_4, falling in the gap between the costs of internal and external finance In this case investment would be constrained by cash flow. While the return to investment would be high enough to justify further cash flow financing, it would fall short of the hurdle rate for any borrowing

Pecking-Order Behavior

The Cost of Funds for Varying Investment Demands



[16] See Steven M Fazzari, R Glenn Hubbard, and Bruce C Petersen, "Financing Constraints and Corporate Investment," *Brookings Papers on Economic Activity*, 1 1988, pp 141-206 See also Richard Cantor, "A Panel Study of the Effects of Leverage on Investment and Employment," in *Studies on Financial Changes and the Transmission of Monetary Policy*, Federal Reserve Bank of New York, May 1990

[17] W Carl Kester, "Capital and Ownership Structure A Comparison of United States and Japanese Corporations," *Financial Management*, Spring 1986, pp 5-16, and John Baskin, "An Empirical Investigation of the Pecking Order Hypothesis," *Financial Management*, Spring 1989, pp 26-35

[18] Firms may have leverage targets for total debt as well, but the adjustment may happen too slowly to be detected

mal capital structure while they adjust short-term debt to accommodate cash-flow shocks. The link between cash flows and short-term debt makes sense to the extent that shocks to cash flow are transitory, since the transactions costs for both issuing and retiring debt are much lower for short-term debt than for long-term debt

This pattern of behavior implies that in France, Germany, and Japan, where major firms have been reducing primarily short-term debt, strong cash flows would explain the decline in leverage. In Australia and the United States, where corporations have been taking on largely long-term debt, something other than weak cash flows would be needed to explain the rise in leverage.

Leverage-target behavior

To evaluate the extent to which interest rates and stock prices can explain recent trends in leverage, this section presents estimates of leverage-target behavior. Leverage is specified in terms of both total debt and long-term debt The leverage target is specified to depend on the observable costs of debt and equity and on a proxy for the costs of financial distress. Overall, the empirical results for leverage-target behavior are less than impressive for explaining the trends in leverage. To the extent that observable cost factors can explain such behavior in the 1980s, however, they appear to work better when leverage is measured in terms of long-term debt than when leverage is measured in terms of total debt.[19]

The estimating equations assume gradual adjustment by firms to the leverage target. Formally, the adjustment is described by $\Delta d = \lambda(d^* - d_{-1})$, where d is the ratio of debt to assets, d^* is the desired ratio, d_{-1} is the previous period's debt-asset ratio, and λ is the adjustment coefficient, with $\lambda = 1$ implying complete adjustment in a fiscal year. Here the amount of adjustment is proportional to the difference between desired and actual leverage. The desired ratio is then specified as a function, $d^* = f(c^D, c^E, c^{FD})$, where c^D, c^E, and c^{FD} are the costs of debt, equity, and financial distress, respectively. Since Δd is $d - d_{-1}$, the estimating equation can be written as $d = \lambda f(c^D, c^E, c^{FD}) + (1 - \lambda)d_{-1}$. The cost of debt would have a negative effect on leverage, the cost of equity a positive effect, and the costs of financial distress a negative effect.

The equations are estimated for Germany, Japan, the United Kingdom, and the United States for the period covering the fiscal years from 1983 to 1988. The estimates are based on panel data from Global Vantage and use the same sample of firms used for the leverage ratios in Chart 1. The cost of debt is measured as the real interest rate on corporate bonds minus the product of the corporate tax rate and the nominal interest rate.[20] The cost of equity is measured as the ratio of cash flow per share to the stock price for each firm The results tend not to be sensitive to the way in which the costs of debt and equity are measured. For the costs of financial distress, the equations use the ratio of fixed assets to total assets as a proxy negatively related to these costs.[21]

Total debt

Table 2A reports the leverage-target equations for total debt. The costs of debt and equity for Germany, Japan, and the United Kingdom show signs contrary to those predicted by theory. Given that the cost of equity is measured as the ratio of cash flow to stock price, the minus sign on this variable may in fact be picking up pecking-order behavior, with strong cash flows tending to reduce leverage. The equation for the United States gives the theoretically correct signs, but the coefficient is significant only for the cost of equity. In all cases, the equations show the wrong sign for the ratio of fixed assets to total assets, a variable which should have a positive effect on leverage if it is an inverse proxy for the costs of financial distress. The final disappointment is that the coefficients on the lagged debt-asset ratio for German, Japanese, and U.K. firms are not significantly different from one, implying no discernible adjustment towards a leverage target.

Long-term debt

On the whole, estimates of leverage-target behavior in terms of long-term debt yield modestly more favorable results than estimates in terms of total debt. For the United States, however, it seems to make a difference whether firms buying back their stock are included in the sample. Table 2B reports a second set of estimates for the United States that excludes cash-rich U.S. firms using long-term debt to finance stock buybacks[22]

[19]This result is consistent with Donaldson's finding that the most common measure of debt capacity used by U S corporations is the ratio of long-term debt to capitalization See Gordon Donaldson, *Corporate Debt Capacity,* Harvard Business School Division of Research, 1961

[20]For a fuller explanation of the variables, see Eli M Remolona, "Why International Trends in Leverage Have Been So Different," Federal Reserve Bank of New York, Working Paper no 9002, February 1990

[21]In justifying this proxy as a measure of the value of tangible assets available for liquidation in case of bankruptcy, Long and Malitz argue that the costs of financial distress are associated largely with the loss of intangible assets See Michael S Long and Ileen B Malitz, "Investment Patterns and Financial Leverage," in Benjamin Friedman, ed , *Corporate Capital Structure in the United States* (Chicago University of Chicago Press, 1985), pp 325-48

[22]This study defines "cash-rich" firms as those whose measured cash flows exceed predicted investment and dividends, with the prediction based on sales and lagged dividends

Stock buybacks have become an important U.S. phenomenon, and it would be of interest to know whether they represent a separate kind of leveraging behavior. When even cash-rich firms go deeper into debt to finance buybacks, such behavior may reflect an effort to leverage up and not just to substitute for dividends.[23] The exclusion of these buyback firms from the U.S. sample reduces the explanatory power of the costs of debt and equity in the leverage-target equations.

With leverage measured in terms of long-term debt, the estimated effects of the cost of debt for Japan, the United Kingdom, and both U.S. samples now have the correct sign, although in no case is the effect statistically significant. The estimated effects of the cost of equity have the right sign for Japan and the U.S. full sample (with statistical significance in the case of the latter), but the sign is reversed when the buyback firms

[23] Bagwell and Shoven view stock buybacks as a substitute for dividend payments See Laurie S Bagwell and John B Shoven, "Cash Distributions to Shareholders," *Journal of Economic Perspectives*, vol 3 (Summer 1989), pp 129-40

Table 2A

Leverage-Target Equations for Total Debt

Dependent Variable Is the Ratio of Total Debt to Assets

Explanatory Variable	Germany	Japan	United Kingdom	United States
Constant	0 0254 (1 6076)	0 0658 (2 0184)	0 1045 (3 2453)	0 1993 (12 7756)
Cost of debt	1 3425 (1 6388)	0 4784 (0 3489)	1 4295 (1 9813)	−0 2964 (−0 4984)
Cost of equity	−0 0021 (−0 8750)	−0 1183 (−3 4794)	−0 1308 (−6 5729)	0 0371* (3 0917)
Lagged fixed to total assets	−0 0323 (−0 7341)	−0 1448 (−2 5134)	−0 522 (−1 2429)	−0 0377 (−1 7700)
Lagged long-term debt to assets	0 9524 (−1 4783)	1 0517 (1 5029)	0 9712 (−0 5125)	0 6458* (−16 6291)
F	1 547	4 874	13 622	79 579
Adjusted R2	0 012	0 082	0 022	0 052
n	185	173	2,291	5,777

Notes The t-values for the null hypotheses are in parentheses An asterisk indicates correct sign and significance at the 5 percent level

Table 2B

Leverage-Target Equations for Long-Term Debt

Dependent Variable Is the Ratio of Long-Term Debt to Assets

				United States	
Explanatory Variable	Germany	Japan	United Kingdom	Full Sample	Without Buyback Firms
Constant	0 0072 (1 2632)	0 0287 (2 0648)	0 0127 (4 2333)	0 0548 (10 1481)	0 0297 (6 1875)
Cost of debt	0 1677 (0 4712)	−0 2196 (−0 3402)	−0 0830 (−0 8755)	−0 2188 (−1 0069)	−0 1899 (−1 0544)
Cost of equity	−0 0004 (−0 4000)	0 0078 (0 4937)	−0 0003 (−0 1154)	0 0103* (2 3409)	−0 0178 (−4 3415)
Lagged fixed to total assets	0 0060 (0 2985)	−0 0267 (−0 9744)	0 0184* (3 4074)	0 1481* (18 5125)	0 0564* (7 7260)
Lagged long-term debt to assets	0 8806* (−2 9337)	0 8836* (−3 1290)	0 7912* (16 5714)	0 4436* (−65 4588)	0 7943* (−21 2062)
F	2 382	3 200	69 044	1,061 232	124 294
Adjusted R2	0 029	0 048	0 106	0 423	0 101
n	185	173	2,291	5,777	5,485

Notes The t-values for the null hypotheses are in parentheses An asterisk indicates correct sign and significance at the 5 percent level

are excluded for the United States. This time the ratio of fixed assets to total assets works as a negative proxy for the costs of financial distress for the United Kingdom and both U.S. samples.[24] The coefficients on the lagged debt-asset ratio now indicate significant adjustment towards a leverage target, whether or not the sample shows rising leverage over the period. The coefficients suggest that German and Japanese firms adjust their capital structures about 12 percent a year towards their leverage targets, British firms adjust 21 percent a year, and American firms adjust about 56 percent a year.

The sample period may have been too short to allow enough variation in interest rates and stock prices to show marked effects on leverage trends.[25] Nonetheless, the fact that the long-term debt equations work better than the total debt equations suggests that long-term debt is probably what is determined by leverage-target behavior.

Pecking-order behavior

The pecking-order hypothesis explains why firms might rationally let cash flows determine leverage. If managers are seen as having an informational advantage, outside investors will demand a return premium that will make internal cash flows a cheaper source of financing than external funds. Thus firms will use up their cash flow before they turn to debt, so that strong cash flows relative to investment will tend to lead to a decline in leverage.

Aggregate data on cash flows and financing

Table 3 shows how large corporations in six countries actually matched their sources and uses of funds in the 1980s. The sources are internal cash flow and external finance. The uses are investment and dividends. A negative residual suggests that total identified financing is short of total known uses.[26] The negative residuals indicate that it is easier to underestimate cash flow than to overestimate it (see Box 2 for the measurement of cash flow).

In most cases, relatively strong cash flows in the aggregate seem to accompany declines in leverage, a finding which is consistent with the pecking-order hypothesis. In the case of Australian firms, even counting the large negative residual as unidentified additional cash flow would result in cash flows weak enough to be somewhat consistent with the modest rise in their total leverage during the period. By contrast, cash flows were so strong among French and German firms that it is easy to see why they had a sharp decline in leverage.[27] Significantly, much of this cash flow went into reducing short-term debt. One

[24] In *Corporate Debt Capacity*, Donaldson finds that debt contracts often limit new long-term borrowing to a percentage of tangible assets

[25] To reduce multicollinearity, the costs of debt and equity were combined in a single ratio, but the results were not substantially better Logarithmic transformations also failed to improve results

[26] Sources and uses do not always balance because most of the figures are constructed from income statements and balance sheets, not from flow of funds statements

[27] In France, the large societies apparently enjoyed strong cash flows in part because of government policies to restrain wages in the early 1980s

Table 3

Sources and Uses of Funds in Six Countries

(Averages over the Period, Percent of Total Sources)

	Australia 1984-87	France 1983-87	Germany 1983-87	Japan 1984-88	United Kingdom 1983-88	United States 1983-88
Sources						
Internal cash flow	34 6	88 7	104 6	63 2	82 5	77 7
External finance	65 4	11 3	−4 6	36 8	17 5	22 3
Short-term debt	16 5	6 6	−9 4	22 2	−9 3	5 3
Long-term debt	39 0	1 4	2 3	10 7	9 4	15 4
Equity	9 8	3 3	2 6	3 9	17 4	1 9
Uses						
Investment	121 4	105 2	92 6	99 3	83 3	73 8
Dividends	13 1	9 1	9 5	6.2	15 3	23 5
Residual	−34 4	−14 2	−2 1	−5 5	1 4	2 7

Source of basic data Standard and Poor's Global Vantage
Notes The sample of companies corresponds to that in Chart 1 Short-term debt includes accounts payable Investment includes fixed capital, inventory stocks, acquisitions, and financial assets See Box 2 for the components of cash flow

seeming inconsistency is that Japanese firms apparently suffered weaker cash flows than U.S. firms without seeing the rise in leverage that characterized U.S. firms during the period.[28] But Japanese firms also paid much smaller dividends than American firms.

Although these aggregate ex post financing patterns are suggestive, they do not provide a convincing test of pecking-order behavior. The patterns do not reveal whether the firms reducing debt were also the ones with excess cash flow or whether the firms borrowing heavily were also the ones with strong investment demands. Moreover, if firms with strong cash flows were investing the excess cash instead of retiring debt, then investment would appear strong ex post and it would be difficult to verify pecking-order behavior

[28]If the figures are accurate, financing patterns would necessarily be consistent with leverage trends When the ratio of new debt to net investment is lower than the initial leverage ratio, leverage must decline In the case of Japan, for example,, investment net of depreciation and amortization was 61 percent of funds from all sources Given that new debt was 33 percent of all funding, leveraging at the margin was 54 percent (33 divided by 61) With an initial leverage ratio of 60 percent at end-1983, the 54 percent debt financing over the period reduced the leverage ratio to 56 percent at end-1988

Testing for pecking-order behavior

Estimates of cash flow and investment demand at the firm level allow a more direct test of the pecking-order hypothesis. The test compares borrowing behavior of firms with different strengths of cash flow relative to investment demand to determine whether differences in such behavior seem to reflect the existence of a gap between the costs of internal and external finance.

The strength of investment demand relative to cash flow is measured in terms of the *predicted* external financing need (PEF), which in turn is specified as the difference between *predicted* investment and dividends (PID) and *actual* measured cash flow (CF), that is, PEF = PID − CF.[29] For PID, an ex ante concept of

[29]Clearly, it will not do to use *actual* external financing or *actual* investment and dividends Given the amount of cash flow, the accounting balance between sources and uses of funds will ensure that changes in debt and equity always match actual investment and dividends Such data will preclude detection of any gap between the costs of internal and external financing

Box 2: Measurement of Cash Flows

Financial statement data from Global Vantage allow the estimation of cash flows by a procedure suggested by Cottle, Murray, and Block † This procedure adds back to reported after-tax earnings those reported expenses that drain no cash — expenses such as depreciation of fixed assets, amortization of intangibles, increases in deferred taxes, and additions to provisions and reserves The reason for this adjustment is that reported earnings alone are not always an adequate measure of cash flow. As the table below shows, for most of the countries, and especially for France and Germany, charges to depreciation of fixed assets and amortization of intangibles are a more important source of cash flow than earnings In the case of Germany, additions to provisions and reserves represent nearly twice as much cash flow as earnings. Moreover, increases in deferred taxes, although not nearly as important as earnings, can also be a significant component of cash flow.

†Sidney Cottle, Roger F Murray, and Frank E Block, *Security Analysis,* 5th ed (New York McGraw-Hill, 1988), pp 237-62

Components of Measured Cash Flow

(Percent of Measured Cash Flow)

	Australia 1984-87	France 1983-87	Germany 1983-87	Japan 1984-88	United Kingdom 1983-88	United States 1983-88
Earnings after taxes†	79 2	37 8	16 6	48 7	80 8	47 6
Depreciation and amortization	51 2	59 5	59 8	62 3	32 5	52 5
Provisions and reserves	2 3	9 7	31 0	4 0	0 6	—
Deferred taxes	9 8	7 9	0 8	0 8	1 0	7 2
Accounts receivable	−42 5	−14 9	−8 3	−15 8	−15 0	−7 3

†Earnings include extraordinary items

investment is obtained by taking fitted values from a regression of the sum of investment and dividends on the change in sales and the first lag in dividends (all variables normalized by firm asset size), since accelerator models of investment tend to work well and dividends tend to adjust slowly

Subtracting actual cash flow from PID yields the PEF for each firm in a given year. The observations are then divided into three groups:

(1) cash-rich firms with negative PEFs (corresponding to firms with investment demands such as I_1 in Box 1);
(2) a middle group with positive but relatively small PEFs (corresponding to cash-constrained firms with investment demands such as I_4, as well as firms with demands such as I_2 in Box 1), and
(3) cash-poor firms with relatively large PEFs (corresponding mainly to firms with investment demands such as I_2 in Box 1).

The precise separation of firms into the middle and cash-poor groups is determined through an iterative maximum-likelihood procedure, which finds the division that produces the best combined fit for regression estimates.[30] The idea of the test is to try to detect in the middle group borrowing behavior that reflects a cash constraint

For each group, we estimate the equation $\Delta D/A = a + b$ (PEF/A), where ΔD is net borrowing in terms of the change in total debt, A is total firm assets, a is the constant term, and b is the pecking-order coefficient. The variables are divided by assets to avoid problems of heteroskedasticity related to firm size Under the pecking-order hypothesis, the pecking-order coefficient for the cash-rich group would be close to one. This result would reflect the use of excess cash flow to retire debt, with the amount retired varying one-to-one with investment demand across firms Within the middle group, the coefficient would be less than one, reflecting the presence in the group of at least some cash-constrained firms for which debt would be unaffected by the strength of investment demand. Finally, within the cash-poor group, the coefficient would again be close to one, reflecting amounts of borrowing that varied one-to-one with investment demand (The presumption is that relatively few firms actually resort to external equity financing.)

[30]Steve Peristiani wrote an algorithm for seeking a maximum for the concentrated log-likelihood of a bivariate switching regression model The log-likelihood is from Stephen M Goldfeld and Richard E Quandt, "The Estimation of Structural Shifts by Switching Regressions," *Annals of Economic and Social Measurement*, vol 2 (1973), pp 475-85

Table 4

Pecking-Order Equations

Dependent Variable Is $\frac{\Delta D}{A}$

				United States	
Explanatory Variable	Germany	Japan	United Kingdom	Full Sample	Without Buyback Firms
Cash-rich group	n=74	n=11	n=229	n=918	n=626
Constant	−0 0166	0 0285	−0 0109	0 0577	−0 0209
PEF/A	0 2252	1 0657**	−0 0382	0 7855	0 9238*
	(−9 3462)	(0 0674)	(−15 2006)	(−3 8718)	(−1 6710)
Middle group	n=54	n=66	n=1,190	n=3,375	
Constant	0 0028	−0 0062	0 0030	0 0082	
PEF/A	0 1384**	0 6132**	0 4149**	0 4472**	
	(0 4878)	(1 4819)	(−8 9877)	(−11 7617)	
Cash-poor group	n=27	n=68	n=491	n=522	
Constant	−0 0424	−0 0267	−0 1897	−0 2306	
PEF/A	0 8515**	0 8204**	1 0461**	1 2776	
	(−0 4914)	(−0 5390)	(1 3599)	(4 7130)	

Notes The t-values under the null hypotheses are in parentheses One asterisk indicates failure to reject the pecking-order hypotheses at the 5 percent level, and two asterisks, failure to reject at the 10 percent level The null hypotheses are b=1 for the cash-rich and cash-poor groups and b=0 for the middle group, where b is the coefficient on PEF/A In the case of the middle groups for the United Kingdom and the United States, however, the asterisks indicate rejection of the null hypothesis that b=1

Test results

Table 4 reports the regression estimates for Germany, Japan, the United Kingdom, and the United States for the same large firms as before. The change in total debt is used for the dependent variable.[31] For the cash-rich groups in the United States, two sets of estimates are reported, one for the full sample and one for the sample excluding firms that were buying back stock and engaging in net long-term borrowing at the same time

The results are broadly in accord with pecking-order behavior. Nine of the thirteen estimated pecking-order coefficients are consistent with the hypothesis The most telling result in favor of the pecking-order hypothesis is the difference between the estimated coefficients for the cash-poor and the middle groups, particularly in the case of German and British firms. The much lower propensity for debt financing by firms in the middle groups suggests the presence among them of cash-constrained firms with investment demands caught in a gap between the costs of internal and external finance.[32] In the case of the full sample of U.S firms, only the coefficient for the middle group is consistent, but when the buyback firms are excluded, the coefficient for the cash-rich group becomes consistent with pecking-order behavior.

Aberrant behavior

The deviations from pecking-order behavior are noteworthy It is the cash-rich firms that tend to depart from pecking-order behavior. In theory, these firms should have been using all their excess cash flow to retire debt in order to create slack for possible future borrowing needs It appears, however, that only the cash-rich firms in Japan were behaving according to the pecking-order hypothesis, conscientiously using excess cash flow to retire debt [33] In Germany and the United Kingdom, the firms were putting their excess cash flow into financial assets, including stock to acquire other firms; a few British firms were even borrowing for this purpose The German firms may have been averse to retiring debt because of their close relationship to their banks. In spite of this reluctance to retire debt, many German firms were so cash-rich that aggregate debt retirement was sufficient to cause leverage to fall sharply The British firms appear to have been simply taking advantage of unusually favorable credit conditions in the United Kingdom at a time of government budget surpluses Indeed some large British firms were

[31] Similar equations were estimated for long-term debt by combining net short-term borrowing with cash flow, but the results were not nearly as favorable

[32] The large relative sizes of the middle groups, especially for the United Kingdom and the United States, indicate that these groups probably include many firms that were not cash-constrained The algorithm for dividing the sample between the middle and cash-poor groups tended not to be very effective because the shape of the concentrated log-likelihood function was quite flat for wide ranges

Table 5

Stock Buybacks and Long-Term Borrowing by Cash-Rich U.S. Firms

(Millions of Dollars)

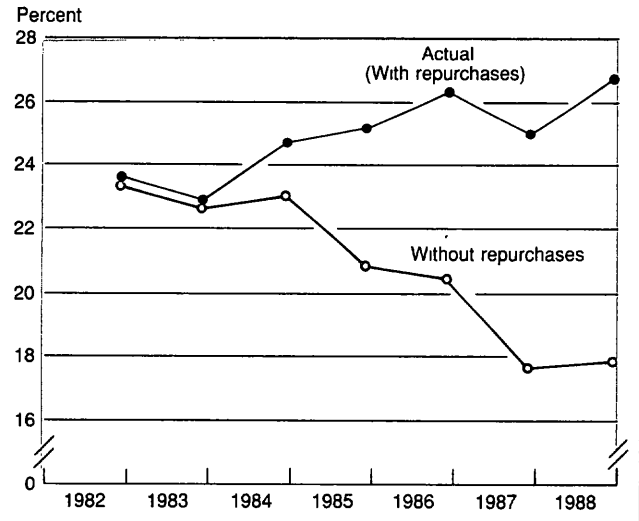
Year	Number of Firms	Amount of Buyback (Net)	Long-Term Borrowing (Net)
1983	20	628 2	557 4
1984	37	2,462 8	2,019 6
1985	64	11,491 2	14,474 8
1986	51	3,275 2	6,907 4
1987	62	4,791 0	5,542 4
1988	58	5,638 3	9,028 8
Total	292	28,286 7	38,530 4

Source Global Vantage

Notes Cash-rich firms are selected on the basis of the difference between predicted investment and dividends, on the one hand, and on the other, actual measured cash flow

Chart 2

Effect of Stock Repurchases on the Ratio of Long-Term Debt to Assets in the United States



Source Standard and Poor's Global Vantage

Note Interest expense due to cumulative stock repurchases since 1982 is calculated using LIBOR

also providing trade credit liberally to other firms while paying off their own trade debt. In effect, these British and German industrial firms were engaging in some financial intermediation of their own

U.S. stock buybacks

Unlike firms in other countries, firms in the United States may buy back their stock with little restriction.[34] Indeed, while many cash-rich U.S firms were exhibiting good pecking-order behavior by retiring debt, nearly a third of their number at a given time were returning cash to their stockholders not only by paying generous dividends but also by borrowing heavily to buy back their own common stock. For the sample used here, 292 of 918 observations on cash-rich U.S. firms were on firms engaged in stock buybacks financed with long-term debt Table 5 shows the amounts of buybacks and long-term borrowing by these firms. In the 1980s, stock repurchases were the difference between rising leverage and falling leverage in terms of long-term debt in the United States Chart 2 shows that in the absence of the repurchases, the ratio of long-term debt to assets for the sample would have been about 18 percent in 1988 instead of 27 percent

Significantly, nearly all the new debt used to finance the U S buybacks was long term, and in some cases short-term debt was reduced. If the firms were seeking merely to put cash in the hands of stockholders through some method other than dividends, then they could have accomplished their goal using more modest amounts drawn from the available cash flow or financed with short-term debt that could be promptly repaid. The fact that cash-rich firms resorted to long-term debt suggests that a lasting change in leverage was an important motive. Some firms may have raised their leverage ratios to defend themselves against perceived takeover threats, others to support the market value of their shares.[35] But whatever the motive, it appears that the capital restructuring in the form it took would be difficult to reverse in the short run [36]

[34]In the United Kingdom, the power of a company to buy back its own stock must be granted by a shareholder vote, but even the firms already granted the power have rarely exercised it

[35]Financial innovations such as junk bonds, strip financing, and blind-pool buyout funds may have made takeover threats more credible in the 1980s than before Bagwell finds that share repurchases make a potential target more expensive to acquire See Laurie S Bagwell, "Share Repurchase and Takeover Deterrence," Northwestern University Department of Finance, Working Paper no 53, 1989

[36]In Australia, where leverage in terms of long-term debt has also risen, developments similar to those in the United States may be taking place

Conclusion

The international evidence examined here suggests that two distinct types of company behavior have accounted for the differences in leverage trends across countries. For the most part, declines in leverage abroad and among many U.S. corporations have resulted from a type of behavior in which firms enjoying strong cash flows have retired debt or reduced their use of debt for financing investment. In contrast, much of the rise in leverage in the United States has been a consequence of a strikingly different type of behavior, in which some cash-rich U.S. firms have actually borrowed heavily, not to invest, but to repurchase their stocks

Although both types of behavior can be found among U.S firms, the U.S. trend in the aggregate differs from trends elsewhere because of the large number of firms buying back their stock. The precise reasons for the buybacks are not well understood, but the use of long-term debt to finance the buybacks suggests a lasting change in attitudes towards leverage.

Where aggregate trends show that declining leverage accompanied strong cash flows, disaggregate data reveal the firm-level behavior underlying the trends. companies were acting as if external funds were substantially more costly than internal funds, a behavior consistent with the so-called pecking-order hypothesis. Moreover, the finding that the declines in leverage were achieved largely through reductions in short-term debt indicates that firms were treating favorable cash flows as transitory shocks and that the declines in leverage were a cyclical phenomenon.

Some countries, of course, have had stronger cash flows than others. The large German companies and French societies appear to have enjoyed the strongest cash flows and thus have seen the sharpest declines in leverage British firms have also had impressive cash flows, but their investment in financial assets and acquisitions has kept their leverage from falling. Japanese corporations as a group have had relatively modest cash flows, but those firms with excess funds have been scrupulously retiring their debt, so that leverage on the whole has declined. American corporations have actually had somewhat strong cash flows, but the debt-financed stock buybacks have caused aggregate leverage to rise

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