How Much Growth Can a Firm Afford?

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■ For years growth has been second only to profits in the pantheon of corporate virtues. In recent years, however, there are increasing signs that some managements must finally face the fact that unrestrained growth may be inconsistent with established financial policies. The intent of this paper is to demonstrate that the financial policies and growth objectives established by some companies are mutually incompatible, and to explore the options open to firms for remedying this worsening problem.

To test the consistency of a company's growth objectives and its financial policies, a concept called sustainable growth is introduced. For those companies that want to maintain a target payout ratio and capital structure without issuing new equity, sustainable growth is defined as the annual percentage of increase in sales that is consistent with the firm's established financial policies. If sales expand at any greater rate, something in the company's constellation of financial objectives will have to give — usually to the detriment of financial soundness. Conversely, if sales grow at less than this rate, the firm will be able to increase its dividends, reduce its leverage or build up liquid assets.

A note of urgency is added to this discussion because, as will be demonstrated, the effect of inflation generally reduces *real* sustainable growth. If, for example, a company's sustainable growth rate in the absence of inflation is 8%, its *real* sustainable growth rate — measured as the annual percentage increase in physical volume — in the presence of a 10% inflation rate might fall to 3.5%. Inflationary growth therefore consumes limited financial resources almost as voraciously as does real growth, and neither the company nor the economy benefits. The inflation rate is no longer in double digits, but, inasmuch as the economy has been forced through the worst recession in decades to achieve this reduction, there is cause for concern that inflation will be on the rise again as the unemployment rate returns to politically acceptable levels.

Once a company's sustainable growth rate is known, an executive can see immediately whether the firm's growth objectives and financial policies are mutually feasible, and he or she can use the underlying model to search for a more appropriate mix of financial and growth objectives. The model presented is not intended as a replacement for more formal financial projections. For an initial overview of the growth

problem, however, the model is much simpler to use and interpret than formal projections are, and it highlights potentially important interdependencies among key financial and operating variables.

Among the steps a company can take to balance its growth targets and its sustainable growth rate are the sale of new equity shares, a reduction in the firm's dividend payout ratio, an increase in its leverage, or an improvement in operating performance. After reviewing these alternatives, it will be suggested in closing that under present conditions the only viable options remaining for a number of companies are to make further cuts in the dividend payout ratio or to reduce the growth rate to a level which is consistent with the firm's financial targets. In this latter case, it is suggested that in certain instances managers must begin to look upon growth not as something to be maximized, but as a decision variable just as important as the firm's target payout ratio, capital structure, or any other policy parameter.

In more academic terms, the argument is that when new equity financing is impossible, the firm's investment, financing and dividend decisions are interdependent. Because investment capital beyond that provided by retained profits and accompanying borrowing is available only through a reduction of dividends or an increase in leverage, the marginal cost of capital increases with investment beyond a certain level. These increased costs are not limited to the usual "issue cost" variety but also include the impact on share price of employing what management believes to be excessive debt, or distributing what is believed to be too little in dividends. The optimal growth rate, therefore, is not simply the outgrowth of accepting all average-risk investment opportunities yielding a return above the firm's cost of capital as conventionally calculated. Instead, management must explicitly consider the tradeoffs between more growth and some combination of more leverage and less dividends.

The Model

To explore the growth-financial policy nexus more closely, let us set aside the problem of inflation for the moment and concentrate on a company that wants to maintain a target payout ratio and capital structure without issuing new equity, and that also wants to increase sales at a rapid rate. We wish to demonstrate that under these conditions the firm's growth rate is not an independent variable, but rather is only one of several variables in an interdependent system. To keep the exposition simple and to concentrate on the important interdependencies, we will restrict the analysis here to a steady-state situation in which depreciation is just sufficient to maintain the value of existing assets. Also, we assume that the profit margin on new sales and the ratio of assets to sales on new sales equal the average of like quantities on existing sales. (Generalization of the model to more realistic conditions is considered in the appendix.)

To demonstrate the interdependencies between growth and financial policy, we need only equate annual sources of corporate capital to annual uses. Toward this end, let

- p = the profit margin on new and existing sales after taxes,
- d = the target dividend payout ratio [$(1 - d)$ therefore is the target retention ratio],
- L = the target total debt to equity ratio,
- t = the ratio of total assets to net sales on new and existing sales,
- s = sales at the beginning of the year, and
- Δs = increase in sales during the year.

Looking at Exhibit 1, and assuming that p and t are the same for new sales as for existing sales, the new assets required to support increased sales of Δs are forecast to be $\Delta s(t)$, shown as the cross-hatched rectangle. On the other side of the balance sheet, total profits for the year are expected to be $(s + \Delta s)p$, and additions to retained earnings to be $(s + \Delta s)p(1 - d)$. This is shown in the exhibit by the shaded rectangle. Finally, because every $1 added to retained earnings enables the company to borrow $L without increasing its debt to equity ratio, new borrowings should equal $(s + \Delta s)p(1 - d)L$. This is shown in the exhibit by the dotted rectangle.

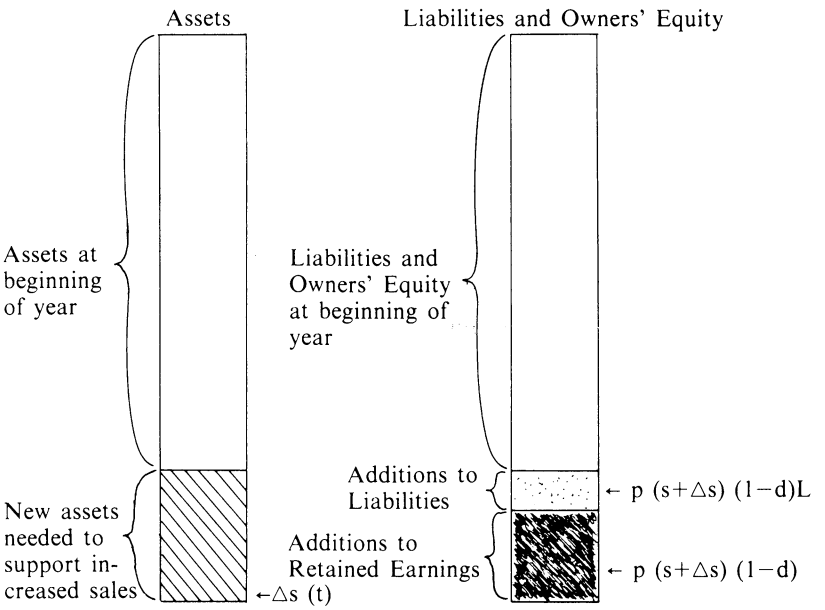
To calculate the firm's sustainable growth rate, we need only observe that the addition to assets shown in Exhibit 1 must equal the addition to liabilities and owners' equity — in other words, the new assets must be financed by new debt and an increase in equity through retained earnings. Setting these two quantities equal and solving for the growth rate, $\Delta s/s$,

$$\text{sustainable growth rate in sales} = g^* = \frac{p(1 - d)(1 + L)}{t - p(1 - d)(1 + L)}.$$

Unless actual growth in sales, g, equals g^*, one or some combination of the variables p, d, L or t must change — or the firm must sell new shares.

Many people would argue that the problems posed

Exhibit 1. Calculating Sustainable Growth



$$\triangle s\,(t) = p\,(s+\triangle s)\,(1-d) + p\,(s+\triangle s)\,(1-d)\,L$$

$$\text{sustainable growth rate} = \triangle s/s = \frac{p\,(1-d)\,(1+L)}{t - p\,(1-d)\,(1+L)}$$

by an actual growth rate in excess of the sustainable rate are not serious ones, because the firm can always sell new shares if need be. However, this ignores some important facts about new equities markets which we will discuss below. Let us note here that aggregate data on the significance of new equity capital for manufacturing firms suggest that many enterprises are either unable or unwilling to sell new equity [1,2]. For these companies, problems of sustainable growth are very real ones.

Sustainable Growth in Manufacturing

The most meaningful estimate of sustainable growth for a company would be based on management's estimates of the variables. To provide a feel for the numbers, however, and to calculate a representative g*, let us refer to the composite financial statements for all U.S. manufacturing firms compiled quarterly by the Federal Trade Commission [6]. We can think of these figures as representative of the typical manufacturing firm, although individual companies can obviously have a higher or lower sustainable growth rate. Because 1975 was such a poor profit year, we will use figures for 1974 as more representative of typical performance. According to these figures, profit margin = 5.5%, payout ratio = 33%, debt to equity ratio = 88%, assets to sales ratio = 73%, and solving for sustainable growth,

$$g^* = \frac{(.055)(1 - .33)(1 + .88)}{.73 - (.055)(1 - .33)(1 + .88)} = 10.5\%.$$

For the typical manufacturing firm, therefore, the only growth rate in sales consistent with stable values of p, d, L, and t in the absence of new equity financing is 10.5%. We will compare this figure to recent growth rates in manufacturing after considering inflation.

Financing Inflation

Inflation adversely affects corporations in several ways. One that is well known by now relates to the fact that depreciation in most countries must be based on the historical cost of assets rather than on their current replacement cost. Because historical depreciation is below replacement cost depreciation during in-

flationary periods, that portion of cash from operations represented by depreciation is insufficient to recover fully the economic value of the depreciating assets. In addition to asset erosion, historical depreciation also results in higher taxable earnings than does replacement cost depreciation, and naturally higher tax bills as well. Because taxable income is overstated, executives rightfully argue that they are taxed on capital as well as profits during inflation. Another manifestation of this excess tax is that the real rate of return on new corporate investment declines, making expansion less attractive.[1]

A second inflation effect is less well publicized but no less important. It relates to the fact that companies must finance inflation-induced increases in working capital just as if they were the result of real and not inflationary growth. This means that even if a company's goal is just to sell the same number of widgets annually, it must invest larger dollar amounts in accounts receivable and inventory to maintain the same physical volume. Part of this increased investment is offset by increasing accounts payable and possibly higher nominal profits, but these seldom cover the full amount. Because the rest must be financed from outside sources, inflation commonly creates financing problems of its own which add to those created by real growth.

The precise impact on a company of using historical cost depreciation during inflation depends in a complicated way on the capital intensity of the firm's production process and on the longevity and vintage of its capital stock. For the sake of simplicity, let us make the admittedly artificial assumption that depreciation is sufficient to maintain the *replacement* value of existing assets. This will enable us to concentrate on the working capital effects of inflation.

As before, consider a company with an aversion to selling equity that wants to maintain a target payout ratio of d and a target debt to equity ratio of L. Assume a uniform inflation rate throughout the economy of j percent, and suppose that new investment in fixed assets varies only in proportion to real increases in sales. Then, total expected nominal profits are $(s + \Delta s)(1 + j)p$, and total sources of capital are expected to be

$$(s + \Delta s)(1 + j)p(1 - d)(1 + L).$$

Because current assets must increase in proportion to nominal sales, the expected increase in current assets is $[(s + \Delta s)(1 + j) - s]c$, where c is the ratio of nominal current assets to nominal sales. Total expected use of cash is therefore

$$[(s + \Delta s)(1 + j) - s]c + \Delta sf,$$

where f is the ratio of nominal fixed assets to real sales. Equating sources to uses and solving for $\Delta s/s$, the company's real sustainable growth rate under inflation is

$$g_r^* = \frac{(1 + j)p(1 - d)(1 + L) - jc}{(1 + j)c + f - (1 + j)p(1 - d)(1 + L)}.$$

Inflation increases real sustainable growth by adding j percent to nominal retained profits and accompanying borrowing. For most companies, however, this is more than compensated for by the necessity to increase working capital by j percent more than would otherwise be necessary.

The above equation captures only one dimension of the inflation-financing problem; nonetheless, the impact is a significant one. Referring again to the composite figures for U.S. manufacturing in 1974, Exhibit 2 confirms that, although the nominal sustainable growth rate rises with inflation, the annual increments in physical volume the firm can finance without new equity decline. Roughly speaking, the real sustainable growth rate declines by 2.2% for every 5 percentage point increase in the inflation rate. With the approximate 10% inflation rate in 1974, real sustainable growth falls from an inflation-free 10.5% to 6.1%. For comparison, the actual real growth rate in manufac-

Exhibit 2. Relation Between Sustainable Growth and Inflation Based on Composite Figures for U.S. Manufacturing 1974

Inflation Rate	Real Sustainable Growth Rate	Nominal Sustainable Growth Rate*
0%	10.5%	10.5%
5	8.3	13.7
10	6.1	16.7
15	3.9	19.5

*Nominal rate = (1+j) (1+real rate) − 1

[1]Taxation of fictitious profits may also affect the firm's target debt to equity ratio, but the direction and magnitude of the impact is difficult to predict. If the inflation is unanticipated by lenders, the real cost of debt will decline and the target should rise. If the inflation is anticipated, however, real borrowing costs will stay constant while real income declines due to excess taxes. In this instance, the firm's ability to service debt will fall, and the target debt to equity ratio may fall as well. The firm's payout ratio may also be affected. For example, if the firm recognizes fictitious profits as such, it may want to reduce its payout ratio to keep the proportion of "true earnings" distributed constant.

turing sales in 1974 was 3.8%, while the figures for the prior two years were 8.2% and 8.4%. Naturally if we were to allow the very real likelihood that annual depreciation is insufficient to maintain the replacement value of existing assets, the impact of inflation on real sustainable growth would be even more damaging.[2]

Managing Growth

An actual growth rate in sales different from g* is inconsistent with a fixed financial policy, and, like it or not, companies will be unable to maintain financial targets under this condition. Executives therefore have two options: they can passively disregard the interdependencies inherent in the sustainable growth equation and continually fail to meet their financial objectives, or they can actively develop a set of growth objectives and financial targets which are mutually consistent. An actual growth rate below g* implies that the company has more than enough capital to meet its investment needs, and calls for an increase in liquid assets, a reduction in leverage, or an increase in dividends. Because the financial problems posed in this case are far less demanding than those in the reverse situation, the following discussion will concentrate on the principal means by which managements can cope with an actual growth rate in excess of sustainable levels.

Sell New Equity

As already noted, the solution offered by many people to sustainable growth problems is simply to sell new equity capital. And indeed it appears that this recommendation will be heeded by an increasing number of firms in the near future. Based on Federal Reserve Board flow of funds data, Manufacturers Hanover Trust estimates that new equity issues by U.S. nonfinancial corporations during 1976-1977 will average $11 billion annually, up more than 50% over the depressed levels of 1973-1975 [7].

While new equity is the obvious solution for a number of firms, particularly larger, well known companies and the healthier public utilities, it is equally apparent that this option is not open to many others. To put matters into perspective, it should first be noted that even in the land of Wall Street—by far the world's largest equity market—new common stock has never been a large source of capital for U.S. corporations. Over the two decades, 1952-1972, new common stock provided *only 4%* of total funds required by U.S. nonfinancial corporations. In fact, in 1963 and again in 1968, new equity was negative, indicating that the value of shares repurchased by companies exceeded the value of new shares issued in these years. This 4% figure compares with a projected 6.2% for 1976-1977; despite the increase, new common stock will continue to be a very modest source of corporate funds. Moreover, if in tabulating these percentages we remove public utilities with their traditional heavy reliance on new equity financing, we find that even these modest figures overstate the importance of new common stock to manufacturing firms. Thus, despite the fact that public utilities and manufacturing firms raised approximately the same total amount of external capital over the decade from 1965 to 1974, public utilities accounted for almost one-half of all new equity raised, while manufacturing firms accounted for less than 10%.

The numbers aside, it is still legitimate to ask why many companies will not break with tradition and issue new equity when their sustainable growth problems become severe. In addition to the obvious fact that common shares are still thought by many executives to be undervalued by recent historical standards, one reason companies do not raise more capital on the equity market is that executives are unwilling to make growth plans predicated on extensive use of such a fickle source of funds. The typical lag between the decision to issue new equity and knowledge of the precise terms on which the new shares can be sold is on the order of two to three months, and, with the stock market as volatile as it is, many companies think it wiser to make expansion plans that are feasible even in the absence of new equity. The stock market then becomes a distinctly secondary source of capital to be tapped only in unusual circumstances.

Other companies are deterred from using the new equities market by their prohibitive costs. These include the transactions costs of registering, underwriting, and selling the issue, as well as possible underpricing costs incurred when the new shares are issued at a price below the prevailing market. Although reliable data on underpricing costs are unavailable, studies indicate that registration, underwriting, and selling costs alone can exceed 20% of proceeds on smaller issues [8]. Moreover, many smaller firms and

[2]Assuming d and L stay constant, use of historical cost depreciation in the above model has two offsetting effects. First, p tends to rise due to fictitious profits; second, the investment required to replace expiring fixed assets rises above the cash flow from depreciation. The former is a source of cash and tends to increase g*, while the latter has the opposite effect. Principally because the fictitious profits are taxed, the increase in p is seldom sufficient to cover the added investment, and g* generally declines.

foreign companies without access to well-developed capital markets often have extreme difficulty selling new shares at any cost. Finally, there is the obvious fact that new equity issues in closely held companies can lead to loss of voting control.

We might also mention the "hope springs eternal" school of financial management which holds that there is never a correct time to raise new equity. As one prominent investment banker puts it, "In the view of corporate treasurers and financial vp's, there very rarely is a time when it is favorable to sell stock. When the price-earnings ratio is 15 to 1, they say 'well, maybe at 20 to 1.' And when it gets to 20 to 1 they say 'well, let's wait until it gets to 30' " [3].

In sum, although breaking the financial policy-growth rate interdependency may be a feasible strategy for a number of companies, there are still many other firms that are unable or unwilling to turn to the equity market for relief. These companies must solve their sustainable growth problems in some other manner.

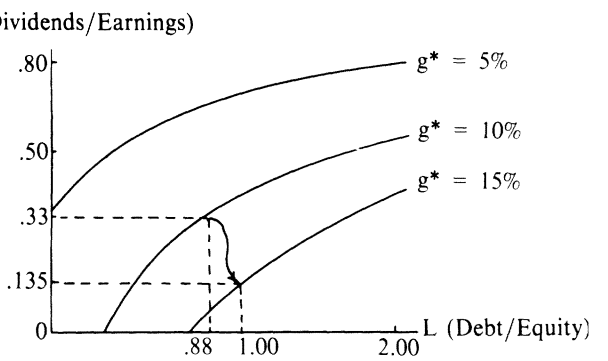
Relax the Financial Constraints

Often without complete understanding of the relationships involved, relaxation of financial constraints is the strategy adopted by many corporations in response to their sustainable growth problems. If actual growth, g, exceeds g*, at the current levels of payout ratio (d) and debt to equity ratio (L), management allows d to decline and L to rise until g* = g.

Exhibit 3 illustrates the effect of changes in d and L on sustainable growth for the typical manufacturing firm in 1974 when p and t stay constant. Ignoring inflation, it shows the values of d and L that are consistent with sustainable growth rates of 5, 10, and 15%.[3] To see how this exhibit can be used, suppose that, consistent with our prior calculations, the typical manufacturing firm's sustainable growth rate is 10.5%, but that based on the market potential foreseen for its products, it wants to expand sales by 15% per annum. According to Exhibit 3, management can increase g* to 15% by selecting any combination of d and L lying on the 15% growth line. As an example,

[3]Exhibit 3 was constructed by fixing the values of g*, p, and t in the sustainable growth equation and finding the value of d consistent with an arbitrarily chosen value of L. This gives one point on a particular growth curve. Repeating this exercise at different values of L enables us to trace the curve. Note that we ignore the fact that increases in L will increase interest costs and reduce p as being of secondary importance. This interrelationship can be taken into account if desired by assuming a specific interest rate and calculating a new profit margin at each capital structure under consideration.

Exhibit 3. Values of d and L Consistent with Sustainable Growth Rates of 5, 10 and 15% When p and t are Constant. Composite U.S. Manufacturing Firms, 1974



one feasible combination would be to cut the payout ratio to 13.5% and increase the debt to equity ratio to 100%. Alternatively, if management is content with g* = 10.5% but wishes to reduce its debt to equity ratio, Exhibit 3 shows the amount by which the payout ratio must decline to offset any reduction in the debt to equity ratio. For example, in order to reduce L from 88% to 75% without affecting g*, Exhibit 3 reveals that d must fall from 33% to about 28%.

The obvious drawback of relaxing financial constraints to increase sustainable growth is that it either increases the risk borne by the firm or reduces the cash flowing to shareholders; an increase in g* can be achieved only by increasing the firm's debt ratio or by reducing its payout ratio. Until recently, this drawback had not been a significant one for many companies. In the 1950's and 60's, ample reserve borrowing capacity enabled companies to increase L without undue concern for the added risks, and comparatively low yields on fixed income securities coupled with a growing investor preference for share price appreciation over dividend income allowed firms to reduce their payout ratios as well.

However, relaxation of financial constraints alone has not done the job. Even in 1974, with the payout ratio at an historic low and the debt to equity ratio at an historic high, actual growth still exceeded sustainable growth for many manufacturing firms. Moreover, there are indications that the continual relaxation of financial constraints has run its course for many enterprises. Looking first at corporate debt levels, Exhibit 4 illustrates the precipitous decline in the ratio of earnings before interest and taxes to interest expense (the interest coverage ratio) since 1960. From a high of over 12 times in 1960, interest

coverage has fallen to less than 4 times by mid-1975. This means that if the average U.S. firm's earnings before interest and taxes fell 75% or more in any year, its operating expenses would not be sufficient to meet even the interest obligations on its debt—to say nothing of principal repayments or dividends. Moreover, if we adjust earnings for replacement cost depreciation and inventory profits to get a more realistic measure of inflation-adjusted profits, Exhibit 4 shows that the coverage in 1975 further declines to below 3 times. There is ample reason to expect, therefore, that the rapid increase in corporate debt levels witnessed over the last decade or so will not continue, and that some other means of managing growth must be found.

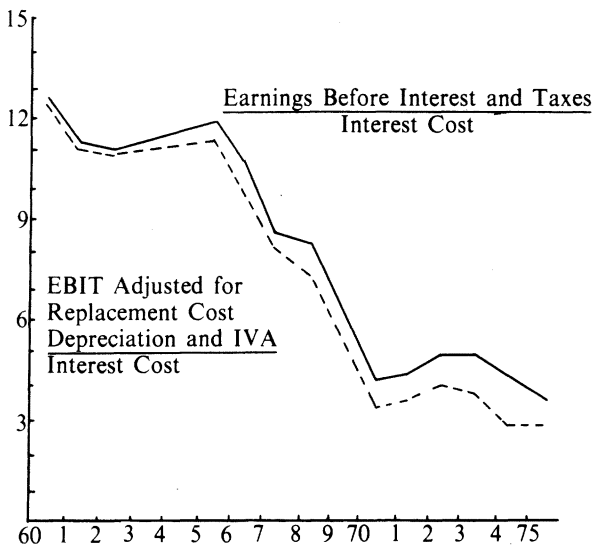
Possibilities for further reducing corporate payout ratios are more promising—but still problematical. It is generally agreed that if equity shares are properly priced, a reduction in dividends to finance new investments offering a rate of return above the firm's cost of capital is not detrimental to shareholders. This is because the reduction in cash dividends should be more than compensated for by an increase in share price produced by the new investment [4,5].

Increasing the proportion of earnings retained is therefore one possible solution to sustainable growth problems; however, evidence indicates that a reduction in payout ratios of the magnitude required is apt to be a difficult undertaking for many companies. In 1974 the percentage of corporate profits distributed as dividends reached a post-war low of 38.5%, down from 63% in 1970, and a 1950-1974 average of 52%. Moreover, the sustainable growth equation reveals that, at least in the manufacturing sector, the dividends-sustainable growth tradeoff is not now a favorable one. Thus it is easy to show that holding all other determinants of g* constant, a halving of the typical manufacturing firm's payout ratio from 33% to 16.5% adds only 2.9 percentage points to sustainable growth.[4] This is also apparent graphically in Exhibit 3. At low payout ratios we see that the sustainable growth lines become quite steep, indicating that large percentage changes in the payout ratio will have only minor effects on sustainable growth.

The fact that payout ratios are already low by historical standards and that significant further reductions will be required to generate only moderate increases in sustainable growth presents at least two problems. On a purely tactical level, most companies are loath to cut dividends directly unless long-run earnings are down as well. This means that reduction in the payout ratio can come only gradually as profits rise in the face of constant dividends, and it suggests that it is probably unrealistic to think that a reduction in payout ratios will solve sustainable growth problems in the short run.

On a more substantive level, the dividend yield on common stocks (dividends/stock price) in 1950 was 6.5%, well over twice the yield on corporate bonds; but by 1974, the situation had almost exactly reversed, and the 9% yield on corporate bonds was more than double the dividend yield on common stock. It therefore becomes legitimate to ask whether further cuts in corporate payout ratios in the face of the steep rise in yields on fixed income securities and renewed investor interest in safety and stability will really leave stock prices unchanged. Without contradicting the perceived long-run relation between dividends and stock price, we can say that significant further cuts in payout ratios will probably be greeted by at least temporary stock price declines, leaving firms open to corporate raids, and making it more difficult for those companies trying to sell new equity.

Exhibit 4. Interest Coverage by Business 1960–75



Source: "Retreading the U.S. Economy," Manufacturers Hanover Trust Economics Department, March, 1976.

[4]Substituting into the equation for g*

$$g^* = \frac{(.055)(1 - .165)(1 + .88)}{.73 - (.055)(1 - .165)(1 + .88)} = 13.4\%.$$

Improve Operating Performance

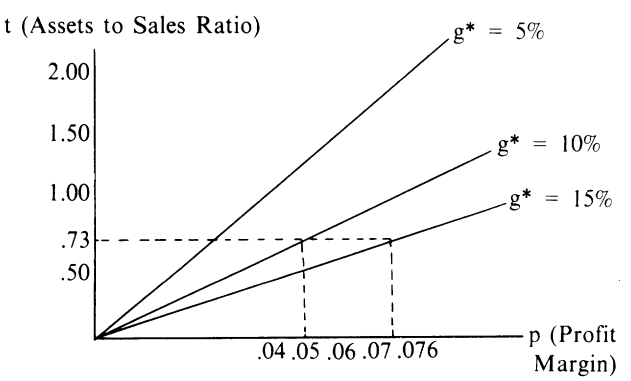
For completeness, Exhibit 5 shows a second approach to increasing sustainable growth. Referring again to the composite figures for U.S. manufacturing firms in 1974 in the absence of inflation, it shows the values of the operating ratios t and p that are consistent with sustainable growth rates of 5, 10 and 15% when d and L are held constant. Consistent with prior calculations, we see that an assets to sales ratio (t) of .73 and a profit margin of 5.5% imply a sustainable growth rate of slightly more than 10%. If the typical manufacturing firm wants to increase its sustainable growth rate to 15%, Exhibit 5 shows the values of t and p that are consistent with this objective. Thus, one way to achieve the desired increase in g* would be to hold t constant and increase p from 5.5% to 7.6%.

It would be presumptuous in the space of this paper to attempt to catalogue the ways in which a company might improve the efficiency with which existing assets are employed and their profitability. So we will be content simply to observe that Exhibit 5 provides a convenient way to check on the internal consistency of a company's growth, financial, and operating objectives.

Make Growth a Decision Variable

Our review of the standard techniques for managing growth suggests that sustainable growth problems are becoming more severe, and that the common solution of increasing firm indebtedness has about run its course. Many companies will be able to solve their growth problems by reducing their payout ratios and selling new equity. It is reasonable to presume, however, that there are a number of firms for which these standard techniques are no longer sufficient. Having exhausted the conventional means for managing growth, these firms must significantly reorient their thoughts about the subject. They must stop thinking about growth as uniformly beneficial and must begin to think about it as a decision variable to be managed and controlled in a manner analogous to the way executives manage their inventories, payout ratios, or capital structure. Rather than tinkering with d, L, p and t whenever g exceeds g*, these firms must think about reducing g itself.

Exhibit 5. Values of t and p Consistent with Sustainable Growth Rates of 5, 10 and 15% When d and L are Constant. Composite U.S. Manufacturing Firms, 1974



The crassest way to restrain growth is to raise prices. This lessens sustainable growth problems, first, by increasing the profit margin (p), and second, by reducing g. A subtler approach is to reduce or eliminate some of the services which accompany product sales. For example, fully one-half of the typical manufacturing firm's total assets is tied up in accounts receivable and inventory. By being less generous with credit terms and by reducing finished goods inventory, a company will increase g* by reducing the ratio of assets to sales (t), and because its products are now less attractive to customers, it will also reduce g.

Increasing prices and reducing customer services can be dangerous strategies, for having sacrificed a competitive edge to other companies, it may be difficult to stem the resulting loss of market position. A possibly more effective strategy is the "profitable pruning" technique employed by Cooper Industries, a leading producer of hand tools and compressors located in Houston, Texas. Faced in 1971 with unsatisfactory performance in its energy divisions, the company decided after much deliberation to pull out of the centrifugal compressor business rather than devote limited financial resources to improving performance in what was to Cooper a marginal operation. The business had growth and profit potential, and Cooper had an established reputation for quality, but the financial resources required were judged to be too large in view of the needs imposed by Cooper's other businesses. By marshalling resources in a few chosen businesses where it believed it could compete most effectively, Cooper sacrificed sales for financial strength and what it hoped would be added long-run profits.

In terms of the sustainable growth equation, effective corporate pruning should increase the profit margin (p) and reduce the ratio of assets to sales (t), and—at least in the year of sale—reduce g. Moreover,

the cash generated from the sale of those businesses judged expendable provides another means of financing future growth in addition to retentions and accompanying borrowing. By carefully concentrating financial resources where they can be used most effectively, companies can bring g and g* into balance without sacrificing their competitive edge. Cooper's almost five-fold increase in earnings per share since 1971 appears to show that profitable pruning has worked well for the company.

Yet another way to control g is to look for a cash cow—a mature product or business which because of its modest future growth potential generates more cash than can be profitably reinvested. By acquiring a cash cow (preferably in an exchange of shares merger), a company can ease its growth pains in several respects. First, if chosen carefully, the cash cow may increase g* by increasing p and reducing t. Second, it may also increase g* by providing added borrowing capacity. Third, because it is in a mature industry the cash cow will probably reduce g.

In closing, we should note that while it is comparatively easy to list the ways a company can reduce its growth rate, limiting growth is not something many managers are used to thinking about, or even willing to think about. When generations of managers have grown up in an environment which says that growth is good, it takes considerable strength to admit that in some cases excessive growth is bad. Moreover, an executive can anticipate significant morale problems when he attempts to enforce a growth rate which is below that attainable in the marketplace. In sum, the reader should recognize that enumeration of growth limiting strategies is likely to be easier than their implementation.

Concluding Comments

How can an executive best use the information and techniques presented in this paper? The first step is to estimate the firm's sustainable growth rate. The example presented involving composite figures for all manufacturing firms is a particularly simple one. Done carefully for an individual company, estimation of g* requires 1) determining appropriate long-run targets for d and L, 2) estimating steady-state values of p and t, and 3) deciding exactly how inflation will affect the firm's sources and uses of funds.

If the resulting g* exceeds estimated g, the manager can turn to the pleasant tasks of deciding how to invest the excess cash and by how much to increase this quarter's dividend. If, as will occur for many firms, g* is less than g, the executive has three not necessarily mutually exclusive choices: 1) prepare to raise new equity, 2) adjust d, L, p and t until g* equals g, or 3) reduce g. As illustrated, the sustainable growth model is a useful device for evaluating alternatives and for guaranteeing that the financial, operating, and growth strategies adopted are internally consistent, but, as usual, the final policy choice and its implementation belong to the manager.

Appendix. A More General Sustainable Growth Model

The purpose of this appendix is to generalize the sustainable growth model derived in the paper in three ways. In the model derived here, the level of investment and profits per dollar of new sales may differ from that of existing sales, depreciation need not be sufficient to maintain the value of existing assets, and the ratio of assets to existing sales may change.

Define the following variables, where in each case $j = 1$ refers to existing sales or assets and $j = 2$ refers to new sales or assets:

p_j = the profit margin on sales after tax,
t_j = the ratio of assets to sales,
Δt_1 = the change in t_1 over the forecast period,
k_j = the investment required per dollar of assets to maintain the value of existing assets,
n_j = depreciation per dollar of total assets,
d = the target dividend payout ratio,
L = the target debt to equity ratio,
s = sales at beginning of period,
Δs = increase in sales during period.

Then, equating uses of cash for new investment and the maintenance of assets to sources of cash from retained profits, depreciation, new debt, and the improved utilization of existing assets,

$$t_2\Delta s + k_2t_2\Delta s + k_1t_1s = (p_1s + p_2\Delta s)(1 - d) + n_1t_1s + n_2t_2\Delta s + (p_1s + p_2\Delta s)(1 - d)L + \Delta t_1s$$

$$\Delta s/s = g^* = \frac{p_1(1-d)(1+L) - t_1(k_1-n_1) + \Delta t_1}{t_2(1+k_2-n_2) - p_2(1-d)(1+L)}.$$

Comparing this expression for sustainable growth with that derived in the paper, the role of depreciation is more apparent. To the extent that depreciation is insufficient to maintain the value of assets (to the extent that $k_j > n_j$), sustainable growth is reduced. Also, it is apparent that if the newly acquired assets are more profitable than existing assets in the sense of produc-

ing sales with a higher profit margin, offering a more rapid depreciation rate, or generating more sales per dollar of assets (if $p_2 > p_1$, $n_2 > n_1$ or $t_2 < t_1$), sustainable growth will rise. Conversely, if new assets are less profitable in any of these senses, g* will fall. Finally, the equation indicates that, other things being equal, g* will rise if the firm can improve its assets utilization by reducing the assets required to support existing sales. This might be achieved by liquidating redundant fixed assets or, if possible, by reducing current assets while maintaining sales.

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