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An Analysis of Corporate Structure Theory, Dividend Policy Theory, and the Effects of the Tax Reform Act of 1986

By: Philip Tinkler
10/31/86

Section I

Franco Modigliani and Merton Miller in 1958 published their paper "The Cost of Capital, Corporation Finance and the Theory of Investment." This work, along with the corrections and replies that followed, is a classic work in the area of capital structure. In this paper, Modigliani and Miller introduced a model for the maximum value of a firm.

In the model presented in this paper there are a few assumptions: (1) shares of firms are "homogeneous"; (2) shares are traded in perfect markets under conditions of atomistic competition; (3) investors have homogeneous expectations about the riskiness and amount of earnings; (4) no corporate or individual taxes and (5) debt for firms and individuals is riskless and remains so even as the amount of debt increases (Modigliani and Miller).

With these assumptions Modigliani and Miller (MM) make two propositions. Proposition I states "the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate, ka, appropriate to its class (Modigliani and Miller, pg. 268)." Mathematically this can be expressed:

$$V=S+D=\frac{EBIT}{ka} \quad (1)$$

The proof for this Proposition is an "arbitrage proof", which can be found in their article.

Proposition II states, "the expected yield of a share of stock is equal to the appropriate capitalization rate ka for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between ka and kd (Modigliani and Miller)." Mathematically this Proposition is expressed:

$$ks=ka(ka-kd)(D/S) \quad (2)$$

These propositions can be graphed as follows:

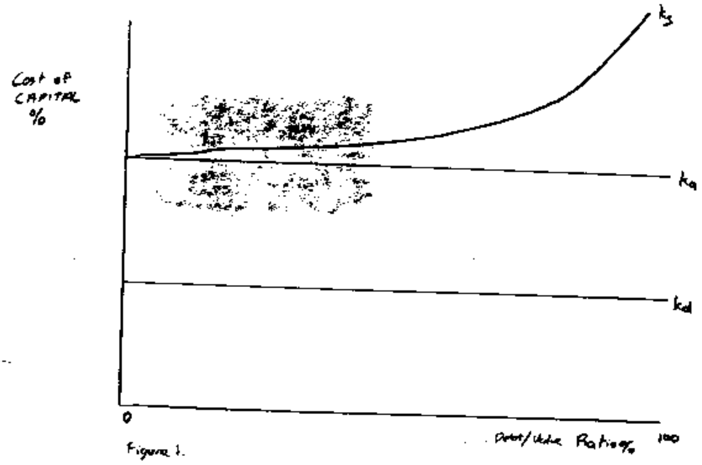

Figure 1.

Source: Financial management theory and Practice, pg. 649.

and,

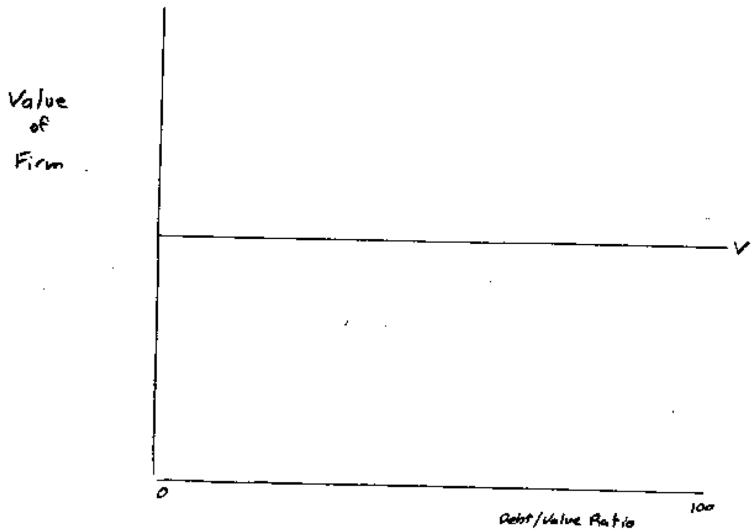

Figure 2.
Source: Financial Management Theory and Practice, pg. 649

These Propositions, however, fail to take into account either corporate income taxes, or individual income taxes.

When corporate income taxes are introduced later in their article the following results are obtained: (Brighman; Financial Management Theory and Practice; pg. 653): Proposition I can be rewritten as:

$$Vl = \frac{EBIT\ (1-t)}{ks} + \frac{t\ kd\ K}{kd} \quad (3)$$

or,

$$Vl = Vu + tD. \quad (4)$$

If no debt is used, tD is equal to zero. Therefore,

$$Vl = Vu \ (4a).$$

Proposition II can be rewritten as,

$$ka = (D/V)\ kd\ (1-t) + (S/V)\ ks. \quad (5)$$

This can be graphically presented:

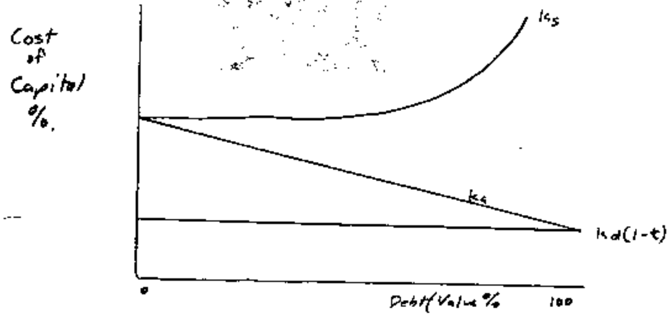

Figure 3.

Source: Financial Management Theory and Practice, pg 655

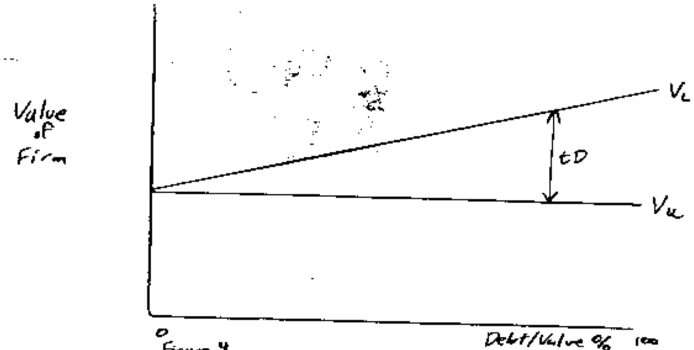

Figure 4.
Source: Financial Management Theory and Practice

Therefore, with corporate taxes taken into consideration, the value of the firm is optimized when there is virtually 100 percent financing. In the limiting case, where debt is equal to 100 percent, the risk is transferred to the bondholders. This obviously would result in ka rising dramatically. However, at 99 percent, the business risk is borne by the stockholders, who own only 1 percent of the total value, allowing for a rate ka just greater then kd (1-t) -- see figure 4.

The fact that kd remains constant is unrealistic in the real world. As the level of debt increases, the risk involved increases. Therefore, kd would rise as the level of debt increases.

Other objections to the MM theory are: (1) the implication that personal and corporate leverage are perfect substitutes, (2) the fact that brokerage and other transaction costs do not exist, (3) the assumption that corporations and investors can borrow at the same rate, and (4) the lack of a personal tax rate in the model. When these objections are taken into consideration the value of the firm can be written (Brigham; Financial Management Theory and Practice; pg 660):

$$\text{Actual Value of Firm} = V_u + tD - \text{PV of expected bankruptcy costs} - \text{Reduction in value from lower EBIT} - \text{Reduction in value from agency costs.} \quad (6)$$

Graphically, the actual value of the firm can be expressed:

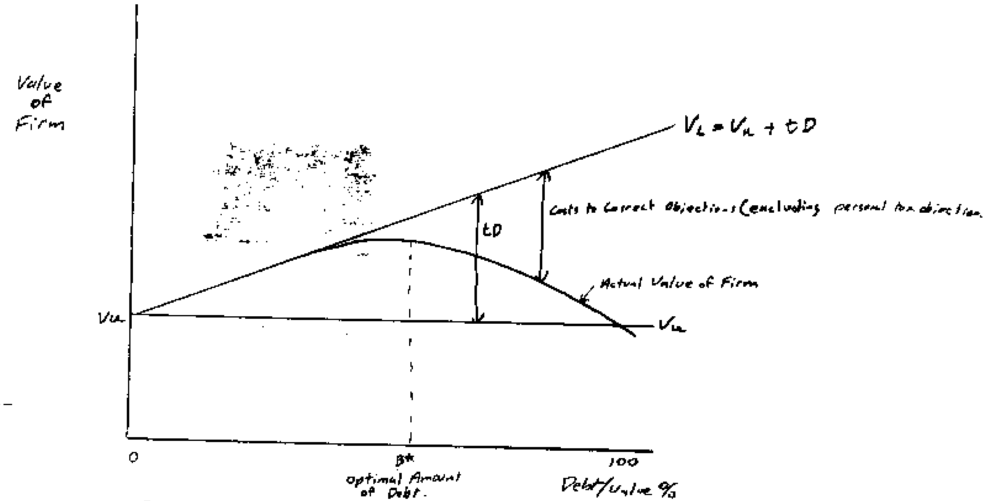

Figure 5
Source; Financial Management Theory and Practice, p. 660

Obviously, the costs to correct the objections raised are very difficult to determine. So, a precise value for the optimal structure can not be determined. These costs, therefore, will be removed from the discussion in the next stage; the inclusion of personal taxes.

Merton Miller included personal taxes in his 1976 Presidential Address to the Americian Finance Association, "Debt and Taxes." In that paper, he shows that:

$$Vl = Vu + \left[1 - \frac{(1-tc)(1-tps)}{(1-tpd)} \right] D, \quad (7)$$

where tc is the corporate tax rate, tps is the weighted average tax of dividends and capital gains, and tpd is the tax rate on interest income from debt (Miller, pg. 267).

Three interpretations follow. First, if the personal tax rate is zero, then the second term reduces to tD. This obviously is the MM theory with corporate taxzes, as expressed by equation (4). Second, if the personal tax rates on debt and equity (dividends and capital gains) are equal, the MM theory with corporate taxes would also apply. (Once again, this equation would reduce to equation (4)). The third, and final, interpretation would be to have different rates for the interest and equity income. Miller believes that (1-tc)(1-tps)=(1-tpd). If this is the case, the second term would reduce to zero. The equation would reduce to:

$$Vl = Vu \quad (8)$$

which is the same as equation (4a) (Brighman; Financial Management Theory and Practice; pg. 663).

The third interpretation is the one Miller supports in his article. He states, "in equilibrium, the market value of any firm must be independent of its capital structure (Miller, pg. 262)." This obviously is the result of the third interpretation of equation (7).

Miller believes that there is an equilibrium level of aggregate corporate debt, B*, when the rate on tax exempts grossed up by the marginal tax rate is equal to the tax-exempt rate grossed up by the corporate tax rate (see figure 6).

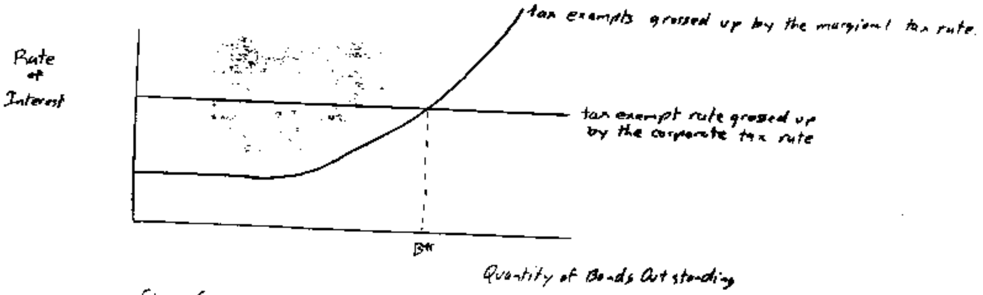

Figure 6
Source: Debt and Taxes _ pg. 269.

B* will be the equilibrium level of aggregate corporate debt. This point is also the point of an equilibrium debt-equity ratio for the corporate sector. "But there would be no optimum debt ratio for any individual firm (Miller, pg. 269)." Companies could follow strategies that would optimize their stockholder's wealth. If a firm used low leverage, or none at all, it would attract high tax bracket individuals. On the other hand, high leveraged firms would attract low tax bracket individuals. This is the "clientele effect (Miller, pg. 269)."

This brings us to the current view of capital structure theory. The theory, a result of incorporating the objections of MM and Miller's personal tax capital structure theories is summarized in figure 7.

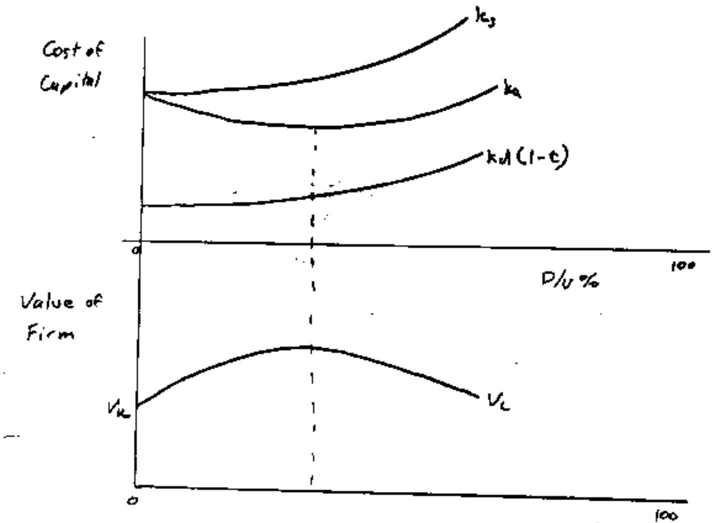

Figure 7
Source. Financial Management Theory and Practice

The item of change is kd (1-t) which now slopes upward, as opposed to the zero slope in figure 3. This results in an optimal capital structure with some level of debt at D/V*. At this point, VI is maximized, and ka is minimized (Brigham; Financial Management Theory and Practice; pg. 665).

The theory of capital structure and the theory of dividend policy will help in the analysis of the effects of the new tax law on corporate financing and dividend policy. Before this analysis, consideration of dividend policy and the clientele effect is appropriate.

Section II

As was briefly mentioned earlier, the clientele effect of dividend policy will be important in our analysis. First, lets consider dividend policy.

Dividend policy should maximize the price of a company's stock. This correlates to the overall goal of maximizing shareholder wealth, which is the basis of all financial decisions. There are two effects which oppose each other however. These effects can be seen when we look at the price model of a share of stock:

$$P_0 = D_1 / (k_s - g) \quad (9)$$

The first effect is, when dividends are raised the stock price will rise, since D1 will be greater. The second effect of increased dividends is that the growth rate, g, will fall. Thereby, lowering the stock price. "The optimal dividend policy is the one that strikes a balance between current dividends and future growth and thereby maximizes the price of the firm's stock (Brigham; Financial Management Theory and Practice; pg. 674)."

The effect of dividend policy was expressed mathematically by Merton Miller and Franco Modigliani as (Modigliani and Miller; Dividend Policy, Growth, and the Valuation of Shares; pg. 413):

$$V(t) = (1/(1+ke)[D(t) + V(t+1) - m(t+1)\,p(t+1)], \qquad (10)$$

where m(t+1) is equal to the number of new shares sold during t. It is apparent that V(t) will increase because of D(t) and V(t+1). The effect of D(t) was already discussed. V(t+1) does not effect V(t), since efficient markets are assumed. V(t+1); and, will depend upon future events not past ones. Therefore, should be considered a constant. The third term will also influence the value, but in a negative fashion. This term, -m(t+1)p(t+1 increases as D(t) increases, since new capital will be needed to maintain the desired level of investment.

In the ideal world presented in their article, "Dividend Policy, Growth, and the Valuation of Shares," they make an interesting assumption. They assume "there are no tax differentials either between distributed and undistributed profits or between dividends and capital gains (pg. 412)." With their assumption, which is more relevant with the new tax law, they conclude that the two conflicting aspects of dividend policy, Dt and -m(t)p(t+1), cancel out. This results in the conclusion that "the current value of the firm must be independent of the current dividend decision (Modigliani and Miller; Dividend Policy, Growth, and the Valuation of Shares; pg. 414)."

Since dividend policy theoretically does not effect the value of the firm, how should dividend policy be used to maximize shareholder's wealth? The residual theory of dividends is a way in which this question is solved. In Section I, it was mentioned that there is no optimal capital structure for an individual firm, per se, but the optimal structure is based upon the entire corporate sector.

With this in mind, each firm should "determine the optimal capital budget, (2) determine the amount of equity needed to finance that budget

(3) use retained earnings to supply this equity to the extent possible; and (4) pay dividends only if more earnings are available than needed to support the capital budget (Brighman; Financial Management Theory and Practice, pg. 674)." This implies that a firm will only pay the residual amount to the stockholders. This maximizes their wealth since the firm will reinvest earnings as long as the expected earnings from the reinvestment is greater than the stockholder's required rate of return.

It is apparent then, that each firm will attract different investors depending upon their capital structure. This is the clientele effect. A firm should determine its optimal structure. This structure and dividend policy will dictate who the investors will be. Investors will switch their stock to the company with the policies that will maximize their own wealth. The effects of the new tax law on the clientele theory will be discussed later.

Section III

How will the tax law affect the theories presented? To answer this, Miller's model which includes personal taxes will be discussed: first, specifically, the relationships in equation (7); second, the effect on figure 6. This is the accepted current view of capital strucutre. Finally the affects on dividend policy and the clientele theory will be discussed.

Theoretically, equation (7)

$$Vl = Vu + [\,1 - \{(1-tc)(1-tps)/1-tpd\}]\; D \quad (11)$$

reduces to $Vl = Vu$. This is the result since Miller argues in his article, "Debt and Taxes," that $(1-tc)(1-tps)=(1-tpd)$. The theoretical result of the new tax law, assuming that the personal tax rate of income from stocks, tps, is equal to the personal tax rate on interest income from debt, tpd, would be;

$$Vl = Vu + tD. \quad (12)$$

It is interesting to note, that this equation is the same as equation (4). Equation (4) was the result obtained by Miller and Modigliani when they first introduced corporate taxes into their model, without introucing personal taxes. This equation implies virtually 100 percent debt. This obviously is not the optimal structure for other reasons already introduced (bankruptcy costs, agency costs, increasing costs of debt, etc.) (Brigham: Financial Management Theory and Practice; pg. 663).

As a result of these neglected aspects of capital structure theory, the current view was introduced (see figure 6). The result of the new tax law on this figure would, cause kd(1-t) to rise more quickly, and cause ks to rise. kd(1-t) would rise because of the reduced incentives to borrow, because of the smaller percentage of the interest deductible. The rate of return on stock, ks, would have two conflicting factors; (1) as the demand for bonds decrease, the demand for stock as a source of funds will increase, driving down the price , therefore increasing the return, and (2) as less debt is used in the economy, interest rates in general will decline, resulting in a general decline of ks. The first factor is the dominate one.

The final result on the cost of capital, ka, will be the raising of the ka curve. This is the result of the increase in kd and ks. This appears obvious since the general cost of capital for stocks increases; and therefore, has a y-intercept above the current intercept. One could also conclude that the D/V Ratio optimum would shift to the left. This would result because of the trend away from debt with more equity financing with the new tax law.

These conclusions can be summarized in the following figure:

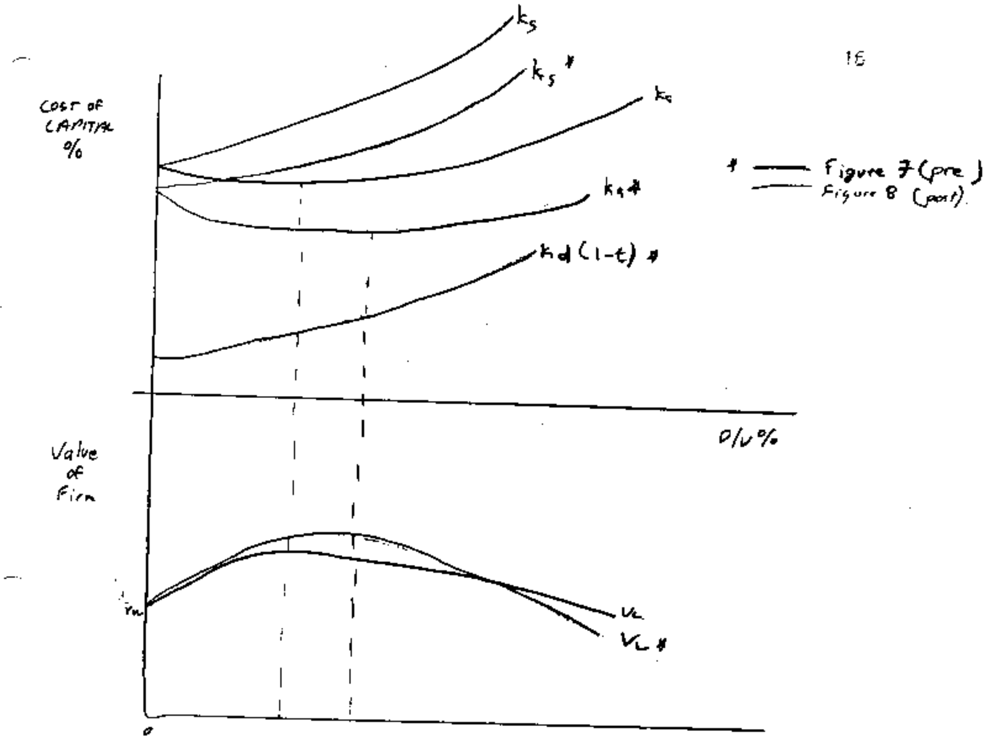

Figure 8.

The maximum value of the corporate sector will shift to the left since by definition, it is at the point where ka reaches a minimum. The specific value of the firm will depend upon its own capital structure. Those with high levels of debt will be hurt by the decreased tax deductions. Those with conservative capital structures, mainly through equity financing, will benefit because of the decreased tax rates and therefore decreased tax liabilities.

Section IV

In the previous section, the effects of the new tax law were discussed on a more theoretical level. There are also considerations which should be looked at from a more "business man's" point of view. The effects on different companies/ industries will be looked at. Dividend policy and the clientele effect will be considered, as well as the effects on the global U.S. economy.

How will the new tax law effect companies and industries? As was discussed previously, corporate debt loads should decrease, since the lower tax rates reduce the tax advantages of debt. This will result in a decreased interest rate, and an increased demand for stock, as a source of funds. This fact will raise the return on stock for the stockholders, which increases the costs to the companies.

There will be a substantial increase in the number of shares of stock, since equity will be more attractive. This increased supply will drive down the price, and therefore raise the cost to the issuing firm. Companies with a lot of debt will therefore be in a difficult position. They will all be trying to expand their ratio of equity to value to the point of optimal capital structure. With this increase in equity supplied however, their costs to obtain the funds will rise considerably. One way in which this could be prevented is to issue stock with a solid dividend policy. This will make the stock more attractive since capital gains are taxed at the same rate as dividends. Therefore, investors will desire present dividends since there is no tax benefit to capital gains.

Industries that have been aggressive towards using tax loopholes and the ITC will be hit hard. They will all of a sudden find themselves in a situation in which they will have to pay considerable amounts of income tax. Examples of these industries are, steel utilities, real estate, railroads, airplanes, and heavy industry. Industries which have traditionally paid higher taxes, with fewer loopholes will benefit greatly from the decrease in the corporate tax rate. Examples of these industries include; retailers, service corporations, securities. It really depends upon the individual firms however, and their tax and structure strategies.

Dividend policies will also affect the attractiveness of a stock. Investors will not receive benefits from capital gains, so receiving cash may make securities more attractive. However, the clientele effect and residual theory of dividends will still apply. Investors that desire present dividends will purchase stock with high payout ratios. On the other hand, other investors will benefit equally from growth stocks. This category on a whole will decrease considerably. This is especially the case since many of the true growth opportunities relied upon capital gains to make the risk worth taking. Venture capitalists are one example. The result is a possible slowdown, which could slowdown the economy.

The residual theory of dividends will still be very relevant. As presented earlier, the theory states, "investors prefer to have the firm retain and reinvest earnings rather than pay them out in dividends if the return on reinvested earnings exceeds the rate of return the investors could obtain on other investments of comparable risk (Brigham; Financial Management Theory and Practice)."

The effects on the U.S. in the global economy are relevent. The primary benefit to the U.S. will be a decrease in the interest rate. It was mentioned in the Wall Street Journal, "lower rates [a result of the tax law change] should reduce the value of the dollar in foreign-exchange trading. Over time, this could ultimately help the nation compete overseas (WSJ, pg. 8)."

The final important benefit of the new tax law is the result it could have on investments. At first, there will be a decrease, because of the withdrawal of the ITC. However, in the long run investments should increase our national output, and cause the U.S. to be more competative and efficient. This will result since investing will no longer be based on the tax benefits. Investing will only pay off if companies find worthwhile economic investments. This view was expressed by Sen. Bill Bradley, "dollars will flow to those areas of the economy that have real value in the marketplace (WSJ, pg. 8)."

This simple fact will increase the economy in terms of efficiency, productivity, and growth. There are many obstacles to overcome, but the long run results are possible.

Section V

The theories brought up in this paper have not changed as a result of the new tax law. What I have attempted to do is work through the theory, and then apply it to a current situation; the change in the tax law. It has been an exciting 25 years in the area of capital structure theory. And, it promises to be an exciting 25 years for corporate America. They will have to adjust their structure and strategies, but the long run results should be beneficial as a whole.

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