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Leverage Changes and Product Pricing Incentives -- A Tax Induced Analysis

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LEVERAGE CHANGES AND PRODUCT PRICING INCENTIVES- A TAX INDUCED ANALYSIS

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Abstract

This paper provides a tax induced framework which can explain the linkage between pricing policies and capital structure choice documented in recent studies by Chevalier (1995a), (1995b) and Phillips (1995). The model proves that firms will optimally change their pricing decisions after taking on additional debt. The reason is that the value of debt related tax shelters and the probability of their use is dependent on revenues realized in the product market. The direction of change is shown to depend on several variables, importantly the elasticity of demand for the firm's product. In an ensuing section, the paper extends the analysis to provide some insights into the impact of pricing choices on the promised yield on debt.

I. INTRODUCTION

The late 80's and early 90's have witnessed an increase in academic interest in the impact of leverage on product market decisions of firms. Three recent empirical papers, Chevalier (1995a),(1995b) and Phillips (1995) document changes in firms' pricing and other product market policies following substantial increases in leverage[1]. The theoretical background cited by Chevalier and Phillips is the extensive strategic interactions literature, including papers by Brander and Lewis (1986), Maksimovic (1988) Gertner Gibbons and Scharftein (1988) Bolton and Scharftein (1990) and others. These latter studies present the idea that leverage alters the strategic incentives of firms and affects their product market behavior[2]. The purpose of this paper is to show that leverage can induce pricing changes because of simple tax and bankruptcy cost considerations, even in the absence of strategic interactions. Models in this strand of the literature include Hite, (1978) De-Angelo and Masulis (1980) and more specifically, Dotan and Ravid (1985) and Dammon and Senbet (1988)[3]. This paper, in conjunction with the empirical work described below, also highlights the implications of the dearth of covenants governing pricing policies. The last section of this paper is devoted to this question.

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[1] Related work on similar data but with a different focus shows the empirical impact of capital structure on plant closings and investment decisions (Kovenock and Phillips (1997)). The results of this latter study are consistent with Myers (1977) but also with Dotan and Ravid (1985) and Dammon and Senbet (1988).

[2] See, however, Dybvig and Zender (1991) for criticism of strategic pre-commitment models. Dybvig and Zender (1991) argue that in general, contracts which lead to sub-optimal second period actions can be profitably re-negotiated.

[3] See also a review of the literature up to 1988 by Ravid (1988), and a related survey by Allen (1987).

II. THE EMPIRICAL WORK

Chevalier(1995a) in an interesting study of the supermarket industry, shows that, following an LBO, supermarket chains tend to change their prices. Aggregate price changes for different cities are measured and regressed on several strategic variables. In general, price increases tend to be positively correlated with the market share of LBO firms in different cities, and negatively related to the market shares of the largest non-LBO firms. These results, as well as results of another study, which directly measures reactions by other firms in the industry to LBO's (Chevalier, 1995b) are interpreted as supporting the strategic interactions paradigm. However, they are also consistent with the empirical implications of the current model.

Our model can generate scenarios in which higher leverage results in higher prices whereas lower leverage results in lower prices. Such scenarios are consistent with Chevalier's (1995a) finding that in general, LBO firms charge higher prices. In 10 of the 17 cities studied, all of the LBO supermarkets charged higher prices than any of the non-LBO supermarkets. Finally, Chevalier's (1995a) regressions tend to have a low explanatory power (R^2) which may mean that other factors, such as the ones discussed in our model, (namely, taxes and bankruptcy costs), are at play.

Phillips (1995) selected four industries: fiberglass insulation, tractor trailers, polyethylene and gypsum which experienced substantial changes in debt to value ratios. These industries generally featured a leading firm and concentrated market shares. Prices of inputs as well as the quantity and prices of output were calculated. The paper considered several issues, but the interesting part for our purposes concerned the estimation of demand, supply, and reduced form equations.

In three industries, debt ratios negatively affected the quantity sold, whereas in the fourth (gypsum) the relationship was positive.

Effects were generally significant. We will return to a more detailed comparison of these results with our model's predictions later.

The next section describes a simple model that computes optimal pricing after an increase in leverage. In order to abstract from strategic interactions, we will assume a monopolistic firm.

III. THE MODEL

We assume a risk neutral monopolistic[4] firm facing uncertain costs but a known demand curve. Specifically, for each price charged, p, the quantity demanded is x(p) and the marginal cost of production is b+v, where b is a constant and v is a stochastic variable with a density function f(v) such that E(v)=0.[5] This is a one period, two points in time model, where at time 0 investment and leverage decisions are taken. The pricing decision is taken immediately after debt had been issued[6], and

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[4] As noted, the assumption of a monopoly is made since we would like to abstract from strategic considerations and show that taxes and bankruptcy costs alone are sufficient for interactions to take place. Naturally, in principle one could superimpose strategic reactions on tax cum bankruptcy considerations. All we need for the current model to hold true is some market power.

[5] This specification is only for convenience in presentation. Results turn out to be very similar for a model in which costs are known but demand is stochastic.

[6] This assumption is made so as to conform to the framework in the empirical papers. If pricing and leverage decisions are taken together, they still interact, but in a somewhat more complex manner. Also, we could add a period - i.e. leverage is taken in period 0 and prices are changed in period 1. It would make no analytical difference.

it is not restricted by any covenant. At time 1 uncertainty is resolved, the firm disbands and cash-flows are distributed to security-holders. Investment is exogenous, and fully observable [7]. It is completed at time 0 and provides a tax shelter of S, claimed at time 1 when taxes are paid.

To simplify the presentation, we assume that only corporate taxes are levied.[8] This tax rate is denoted by t. The firm is assumed to sell debt D at par, and it promises to pay an appropriate interest rate r on this obligation. Debt-holders are assumed senior to the tax-collector, and if the firm has enough tax deductions, it may not pay taxes. If it can not pay bond-holders, the firm is declared bankrupt, bond-holders assume control of the enterprise, and a bankruptcy cost (B) must be paid.

We now describe the cash flows to security holders at time 1, given debt of D and a product price p.

<u>Cash Flows to Bond-Holders</u>:

$D(1+r)$	if $v<v2$
$x(p)[p-(b+v)] - B$	if $v2< v< v3$
0	if $v> v3$

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[7] This paper focuses on pricing decisions, hence we abstract from investment issues. These issues are analyzed in a tax induced framework for instance, in De-Angelo and Masulis (1980), Dotan and Ravid (1985) Ravid (1987) and Dammon and Senbet (1988).

[8] All we really need here is that there should be some tax-advantage to debt, thus personal taxes could be added (see De Angelo and Masulis (1980)). To keep the presentation simple, however, we abstracted from personal taxes and the trade-off for optimal leverage is thus between this tax advantage debt and the cost of bankruptcy.

<u>Cash Flows to Share-Holders</u>:

$$x(p)[p-(b+v)](1-t) - D[1+r(1-t)] + St \qquad \text{if } v< v1$$

$$x(p)[p-(b+v)] - D(1+r) \qquad \text{if } v1<v<v2$$

$$0 \qquad \text{otherwise.}$$

r is the promised interest rate to be defined soon, and v1, v2, v3 are defined below:

$$v1= -[Dr + S]/ x(p)+ p-b$$

$$v2= -D(1+r)/x(p) +p - b$$

$$v3 = -B/x(p) +p- b$$

v1 is a number such that if $v>v1$, the marginal cost of production is sufficiently high so that accounting income is negative. If v exceeds that level, no taxes are paid. If $v>v2$, then the firm is bankrupt, i.e., it can not pay its debt obligations in full. For $v>v3$, nothing is left at all, and bankruptcy costs consume all available cash flows.[9]

The value of the firm is given by equation (1) below, (for convenience of presentation a period 1 future value is shown) where additionally, rF is the risk-free rate of return: If r (the promised rate of return) is to provide bondholders with an expected rate of return equal to the risk-free rate, then it must be computed such that:

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[9] One should note that the above formulation implies that S is greater or equal to D. However, within this framework this is consistent with the tax code. In a one period model the depreciation allowance reflects the value of investment. D is the amount of debt, and tax deductions for interest payments on debt in excess of the initial investment are not allowed by law (see Dotan Ravid (1985),pp.506).

$$w = -B\int_{v2}^{v3} f(v)dv + \int_{v1}^{v3} x(p)[p-(b+v)]f(v)dv$$

$$+\int_{-\infty}^{v1} (x(p)[p-(b+v)](1-t)+Drt+St)f(v)dv - S(1+rF) \quad (1)$$

$$D(1+r)F(v2) + \int_{v2}^{v3} [x(p)(p-(b+v)-B]f(v)dv = D(1+rF) \quad (2)$$

In other words, the expected cash flows to bond-holders must yield an expected risk-free return.[10] If pricing changes are indeed anticipated by bondholders, then p in this equation will be the ex-post optimal p* computed in equation (3) below. If not, it will be the then prevailing p. We should note that if bond holders are fairly compensated for anticipated changed in pricing policies, then there is no analytical difference between firm value maximization as described above and equity value maximization.

The taxes and bankruptcy effects will prevail in either case. We proceed to demonstrate this.

More specifically, we assume the following sequence of events: a firm has taken on leverage D (it could be a simple capital structure change as in Phillips (1995) or could

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[10] We can see from this formulation that risk-neutrality is only a simplifying assumption-if investors are not risk neutral, we will simply obtain a more complicated expression in equation (2). Furthermore,the whole discussion will not change qualitatively if we use the state-prices concept, as in De-Angelo and Masulis(1980).

be an LBO as in Chevalier (1995a), (1995b)). It now faces an optimal pricing decision, given this new level of leverage D. There are no competitors, and no asymmetric information. Yet, as we shall see, optimal pricing will change. In the general formulation we will allow r to change as p changes. However, since from the point of view of the issuing firm r is fixed ex-ante, we will assume in the proposition below that $\delta r/\delta p = 0$. If D changes, however, this change will be reflected explicitly in the interest rate charged. This framework is consistent with the real life setup in the empirical studies we have discussed, in which additional debt may trigger covenants, but pricing changes are not constrained by any explicit agreements. An analysis of the desirability of pricing covenants which can change this reality is deferred to the next section.

Taking the derivatives of equation (1) with respect of p and equating it to 0 yields:

$$\frac{\partial w}{\partial p} = Bf(v2)\frac{\partial v2}{\partial p} + \int_{-\infty}^{v3} (x'(p)[p-(b+v)]+x(p))f(v)dv \\ -t\int_{-\infty}^{v1} ([x'(p)(p-(b+v)+x(p)]-D\frac{\partial r}{\partial p})f(v)dv=0 \tag{3}$$

Since in this paper we take the investment decision as given, the last term is of no analytical consequence.

We now present our main result.

Proposition 1

a) A value maximizing firm will optimally change prices as it takes on more debt even in the absence of strategic considerations or informational asymmetry.

b) Under the scenario described in this section, and if the elasticity of demand in the product market is sufficiently high, then higher leverage will be accompanied by a decrease in the optimal price charged by the monopolist.

Proof:

For part a), we can inspect equation (3) but more precisely, we can show that the cross derivative of w with respect to p and D does not vanish.

By eqs. (3) and (2) and we obtain:

$$\frac{\partial^2 w}{\partial p \partial D} = Bf'(v2)\left(\frac{\partial v2}{\partial D}\right)\left(\frac{\partial v2}{\partial p}\right) + Bf(v2)\frac{\partial^2 v2}{\partial p \partial D} + t\left[\int_{-\infty}^{v1}\left(\frac{\partial r}{\partial p} + D\left(\frac{\partial^2 r}{\partial p \partial D}\right)\right)f(v)dv + \left(r + D\frac{\partial r}{\partial D}\right)f(v1)\frac{\partial v1}{\partial p}\right. \quad \textbf{(4)}$$

If we impose the restriction that the derivative of r wrt p is zero, this derivative still does not identically vanish. QED

Discussion: The intuition of this simple result is that the existence of debt affects the states in which the firm pays taxes, and thus the expected marginal revenue from a change in product prices.

Stated differently, the condition appearing in equation (3) is the familiar marginal condition for optimal pricing. However, the marginal after tax profit is affected by the level of debt.

The proposition implies that we would expect to see firms which change their capital structure subsequently change their pricing policies, even in the absence of any other firms in the business.

This ramification is consistent with the results of Chevalier((1995a),(1995b)) and Phillips(1995).

The second part of the proposition provides a more precise specification of the possible direction of price movements as capital structure changes. It presents of course, only a set of sufficient conditions.

Proof of part b).: We proceed with the assumption of no pricing covenants, i.e. that $\delta r/\delta P = 0$. It is important to note that we do not assume that $\delta r/\delta D = 0$. In other words, debt covenants which are extremely common in practice, are accommodated in the proof.

We note first that $sgn(dp/dD) = sgn\ (\partial^2 w/\partial p\, \partial D)$.

As is quite evident, in the general case this derivative may be ambiguous. However, under the assumptions set forth by our proposition, we can see the following:

Since at v2 the firm is bankrupt, then at least for normal or uniform distributions $f' \leq 0$. By appendix a $\partial v2/\partial D < 0$.

We now come to our elasticity condition. By appendix a, and if r is not a function of p, then a sufficient condition for $\partial v2/\partial p$ to be less than zero is that the elasticity, $| e | > (x(p)p)/D(1+r)$. We note that the condition is not vacuous, since it requires that the number on the left hand side be greater than 1, and monopolies produce generally in the elastic range of the demand curve.

The conditions above establish that the first term is less or equal to zero. It can be easily shown that under our scenario, $\partial^2 v2/\partial p \partial D = (1 + D\partial r/\partial D + r)(x'(p))/x(p)^2$, which is a negative expression.

If r is not a function of p the third term disappears, and the fourth term is negative if the elasticity condition holds. Hence, the entire expression is negative Q.E.D

Discussion: We shall now discuss the intuition of part b). Increased debt provides a higher tax shield. However, if prices increase so that the probability that this tax shield should indeed be used becomes lower, its expected value decreases. Conversely, a "correct" pricing policy can increase the expected value of a debt-related tax shield. The choice of whether one should increase or decrease prices in order to take advantage of the debt tax shield depends on the elasticity of demand. In the proper range, a decrease in prices can bring in more expected revenues and make the loss of tax shelters less likely. On the other hand, if prices are lowered in the wrong elasticity range, then revenues will decrease, precipitating a loss of tax shelters.

A similar argument relates to bankruptcy. The probability of paying the bankruptcy cost is affected by both the amount of debt and the pricing policy. Here these two interact, and again, the impact of changes in prices is affected by the elasticity of demand.

As noted, in theory bond-holders may be able to "price" product price changes away by requiring an appropriate rate of return according to equation (2). However, first, similar to Myers (1977) we would still observe price changes after leverage changes, and second, in the absence of covenants, and given the ease of price changes, one would find it surprising if in reality all changes were correctly anticipated.

We can compare proposition 1 to the study which tested similar issues, namely Phillips (1995). Phillips (1995) calculated elasticities of demand for several industries and documented price responses following a substantial increase in leverage. In three out of the four industries he studied, quantity decreased (price increased) as leverage went up. The fourth, the gypsum industry, had a somewhat less statistically significant quantity increase (price decrease). Demand in all cases seemed rather inelastic which is broadly consistent with our model. Although we could only prove that elastic demand should lead to price reductions following an increase in leverage, the logical counterpart would be that inelastic demand should lead to price increases in such cases.

Similarly, demand for groceries tends to be rather inelastic[11], and hence price increases following LBO's as documented by Chevalier (1995a) are also broadly consistent with our model.

IV. PRICING COVENANTS

In this section we consider an issue which complements the previous analysis. If pricing changes can be anticipated, how should they affect ex-ante interest rates. In the real world, this setup most closely corresponds to rate covenants for utilities.

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[11] A study by Connor and Peterson (1992) cited elasticities for processed food products in the range of 0.065 to 0.381.

Since utilities are regulated, changing prices requires regulatory approval and thus is easily monitored. Many debt contracts indeed include rate covenants. Such covenants specify (rather broadly) that prices, or rates to customers, should be set so as to satisfy bondholders claims.[12]

Our framework enables us to analyze the structure of such covenants. Namely, we specify below how product market pricing should affect the promised rate of return on debt issued. The second application of the subsequent analysis may be as an extension of the empirical studies of Chevalier(1995a, 1995b) and Phillips (1995). We should be able to test whether following pricing changes, yields on debt obligations of the companies in question indeed change in the direction proposed below. The only difficulty with this empirical design is that if pricing policies were anticipated, yields might already reflect these price changes, and thus may not move much. In practice, it is hard to believe that all pricing policies are fully anticipated and hence some effect can be expected.

Formally, we can state the following:

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[12] This is done either by specifying that rates should be sufficiently high so as to meet all expenses, or by providing for a safety margin above debt service. (see Fundamentals of Municipal Bonds (1990)). A typical covenant reads (Massachusetts Water Resource Authority series A January 1990) "..the authority covenants that for each fiscal year it will fix and adjust the rates and charges at least sufficient.. i) to pay all current expenses ii) to pay all debt service"

Proposition 2

For a sufficiently low bankruptcy cost, and a sufficiently low (in absolute value) elasticity of demand, bond-holders should require a lower (promised) interest rate as share-holders increase the price they charge in the product market. If B is sufficiently low, but elasticity is sufficiently high, then an increase in price will be followed by an increase in the required promised rate of return.

Proof:

From appendix a equation (8) we obtain that as B gets closer to zero, the partial derivative of r with respect to p approaches:

$$\frac{\partial r}{\partial p} = \frac{-\int_{v2}^{v3} [x'(p)(p-(b+v))+x(p)]f(v)dv}{DF(v2)} \tag{5}$$

The expression in square brackets which determines the sign of the entire derivative can be written as

$x(p)\{e - x'(p)(b+v)/x(p) + 1\}$ where e is the elasticity of demand.

The expression in the middle is clearly positive. Hence, if e is -1 or closer to zero, or else less than -1 but sufficiently small in absolute value (a monopoly would not usually produce in the inelastic range), then the entire integral is positive and

$\partial r/\partial p < 0$. Similarly, if the elasticity if sufficiency great, then the expression above turns negative, and the derivative is positive. QED.

If bondholders anticipate price changes, they will require fair compensation in the rate of return on debt. If elasticity is high, an increase in product prices will mean decreased revenues, and hence debtors should require a higher promised rate of interest. However, if conditions are as stated in first part of the proposition, and demand is fairly inelastic, an increase in price will not require an increase in the promised rate of interest. The assumption of a low bankruptcy cost is required to make bankruptcy less of a traumatic experience-if this cost is very high, then bondholders will typically require a high rate of return, and some of the conclusions above may be reversed. We should note that the conditions described in the proposition are indeed very similar to real life utilities. They generally have (even accounting for well publicized failures such as Orange County) a low probability of default and also, traditionally, have carried much more debt than the typical industrial firm. Also, the elasticity of demand for electricity or gas tends to be low [13] Therefore, the set of sufficient conditions in part a) seems to hold and we can form the hypothesis that in the presence of rate covenants, utilities may be able to lower the cost of borrowing if they are able (allowed) to increase the rates they charge customers. Since the

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[13] See for instance, Itteilag (1985) who estimates the demand elasticity for gas utilities in the U.S. and obtains an average of -0.17. Branch (1993) estimates residential demand elasticity for electricity using household panel data. His number is -0.20.
Similarly, Zarnikau (1990), who examines short run demand responses of large industrial users, obtains a figure of -0.09.

conditions are only sufficient, further empirical implications must rely on the set of existing market conditions.

Another testable hypothesis regards, as noted, changes in the yield on companies' debt following significant pricing changes. Of course, we must assume that not all changes are anticipated ex-ante. This can be tested for instance, on companies included in the Chevalier (1995a) or Phillips (1995) samples.

V. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has demonstrated that the linkage between leverage and product pricing policies found in recent empirical studies, may be explained using a simple interaction model based upon taxes and bankruptcy considerations. While not providing a complete debt pricing model, we are able to predict shareholders' optimal actions following an increase or a decrease in the amount of debt issued. We also show that interest rates on debt should be affected ex-ante by anticipated changes in product pricing. Similarly, if debtholders can monitor and enforce changes in debt contracts, then un-anticipated product pricing changes will be followed by contract re-negotiation. This discussion, and the empirical evidence leave unresolved the question of why no attempt has been made to incorporate some type of pricing covenants into debt contracts of industrial firms. We find little or no mention of such covenants in the few empirical papers addressing the subject (see for example, Kalay (1979), Malitz (1986) or Kahan and Tuckman (1993)) in reading debt indentures or even in the theoretical literature (recent examples include Rajan and Winton (1995) or Kahan and

Tuckman (1993) and Berlin and Mesner (1992) analyzing private and bank debt). Yet, it seems that such covenants may significantly affect the welfare of bondholders. Since pricing involves complicated contracts and can be different for different customers, pricing covenants may be harder to monitor or enforce. However, both the theoretical models and the empirical regularities seem to indicate that some price monitoring, say, a limitation on price reductions or increases for the most significant products of firms, may be a useful addition to the numerous covenants a typical bond offering features.

APPENDIX A: Calculations of derivatives of limits.

$$\frac{\partial v1}{\partial p} = \frac{(Dr+S)}{x(p)^2} x'(p) + 1 - \frac{D\partial r/\partial p}{x(p)} \tag{6}$$

$$\frac{\partial v2}{\partial p} = \frac{-D\ \partial r/\partial p}{x(p)} + \frac{D(1+r)x'(p)}{x(p)^2} + 1 \tag{7}$$

$$\frac{\partial r}{\partial p} = -\frac{\int_{v2}^{v3} [x'(p)(p-(b+v)) + x(p)]f(v)dv + Bf(v2)\ \partial v2/\partial p}{DF(v2)} \tag{8}$$

The derivatives with respect to D are much simpler and can be unambiguously signed.

$$\partial v1/\partial D = -(r + D\partial r/\partial D)/\ x(p) < 0 \tag{9}$$

$$\partial v2/\partial D = [-(1+r) - D\ \partial r/\partial D]/\ x(p) < 0 \tag{10}$$

$$\partial v3/\partial D = 0 \tag{11}$$

In other words, all limits, except v3, decrease with increased debt.

REFERENCES:

Allen, F.(1987) "Capital Structure and Imperfect Competition in Product Markets" Discussion paper, University of Pennsylvania.

Berlin, M. and L. Mesner (1992) "Debt Covenants and Renegotiation" Journal of Financial Intermediation, 2, pp. 95-133.

Bolton, P. and D.S. Scharfstein (1990) " A Theory of Predation Based on Agency Problems in Financial Contracting" American Economic Review, 80, pp.93-106.

Branch, E.R. (1993) "Short Run Income Elasticity of Demand for Residential Electricity Using consumers Expenditure Survey Data" Energy Journal, 14(4) pp.111-121.

Brander, J. and T.R. Lewis(1986) "Oligopoly and Financial Structure: the Limited Liability Effect" American Economic Review , December, pp.956-970.

Brander, J. and B. Spencer (1989) "Moral Hazard and Limited Liability: Implications for the Theory of the Firm " International Economic Review, 30, pp. 833-849.

Chevalier,-J, A. :(1995a) Do LBO Supermarkets Charge More? An Empirical Analysis of the Effects of LBOs on Supermarket Pricing Journal-of-Finance; 50(4), September, pages 1095-1112.

Chevalier,-J, A. :(1995b) Capital Structure and Product Market Competition: An Empirical Study of Supermarket LBO's American Economic Review; 85,June, pp. 415-435.

Connor, J.M. and E.B. Peterson:(1992) "Market Structure Determinants of National Brand Private Label Price Differences of Manufactured Food Products" Journal of Industrial Economics, June, 40(2) pp. 157-171.

Dammon, R. and L. Senbet(1988) "The Effects of Taxes on the Interaction between Production and Finance" Journal of Finance, June, pp.357-374

De-Angelo, H. and R.W. Masulis(1980) "Optimal Capital Structure Under Corporate and Personal Taxation"Journal of Financial Economics March, pp.3-29

Dotan, A. and S.A.Ravid(1985) "On the Interaction of Real and Financial Decisions of the Firm Under Uncertainty" Journal of Finance, June, pp.501-517.

Dybvig,P.H. and Zender,J.F. (1991) "Capital Structure and Dividend Irrelevance with Asymmetric Information" Review of Financial Studies, 4(1), pages 201-19.

Fundamentals of Municipal Bonds Public Securities Association, Fourth Edition, 1990

Gertner,R. R. Gibbons and D.S. Scharfstein (1988) " Simultaneous Signalling to Capital and Product Markets" Rand Journal of Economics, 19, pp. 173-190.

Hite, G.L.(1979) "Leverage, Output Effects and the M-M Theorems", Journal of Financial Economics, March, pp.177-202

Itteilag, R.L. "An Analysis of Actual and Forecasted Conservation in the Residential Gas Space Heating Market" in Analyzing the Impact of Regulatory Change in Public Utilities, M. Crew, Editor, Lexington Books, 1985.

Jensen M. and W. Meckling(1976) "Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure" Journal of Financial Economics, October, pp. 305-360.

Maksimovic, V.(1988) "Capital Structure in Repeated Oligopolies" Rand Journal of Economics, Vol. 19 #3, pp.389-407.

Malitz, I. (1986)"On Financial Contracting: The Determinants of Bond Covenants", Financial Management, Summer.

Myers, S.C. (1974) "Interaction of Corporate Financing and Investment Decisions-Implications for Capital Budgeting" Journal of Finance March, pp.1-25

Myers, S.C. (1977) "Determinants of Corporate Borrowing"Journal of Financial Economics, November, pp.147-176.

Phillips, G.M. (1995) "Increased Debt and Industry Product Markets- An Empirical Analysis" Journal of Financial Economics, 37, pp. 189-238.

Ravid, S.A. (1987) "Safety First, Bankruptcy and the Pricing and Investment Decisions of Firms", Economic Inquiry, October, pp.695-706.

Ravid, S.A. (1988) "On Interactions between Production and Financial Decisions", Financial Management, Fall, pp.87-99.

Rajan, R. and A. Winton(1995) "Covenants and Collateral as Incentives to Monitor" Journal of Finance, September, pp. 1113 -1146.

Titman, S.(1984) "The Effect of Capital Structure on the Firm Liquidation Decision"

Journal of Financial Economics, March, 13, #1, pp.137-152.

Zarnikau, J. (1990) "Customer Responsiveness to Real Time Pricing of Electricity" Energy Journal, 11(4) pp. 99-116.