

The M&M Propositions 40 years later

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Keywords: *debt, taxes, capital structure*

JEL classification: *G3, G31, G32.*

Some months ago I was being deposed as an ‘expert economic witness’ in a law suit where our side was advancing, among other things, the view that a firm, not actually run by known thieves ready to abscond, could always raise additional equity capital. The firm might not *want* to raise more equity capital, but, in principle, it could. That’s basically just a straightforward, implication of the M&M perfect capital market assumption, I noted.

As I was trying to explain that point in the course of my deposition, the attorney for the other side suddenly cut in and asked: ‘Professor. Do you or do you not believe the M&M Propositions are true?’

Fortunately, you cannot really be held to simple yes or no answers in a deposition. And I hope my inevitably longer answer to the opposing attorney can serve at least as a useful takeoff for my remarks today on the M&M Propositions and where they appear to stand.

Let us first be clear what the M&M Propositions are that we are talking about. *I* will mean essentially the three capital structure propositions in the original 1958 article. Though I am sure no one here needs to be reminded, Proposition I, which is really the key to all the others, is the invariance proposition that the value of a firm, in the sense of the total value of its securities, depends only on the earning power and risk of its operating assets and not at all on the debt/equity composition of the liabilities. Otherwise, the capital markets would be out of equilibrium and arbitrage opportunities would exist. Proposition II goes on to show that if Proposition I holds, the expected return on levered shares will be a linear increasing function of leverage. And Proposition III—which is the one that figures most directly in the law suit—says, in effect, that the cost of capital, in the sense of the minimum expected rate of return required for a project to be just worth doing from the perspective of the current stockholders, is a property of the project and its risk, and not of the particular securities that happen to be used to finance it.

I call these the *capital structure* propositions to distinguish them from the M&M dividend propositions though, as I pointed out in my 1988 survey article, even the dividend propositions are really subsumed under the capital structure

*Keynote address presented at the European Financial Management Association (EFMA), Istanbul, Turkey, 24 June 1997.

propositions. After all, one way to increase your corporate leverage is to raise new debt and use the proceeds either to pay a dividend, or better yet, to buy back shares. This part of the M&M message is by now reasonably well understood even by most corporate CFO's; so to avoid unnecessary distractions, I will say little about dividends from here on out and focus mainly on the capital structure issues.

After describing the Propositions under discussion, I went on to point out immediately to the opposing lawyer that those Propositions were *conditional* propositions. They say that if you accept the specific assumptions we made about the nature of the capital markets, and about what we would call today the nature of the information structure, then you must accept the conclusions. The M&M Propositions follow logically from the assumptions and in that sense they are certainly true.

Having said that our conclusions followed rigorously from our assumptions, I could not help but remember a bit ruefully, that although Franco Modigliani and I were surely seeking to derive our propositions logically from the assumptions, we did not in fact quite get those derivations right in all particulars the first time around in 1958. We made a big mistake on the matter of how firm value is affected by interest deductibility under the corporate income tax. We also goofed a bit on precisely how the expected yield on levered equity changes as the level of leverage increases. These errors have since been corrected in subsequent articles by ourselves and others and I think it is fair to say that as of today, no doubt exists within the finance profession that the M&M Propositions are true in the sense that they do indeed follow logically from the assumptions.

At that point the opposing lawyer got a gleam in his eye and asked: but what if the assumptions underlying the derivatives are false? Doesn't that mean that the M&M Propositions are false?

No, I said, with mock sadness. You still do not seem to understand the principles of scientific inquiry. The minute you start questioning the assumptions underlying a model you leave the world of pure logic behind. You have gone from deduction to induction, from an ideal world to the empirical world where terms like true and false no longer apply. On empirical matters, you cannot speak of anything as simple as right or wrong, but only of the degree of accuracy of the predictions of the model. And for judging the accuracy of the *predictions*, the literal accuracy of the assumptions is beside the point.

For the M&M Propositions, then, as for any other scientific theory, it all comes down to the question of 'goodness of fit', and that alas cannot be given any simple, one word or even one line answer. How good a fit is depends on the specific context and on the specific purpose in asking the question. Worse yet, cases can arise where, in one and the same general context, the fit is very good for some purposes and very bad for others.

Consider, for example, tests of the Put-Call Parity Theorem for options, which, as I explained in my 1988 30th Anniversary paper is just the M&M Proposition I in a strange disguise. Empirical research has shown that the Put-Call Parity Theorem, and hence by implication, M&M Proposition I holds for options up to two decimal places. That is certainly a conspicuous empirical success as the predictions of economic theories go, but may still not be close enough for real-world traders seeking to convert calls into puts. Those traders might still be able to find violations of M&M Proposition I, and hence find

profit opportunities from conversions in the tiny space between two and three decimal places!

The case of the Put-Call Parity Theorem helps explain also why so many researchers, myself included, long ago came to regard *direct* tests of the M&M Propositions as an essentially unpromising line of activity. To test something like M&M Proposition I *directly* means showing that for a given underlying real asset value (for the same firm or cross-sectionally across equivalent firms) different capital structures were associated with no systematic differences in aggregate market values. Fine. But how do you hold real underlying asset value constant? How do you even measure it? The Put-Call Parity case is easy because the relevant underlying is just the price of the stock, which is directly observable. But what is the true underlying for something as complicated as a firm? And how can we be sure it really is being held constant when so much else is changing at the same time?

I am not suggesting, of course, that meaningful tests of at least the major implications of the M&M Propositions cannot be constructed. If the simple, one-equation multiple regression models we have become so accustomed to in ordinary empirical research in finance are not up to the job, then other approaches to data analysis must be tried. Fortunately a recent series of papers by Eugene Fama and Kenneth French, now provides at long last just the kind of innovative data analysis needed for an empirical calibration of the goodness of fit of the M&M Propositions and especially of their key implication that a firm separation can be drawn between the real investment decisions by firms and their financial decisions (Fama and French, 1997a).

Fama and French bring a massive data base to bear on the issue of interaction between investment and financial variables: virtually all NYSE, AMEX and NASDAQ firms on Compustat (over 2,000 firms) for the 28-year period 1965–92. The two major financial variables considered by Fama and French are dividends and leverage, for both of which the M&M, perfect-market model predicts no systematic relation with investment. And that is exactly what Fama and French find. Dividends, they show, are well described by the target payout/speed of adjustment models first noted by John Lintner in the 1950s in which dividends depend on current earnings and last year's dividend. And, more to the point, no evidence exists either that significant numbers of firms depart from their Lintner paths to finance surges in investment from internal funds by cutting dividends (as suggested, say, by some so-called pecking order theories); or that faced with a surge in investment opportunities, but not in earnings, firms will cut their investment outlays rather than cut their dividends. By and large, firms choose to hold to their Lintner dividend paths and their investment plans, financing the investment by outside borrowing and repaying the borrowing when investment opportunities disappear. Borrowing, in effect, serves as the financing residual for investment. Although debt serves as the residual, Fama and French find that firms do tend to have 'target' debt ratios that vary substantially cross-sectionally. Over time, leverage is mean reverting but not so rapidly as to weaken the ability of debt to accommodate to variations in earnings and investment. Certainly nothing in the data indicates that high debt ratios tend to *deter* investment as many post (and pre) M&M theories of capital structure would suggest. And that is a key, perhaps *the* key, implication of the basic M&M 'separation' between real economic activity and the financial superstructure.

The M&M model does not emerge completely unscathed, however. Fama and French find that higher target leverage (as measured by interest coverage) is associated with lower pre-tax profitability—confounding thereby both the Jensen free-cash flow story that firms with high profitability assume high interest burdens to keep managers from wasting resources on unprofitable projects; and the M&M 1963 story that profitable firms will want to leverage up to reduce their corporate income tax liabilities.

Problems with the tax predictions of the M&M models are nothing new, of course. I have argued for many years, as my former students will testify, that the unintegrated corporate income tax is a functionless anomaly in our economy and will eventually be driven out by an endogenous response of the system itself rather than as a result of deliberate Congressional repeal, though that would be even better. But that is most unlikely because repeal would be both budgetarily expensive and politically incorrect. Sam Donaldson and others like him believe the corporate income tax is a tax on the rich. It is a tax on corporate profits, isn't it? Says so right in the name. And the rich own the corporations, don't they? As I need not remind this audience, however, the real incidence of the corporate income tax has never been satisfactorily established by economists, though much circumstantial evidence suggests that like taxes on capital generally, it falls on all of us as consumers and workers in the form of lower economic growth and a lower standard of living.

The endogenous freezing out of the deadweight tax that the M&M model predicts can in fact readily be discerned in the data. In 1946, when I left the Corporate Tax Section of the Treasury's Division of Tax Research, the tax take under the corporate income tax was roughly 75% of the take from the personal income tax (and 4% of the GDP). That ratio of relative tax collections dropped steadily thereafter—and not because of corporate tax rate cuts, which remained in the 40–50% range right down to the middle '80s. By 1958, when the M&M Propositions were first published, the ratio of corporate taxes to individual taxes had fallen to 58%; and by 1962, when our tax-corrected model appeared, the ratio had fallen further to 45%. The drying up of the corporate tax predicted by M&M continued steadily thereafter, but oh so slowly. By 1976 the ratio had fallen to 31%, less than half its peak value right after the war, but still far too high to make much economic sense, at least to me. The standard finance explanation that we were seeing a conscious and well-considered trade-off between the tax benefits of borrowing and the expected costs of bankruptcy was hard to take seriously. The relative numbers were just too far out of line. Firms in 1976 were throwing at the government \$40 billion in corporate taxes, a sum that would cover the true deadweight costs of all bankruptcies for decades. There had to be something else at work.

In my Presidential Address to the American Finance Association in 1976 I wondered whether the continued presence of corporate income tax payments by corporations might trace to interactions between the corporate income tax and the personal income tax, in particular, the very substantial tax differentials under the personal income tax between capital gains and ordinary income. I presented a model showing that for firms seeking to maximize shareholder wealth, the virtual exemption of capital gain income at the personal level might well offset the advantage of deducting interest at the corporate level and including interest as taxable income at the personal level.

Whether tax differentials of that sort were indeed substantially reducing the pressure on corporations to leverage away their corporate tax liabilities is still a contentious issue and I do not propose to go into the matter further here. Suffice it to say only that a recent comprehensive, multi-country cross sectional study by my colleagues Ragu Rajan and Luigi Zingales (1995) suggests that personal income tax considerations do help explain—and notice I said help explain, not explain—differences in average leverage ratios across countries. The fact that substantial differences in average leverage ratios across firms and countries do exist is itself, of course, more consistent with M&M model invariance predictions than with optimum capital structure models based on bankruptcy avoidance.

The tendency of the US corporate sector to squeeze the corporate income tax out of its craw continued after 1976, though at a somewhat slower pace, reaching a minimum of 14% of the individual income tax take (and only 1½% of GDP) in 1984. By 1985, it looked like the end might in fact be near, because the comprehensive tax overhaul of 1985 greatly reduced the relative tax advantage of capital gains under the personal income tax. By my logic, therefore, the tax advantages of corporate leverage should thereby have been noticeably increased. The disappearance of the corporate income tax should have accelerated. But it hasn't. Since 1985, the ratio of corporate tax payments to individual tax payments has slowly, but steadily been increasing. Part of this is just an illusion because the government statisticians insist on treating as corporate tax receipts, the paybacks the Federal Reserve System has to make to the Treasury of its huge interest earnings on the Treasury debt it holds. Even after making the necessary subtractions, however, the trend of corporate income tax payments since 1985 is still up and the level has reached roughly 23% of personal income tax payments in 1997 as compared with its low of only 14% in 1984.

From an M&M perspective, of course, this persistence of the corporate income tax is even more puzzling in 1997 than it was 20 years earlier in 1976. Thanks to developments in the capital markets—marketable high yield bonds, for one thing, and hundreds of derivatives based strategies that have blurred the legal and accounting distinctions between debt and equity—it is easier than ever before to reduce corporate income tax payments (and, as I have argued elsewhere, it never really was all that hard even back in 1976). So why do US corporations, in utter disregard of the M&M logic, continue to hit themselves on the head to the tune of what could be as much as \$150 billion a year in unnecessary taxes?

Perhaps the recent reversal of the long-term downward trend in the corporate tax to personal tax ratio is only transitory. Corporate profits as a fraction of National Income, after all, are running at an all-time high so we may be seeing simply the lagged adjustment of leverage (and hence of corporate taxes) that Fama and French describe. Before taking this easy way out, however, should we not at least look first to theories of capital structure other than the M&M models for explanations of what seems to be a growing corporate income tax burden? Certainly a huge post-M&M literature has emerged over the last 20 years; and while that literature has tended to focus on questions of existence—why we have bonds at all, say, rather than why we do not have more bonds (or less bonds) in the aggregate than we actually see—broader implications for market supply can also sometimes be derived.

Much of the post-M&M theorizing, for example, stresses that management knows more about the firm and its prospects, in effect, than outside investors do, in contrast to the M&M assumption that the firm operates under what bridge players would call double-dummy rules where all the cards are face up on the table. The presumed informational advantage of the management can be shown, among other things, to increase the transaction costs of raising equity capital. How can outside investors be sure, after all, that the current owners are not just seeking to off-load some of their interest in the corporation at prices higher than they know to be really warranted by the true fundamentals? Given these natural suspicions, perhaps the decision to stay underleveraged, at least by M&M standards, may be a conscious choice on the part of firms to avoid equity flotations by maintaining a buffer stock, as it were, of untapped borrowing power for quick access in case of sudden need. Certainly, Fama and French do find debt playing just such an adaptive role in responding to surges in investment demand, given earnings and to shortfalls in earnings, given investment. But Fama and French also find no evidence that high leverage inhibits firms from raising more debt funds when they need to. At present leverage ratios, huge amounts of potential leverage slack would seem available, particularly when you remember that Fama and French also find that some 13% of US corporations report no leverage whatsoever!

A second, and perhaps even larger stream of post-M&M theoretical research, has focussed on agency costs to the shareholders of different financial instruments and arrangements, in contrast to the M&M exclusive focus on the cash-flow consequences. Once agency costs are recognized, a firm's managers must be presumed to be maximising their own utility functions rather than maximising the value of the owners' equity as in the M&M models. If so, managerial debt-aversion might be understandable. After all, if the firm becomes distressed the costs to the stockholders may be small, but the managers may wind up fired!

The possibility that managers might let their own interests override that of the shareholders was something that Franco Modigliani and I were certainly aware of back in 1958 and through all our subsequent revisions and extensions; and we knew that anecdotal evidence of non-value maximising behaviour by under-diversified managers would always be easy to come by. But we doubted that such nonoptimizing behaviour would lead to *systematic* departures from the model. We believed that the stockholders would learn to solve, or at least greatly to mitigate any excessive risk aversion of their managers by appropriate compensation and incentive mechanisms. The stockholders, after all, could always persuade the managers to act more like stockholders by giving the managers stock or stock appreciation rights or stock options of any of a number of kinds. Given the defences available to stockholders to recapture value they believe belongs to them—including defences such as large-shareholder influence and hostile takeovers by outsiders—it is hard to believe that a sum as large as \$150 billion a year would be left lying on the table.

Which brings me to still another possible explanation for what seems like non-optimal behaviour, but one that I am most hesitant to bring up: perhaps the managers may not always understand what the true cost of capital to their firm really is! Immediate plausibility is lent to this view by the evident capture of the finance function and the CFO position in so many corporations by accountants.

The practice of finance, these days, is driven by CPAs, not by the MBAs who take our finance courses. Do not misunderstand me, however. Accountants are surely indispensable. But the very task of mastering their technical skills may keep them from seeing what the game is actually all about. As accountants, they come to believe that what shows on their books is not only more important than economic reality, but that their books *are* economic reality. Hence their obsession with simple, computable one-dimensional concepts like earnings per share or debt ratings rather than concepts more difficult to get a handle on like shareholder value.

Getting accountants to think in terms of shareholder value rather than earnings per share or debt ratings is further complicated by the absence of any easy examples for CFOs to imitate when it comes to capital structure choices. We do not have controlled experiments in economics or finance, unfortunately. When a firm announces a change in its capital structure or in its dividend policy (which, as noted earlier, is also a form of capital structure change), so much else may be changing at the same time, at least in the minds of the observing outside public, that the true source of any change in shareholder value cannot be identified. Fama and French, in fact, make precisely this point in a paper that follows up their work cited earlier. They conclude that 'dividends and debt convey information about profitability ... and that this information about profitability obscures any tax effects of financing decisions' (Fama and French, 1997b). If you do not believe Fama and French that information effects can obscure other effects, just wait until some firm unexpectedly raises its dividend. If the stock price also happens to rise, as it often will, try telling the CFO that dividends have no effect on stock prices! You will not convince him merely by telling him about information effects. I know, I have tried.

On the other hand, perhaps interest payments really have been crowding out tax payments, but I am not measuring the displacement accurately enough. My colleague Mark Mitchell, for example, on spinning the Compustat tapes, notes that corporate income tax payments recorded for 1958, when the M&M papers were first published, were running at 5.3 times interest payments; that they had fallen to 2.1 times interest payments by 1976; to rough equality with interest payments by the tax reform watershed year of 1985; to little more than 50% of interest payments by 1991; and back up, but still only to 90% of interest payments by 1994, the most recent year for which we have Compustat data. And these estimates of the drift are conservative because many of the firms in the leveraged buyouts and hostile takeovers of the '80s and '90s may no longer be listed on Compustat. But in the other direction, some part of the observed drop in the payments relative to interest payments may well have occurred anyway, even apart from any deliberate actions by corporations to increase their reliance on borrowing. Remember that the level of interest *rates* now is also substantially higher than it was during the '50s, '60s and '70s. The rough calculations I have so far been able to do suggest that distinguishing between movements along the curve and movements of the curve will not be easy.

Clearly these and other possibilities must be carefully checked out if we are to account for what to me is the stubborn persistence of such large corporate income tax payments, in the face both of the opportunities and the incentives firms have to reduce them. But I do not propose to do so here. I will instead take my cue from the archeological curators of the tomb of Chin Shi Huang Ti,

the first Chinese emperor. Those scholars have wisely chosen to cease further excavations of the still vast unexplored parts of the site because they believe it important always to leave some unfinished work for the next generation. And, so do I.

References

- Fama, E. and French, K., 'Investment, Dividends, Debt and Earnings', University of Chicago, Graduate School of Business, May 1997a.
- Fama, F. and French, K. 'Taxes, Financing Decisions, and Firm Value', University of Chicago Working Paper, May 1997b, p. 22.
- Ragan, R. and Zingales, L., 'What do we know about capital structure? Some evidence from international data', *Journal of Finance*, Vol. 50, 1995, 1421–60.

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