Merton Miller

The Father of Modern Financial Analysis

David Emanuel

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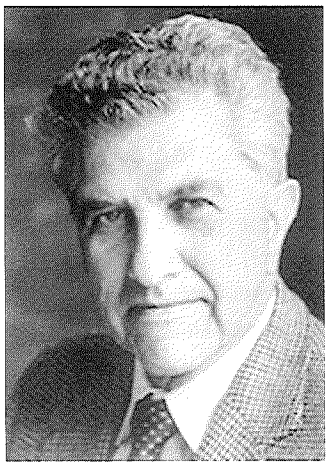
More than any other academic, Merton Miller, the Nobel prizewinner in Economics who died in Chicago on Saturday 3 June, was responsible for transforming finance into the discipline it is today.

Before Miller, it was taught descriptively. Finance lectures consisted of discussions of legal arrangements like the contents of legislation, or contracts like debenture trust deeds, or descriptions of institutions or processes like how an initial public offering might be made.

There was no conceptual framework—no 'theory' if you will. Miller, and others, changed all that.

He will be primarily remembered for the M&M (Modigliani and Miller) theorems, which students have had to confront for the last thirty-plus years. For many students and practitioners these theorems are disconcerting as they are largely about the irrelevance of characteristics of finance—capital structure and dividends, in particular—that many thought were not only relevant but also central.



Merton Miller 1923-2000

In the Chicago tradition

More recently, Miller turned his attention to policy issues, particularly the regulation of derivatives markets like the Chicago Mercantile Exchange.

Miller is part of a longstanding Chicago tradition and ethos that actively supports market solutions to economic problems. His analysis of the crash of 1987, and the mini-crash of 1989, demonstrates that neither portfolio insurance nor index trading were to blame. He has been an advocate of derivatives, indicating that innovations in traded derivative securities have enabled much more sophisticated, and much cheaper, approaches to risk management to be carried out.

Miller also emphasised the importance of derivatives for price discovery. In response to critics who have pointed to the large losses that some have experienced in derivatives trading, he points out that some people will always find ways of losing money (particularly other people's), and that banks have lost far more on real estate deals that have turned sour than they have ever lost on derivatives.

On the Asian financial crisis

Miller's insights are applicable beyond the traditional domain of corporate finance, as his contribution to an understanding of the causes of the Asian financial crisis demonstrates.

His analysis suggests that interest rate and dual currency risks (in essence, borrowing US dollars or yen short-term,

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and investing long-term in the local currency) were major factors. But the most important factor of all was that the short-term loans were provided mainly by Japanese banks, which were already confronting substantial loan losses.

In attempting to alleviate that internal crisis, the Japanese tried to reduce short-term interest rates. The flipside to a lower yen value was a higher dollar value. Currencies linked to the dollar then appeared to be overvalued, and as their balance of payments deteriorated, the currencies attracted the attention of the George Soros's of the world.

Blaming Soros is therefore a bit like blaming the undertaker for the funeral.

Miller blames the crisis on bank myopia in Asia—i.e. the failure to write-off bad debts, and the failure to raise the additional capital required because that money would almost certainly have had to come from 'foreigners', which would have meant the sharing of power. Miller concluded by saying

> A way of endowing both bankers and regulators with the right incentives both to finance industry and to avoid catastrophic collapses—we haven't solved that problem. It's unsolved now, nor will it ever be, I'm afraid, given the moral hazards posed by absurdly high leverage ratios in banking, by deposit insurance, by the doctrine of 'too big to fail', and by the increasing likelihood that the IMF—at least until it runs out of money—always stands ready in the wings to bail out bad banks and bad creditors generally.

Some local politicians could also take heed of these words

> If you look only at exports, you don't see the fact that you are making imports much more explosive, as they are learning in Korea and other places. Make import prices more expensive, eventually the workers realise that in the long run you don't gain by devaluations. A phrase I always use is 'If devaluations could make a country rich, Argentina would be the richest country in the world.'

It is the size of the pizza that matters, not how many slices it is cut up into—a feature some politicians also need to be reminded of from time to time.

The academic legacy

Boston born, Miller completed his undergraduate degree at Harvard University. He received his PhD degree from The Johns Hopkins University, after working in the US Treasury Department, and in the Division of Research and Statistics of the Board of Governors of the Federal Reserve System.

His first academic appointment was at the London School of Economics. From there he went to the Carnegie Institute of Technology (now Carnegie-Mellon University), where he worked with Franco Modigliani. In 1961 he joined the Graduate School of Business (GSB) at the University of Chicago, where he stayed until his retirement in 1993. He continued to teach there until very recently, and details of his course on Financial Regulation are still available from the Chicago GSB web site.

It was with the M&M theorems, however, that Miller really left his mark in academia.

The major conclusion of the first M&M theorem is that a firm's value is determined by its investment decisions and not by its financing decisions.

Value is created by looking at the assets side of the balance sheet. It is the size of the pizza that matters, not how many slices it is cut up into—a feature some politicians also need to be reminded of from time to time. M&M's contribution was through the proof that they provided, based on the simple notion of arbitrage, that identical financial instruments (or combinations of instruments) will sell at the same price (or the same aggregated price).

For example, if an investor does not like risk, he or she could invest in a company that has no debt. Alternatively, the investor might be able to buy a fixed percentage of the debt and the equity, and hence 'neutralise' the impact of debt in the capital structure. Or an investor who is less risk averse could either buy shares in a levered company, or alternatively borrow on personal account and buy shares in an unlevered company.

M&M were able to puncture a fallacy that is as dangerous today as it ever was. They were able to demonstrate, in a very simple way, the mistake associated with the view that debt is 'cheaper' and hence increased leverage must lower the cost of capital of the firm. Debt is not cheaper, as the more debt that is used, the higher the return that shareholders will expect. M&M gave us a structure (and the behavioural argument of arbitrage) to quantify all of this.

The shareholders' required rate of return would consist of a rate of return if the company had no debt (which is

the rate of return required from the assets), plus an addition for financial risk associated with leverage. That add-on is equal to the debt/equity ratio, multiplied by the difference between the rate of return from the assets and the debt rate.

So if the rate of return on assets is 10%, the debt rate is 8% and the debt/equity ratio is 50:50. The shareholders' required return is (not surprisingly) 12%, consisting of 10% to take into account the operating risk characteristics of the firm, plus another 2% compensation for financial risk. If the debt/equity ratio changes to 60:40 to use more of the 'cheaper' 8% debt, shareholders revise their required return to 13% for the additional financial risk they confront, and the average cost of capital stays unchanged at 10%.

'If devaluations could make a country rich, Argentina would be the richest country in the world.'

From here, the next step was to show the irrelevance of dividend policy. Share prices will fall by the amount of the dividend when the dividend is paid. Increasing payout just reduces share value (in their perfect market world) by the same amount, so total returns to shareholders are unaltered, just repackaged. In essence, you cannot have your cake and eat it too.

But M&M made it clear that they were not talking about dividend announcement effects—dividends announcements have a capacity to signal information about future earnings.

Of course, like any theorem, it is based on assumptions and the assumptions here are those of perfect capital markets. There is an obvious advantage in starting with a simple case. If we can understand it well, we can then relax the assumptions to see what, if any, differences we can expect to see in the 'real world.'

On corporate taxes

Capital markets are not perfect, and one reason for this is the presence of taxes. So M&M then tackled the question of corporate taxes. Their conclusion was that corporate taxes do matter, as interest is a tax-deductible expense. The government is subsidising companies for having debt in their capital structure and someone will benefit. Here it will be the equity holders. So it is not that debt is 'cheaper' *per se* that makes the difference, but rather that it is subsidised by the government.

The value of the levered firm will be greater than the value of an equivalent unlevered firm (that is, a firm with the same assets) by the corporate tax rate multiplied by the value of the debt, provided we assume debt is constant and in perpetuity. For example, if the tax rate is 33% and the value of debt is $1 million, the value of the 'tax subsidy'/gain from debt is $330,000.

But this introduces corporate debt only. Miller's 1976 presidential address to the American Finance Association was entitled 'Debt and Taxes'. In that paper he presented a simple argument to show how the impact of personal taxes might neutralise the tax advantage of debt illustrated by M&M. The overall tax advantage involves looking at the interaction of the company tax rate, and the rates at which interest and equity income are taxed in the hands of the individual shareholder. Further, taxes on capital gains (where they exist) can often be deferred as capital gains might only be taxed when the gains are realised.

Obviously these personal taxes differ across individuals. So if there were no personal taxes on equity, and no debt instruments, but a corporate tax rate of say 33 cents in the dollar, then companies could issue debt to individuals whose tax rates on interest income were below 33 cents in the dollar. From this starting point, Miller was able to show that there was an equilibrium amount of corporate debt overall, but not an optimal debt-equity ratio for an individual firm.

The final word

Merton Miller's influence on financial thinking also extended beyond these issues. When Fischer Black and Myron Scholes first submitted their famous option pricing paper to the *Journal of Political Economy* (JPE) it was rejected. Miller was influential in providing feedback to the authors, and suggesting that the JPE take another look at the paper. The rest, as they say, is history.

Eugene Fama, Miller's first PhD student describes him in the following terms:

> Merton Miller epitomised the best of the University of Chicago Graduate School of Business. All who knew him at Chicago and elsewhere recognise him as a path-breaking, world-class scholar, a dedicated teacher who mentored many of the most famous contributors to finance and a graceful and insightful colleague who enhanced the research of all around him. ■