

A reappraisal of Modigliani's finance theories

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Modigliani's continuous interest in finance theory is a direct consequence of the main goal he set himself in his research (1980a, p. xi), namely "that of sorting out the lasting contribution of the Keynesian revolution". To this end many topics had to be clarified and probed into, at both the theoretical and empirical level: not only consumption and saving, but also investment, money and financial markets. In connection with the latter aspects, the model formulations of Keynesian theory brought to light an obvious shortcoming. The rate of interest determined on the money market is a short-term nominal rate, while what is relevant for decisions to invest in physical assets is a long-term real rate.¹

Thus we see finance issues taking on considerable importance, and three in particular: the term structure of interest rates, the relationship between the bond yield and rate of return on risk capital, and the rational valuation of returns and shares in inflationary conditions.

1. The term structure of interest rates

A distinctive feature of Modigliani's research is to be seen in the close link – almost an indissoluble fusion – between theoretical viewpoint and empirical analysis. The most immediate prompt for important theoretical formulations often derived from his wish to carry out rigorous appraisal of the real effects of economic policy measures

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¹ More precisely, money market rates are nominal and short term, while investments are influenced by long-term real rates of a maturity comparable to the life of the capital goods.

actually undertaken. Such was the case with the theory of the term structure of interest rates.

In 1961 the Kennedy administration set itself an ambitious goal in monetary policy, namely to change the slope of the yield curve, flattening it out. Known as operation twist, the manoeuvre aimed at raising the short-term rates, in order to check the outflow of capital, and reduce, or at least leave stable, the long-term rates in order to stimulate investment and favour productive activity in the United States. To this end the Fed open market operations and the Treasury debt management operations aimed at increasing the supply of short-term bonds and decreasing the availability of the long-term bonds.

The then prevailing theories had some difficulty in accounting for what was happening. The pure expectation theory holds that all bonds are perfect substitutes so that their expected returns should be equal. Hence, there is no particular incentive, for lenders or borrowers, to prefer bonds with maturities comparable to those planned for their investment programmes. The consequence is that the rates are determined by expectations alone, and not affected by the actual availability on the market of bonds with different maturities.

The same is true for the liquidity theory of Hicks (and Keynes) which, in addition to expected returns, also takes in account a premium for the risk of illiquidity which increases monotonically with maturity.

In contrast, the segmented markets theory takes it that both investors and issuers have clear preferences for particular maturities and no intention of shifting to others unless there are exceptionally big differences in yield or cost. In other words, the agents' risk aversion is very high, which means that the markets they intend to operate on are in practice quite separate. However, this in turn means that, almost by definition, there is no practical possibility of achieving the goal of twisting the yield curve.

1.1. *The preferred habitat theory*

In two articles published in 1966 and 1967, Modigliani and Sutch chose an intermediate path. What they proposed was the preferred habitat theory, according to which each agent, being somewhat risk-averse, prefers to keep to his or her own habitat, or in other words prefers to

operate over a certain interval of maturities. However, it is not a case of absolute risk aversion, and agents will be prepared to leave their preferred habitat to move on to more distant or closer maturities if they believe that the expected return includes a premium more than sufficient to offset the greater risk.

Investors will be attracted by a higher yield, borrowers by a lower cost. Thus the expected premium is not necessarily positive. In fact, its value will depend on the demand and supply conditions of bonds in the various market segments. For the maturities preferred by the issuers but not by the investors, the premium will be positive in order to lure the latter out of their habitats. On the other hand, the premium will be negative for those market segments where the value of the bonds that the issuers intend to supply exceeds that which investors desire to demand.

In accordance with this theory, while the spread between returns on long- and short-term bonds depends, in the first place, on expectations regarding the future trend in rates, it is also influenced by the quantities of bonds of various maturities issued by the borrowers. If, therefore, the Fed and Treasury set out to alter the availability of bonds on the market, increasing that of the short and decreasing that of the long maturities, then operation twist could in theory be crowned with significant success.

However, the empirical verifications carried out by Modigliani and Sutch point in the opposite direction. What they demonstrate is that in the determination of the long-term rates and spreads it is expectations that count almost entirely while, surprisingly enough, changes in the bond supply structure are of relatively little account.

1.2. Inflationary expectations

For just under a decade the estimations of long-term rates obtainable by extrapolation from the equations of the Modigliani and Sutch model proved fairly good. Times were changing, however, and to a truly significant extent. By the end of the 1960s an inflationary phase had set in, and worries were multiplying on the markets. Before then, as Homer and Sylla (1991, p. 429) point out in their monumental *A History of Interest Rates*, apart from episodes occurring in war time,

inflation did not even amount to a phenomenon worthy of note in economic life, nor was it among the major concerns of investors.

In the new situation it becomes necessary to take account of strong, persistent and highly variable inflation. In fact, the term structure of interest rates comes more and more to depend on expectations of future inflation. Thus the model must be reformulated distinguishing between two mechanisms behind the formation of expectations: one regarding the real interest rate trend, the other the trend in the inflation rate.

In 1973 Modigliani and Shiller proposed, and subjected to thorough empirical verification, a new model characterised by the “proper allowance” given to inflationary expectations. However, the basic mechanism does not depart – or at least not substantially – from that of the Modigliani-Sutch model, and indeed the authors themselves speak of a “generalized version” of the latter.

Apart from a few minor modifications, verification of the new model leads to the same conclusions as in the case of the old one with respect to the mechanism of expectation formation on the basis of a function of distributed lags of past short-term interest rates – the real rates, clearly, and not the nominal rates considered before. The great novelty here lies in the introduction of inflation expectations formalised – like interest rate expectations – through a distributed lags function of inflation rates of many past periods. Moreover – and this is an aspect that obviously had not been considered before – the authors also set about verifying whether the hypotheses regarding interest rate and inflation expectations were consistent with the requisites of the theory of rational expectations, which had by then made its bold entry on the scene and was beginning to dominate a good part of economic literature. The empirical verification appears decidedly satisfactory: the expectations that determine the long-term nominal rate respect all due requisites and thus appear perfectly ‘rational’.

1.3. Changed conventions and invalidity of the mechanism for formation of expectations

The forecasts obtainable using the Modigliani and Shiller model proved acceptable for nearly a decade. Nevertheless, as from 1981, the

long-term rates began to be very much underestimated.² Past history no longer counted as once it had. There had come into force on the markets what Ciocca and Nardozzi (1993, ch. IV) defined as a “monetarist”, or anti-inflationary convention. This had replaced the previous convention which saw inflation as the lesser evil as compared with decline in productive activity and employment, the prospect therefore being continuation of a fairly accommodating monetary policy as far as inflation was concerned, thus ruling out drastic changes in restrictive directions.

The change in convention had been caused by Paul Volcker's Fed, with the decision to pursue a very restrictive monetary policy. In 1981 short-term rates were raised to unprecedented levels. Contrary to what usually happened in the past, the financial markets sent the long-term rates rising proportionally with the short-term rates, and not to a lesser extent. And also later on, although inflation had dipped rapidly and to a considerable degree, and although the Fed had taken action to reduce the short-term rates, the long-term rates fell far less, and very slowly. The markets no longer showed any confidence in seeing inflation rates returning to the past long-run average, as had on the contrary been implicitly hypothesised in the Modigliani-Shiller model.

Thus the change of convention had the effect that the previous mechanism for formation of expectations no longer answered to the criteria of rationality based on past history, which consequently came to lose almost all its explicative force. What now became decisive was the credibility of the central bank, or in other words confidence in its determination to fight inflation at all costs.

However, credibility is not easy to acquire in a short time. If a central bank that has yet to win it decides to lower the short-term rates, it can lead to a rise in the long-term rates, as was often the case in the United States and other countries in the 1980s. On the other hand, however, decisions to raise rates can also come short of credibility for the markets. Moderate increases may fail to convince the markets that the will is there to fight inflation drastically, and so lead to

² Goodhart (1989, ch. 11, par. 3). See also Shiller, Campbell and Schoenholz (1989).

sharper increases in the long-term rates.³ In order to bring them down, it may prove necessary to hold the short-term rates at particularly high levels for quite a long time. It will be remembered that the Bank of Italy pursued this very line, deciding to keep the short-term rates high for a long period of time – indeed, until the single currency was just about to come into effect –, thus bringing about a sharp fall in the long-term rates, which – unimaginable as it had been just a few years before – came down to the level of the German rates.

1.4. *New validity?*

Today we seem to have yet another new scenario. In fact, the markets appear to be showing behaviours not differing greatly from the patterns from which Modigliani, Sutch and Shiller (MSS) drew their empirical estimations. Indeed, the long-term rates seem to be responding to changes in the short-term rates in the same direction, but less intensely. The slope of the yield curve increases – albeit not by very much – when the short-term rates fall and *vice versa*. Of course, without close empirical investigation Modigliani's theses cannot be said to be regaining validity. On the other hand, one cannot exclude such a conclusion. In other words, the possibility must be admitted that the weighted average formulation for 'rational' expectations could be resumed and perform well – a circumstance that would, ironically enough, vindicate Keynes and Modigliani.

However, to forecast the term structure of interest rates, the current practice among financial analysts is to apply highly complex models formulated on the basis of stochastic differential equations that incorporate the hypothesis of Brownian motion for forward rates. But it is not unrealistic to see forecasts as emerging from a 'black box',

³ Cf. the analysis presented by Cozzi (1996, in particular p. 30):

"A very clear case in point is the US experience in 1994-95. During the early months of 1994, the Fed increased the federal funds rate 4 times, the first 3 by 25 basis points and the last, towards the end of May, by 50 b.p. The yield curve, which was always positively sloped, was displaced upwards and became steeper in the first 3 cases. It became flatter instead in the last case, with an actual reduction in the long-term rates. The next increases in the federal fund rate, decided in November 1994 and in February 1995, also brought about new long-term rate reductions. Clearly, the first increases did not convince the markets, the last ones did".

whose contents are hard to weigh up in terms of economic theory. In any case, the results do not seem to contradict the hypothesis of Modigliani and Sutch that forward premiums can be both positive and negative – a hypothesis that is moreover now generally accepted.⁴ However, the premiums do not seem to remain constant over time, although no factor accounting for this variability is identified. Furthermore, as far as I know, no mechanism for formation of expectations has been proposed as alternative to the MSS mechanism and more fully explicative. If the conjecture advanced above of a possible revival of the MSS hypotheses were to prove grounded, then the 'black box' effect could be contained and the distance between economic theory and financial practice once again reduced.

2. The Modigliani-Miller theorem

2.1. *Irrelevance of the financial structure*

In Modigliani's programme of macroeconomic analysis the relationship between short- and long-term rates was intended to prompt reflection on the effective capacity of monetary policy to regulate decisions to invest in capital goods, i.e. with a long-term perspective. However, the cost of debt capital – albeit long term – did not in itself suffice for the purpose. To invest in stock, or directly acquire capital goods, investors require a premium for the risk the market must recognise. Thus the need arises to study the connection between the cost of debt and the risk premium. From the macroeconomic viewpoint,⁵ this is the main purpose of what is known in the literature as the Modigliani-Miller theorem⁶ (henceforth MM).

Modigliani (1988, p. 150) remarked that

“the MM paper is unquestionably the most popular of my writings; [...] it has been, and continues to be, required reading for many graduate business schools. [...] but it] is as a whipping boy – the in-

⁴ Shiller (1990, vol. 1, p. 650).

⁵ Modigliani (1980a, p. xiii).

⁶ Modigliani and Miller (1958).

structor assigns the paper for reading and then has a feast tearing it to shreds”.

The theorem demonstrates that the financial structure of a firm is irrelevant to determination of its market value,⁷ maximisation of the latter being the criterion that must rationally prevail in firm decisions. In fact, the alternative criterion, namely maximisation of profits, which had hitherto been preferred by scholars and firm managers, was not operatively utilisable, being quite ill defined in a world dominated by uncertainty.

Thus, assuming that the managers have the same aim as the shareholders, namely to maximise the value of the firm, the authors go on to demonstrate that, in equilibrium, this value proves independent of the firm's debt/equity ratio. The demonstration assumes perfect financial markets, no (or neutral) taxation and completely rational agents. Under these hypotheses any agent who prefers a debt/equity ratio other than that of the firm he holds shares in can modify it as he chooses; and can do that without bearing any cost if, as is the case under the perfect market hypothesis, the rate of interest he pays to borrow is identical to the rate he receives to loan, and if transaction costs are zero. In fact, the agent can borrow on his individual account if he favours a higher debt, or loan the difference if he prefers a lower one.

It will be seen that the proof is based on the principle of no arbitrage in conditions of equilibrium. All the current theory of finance is based on this principle, but it was MM that opened the way in this direction. Here it is worth stressing that in 1958 the fundamental arbitrage theorem was still unknown; as far as I know it was to be formulated and demonstrated for the first time by Ross in 1976. Until then little more was known than the law of one-price and Keynes's treatment of forward exchange parity.⁸ By utilizing the modern theory of arbitrage, we can now produce many elegant demonstrations of the MM theorem, but this was far from the case at the time. Therefore we must give the authors all due credit for having performed a genuine *tour de force* in analysis and exposition, while, like Modigliani himself,⁹

⁷ The market value is defined as the sum of the market values of the firm's shares and liabilities.

⁸ Keynes (1923, ch. III, 4).

⁹ Modigliani (1988, p. 150).

we also sympathise with students who face considerable difficulties in following the original demonstration step by step.

The conclusions of MM inevitably met with fierce criticism. They were in fact in direct contrast with all that was then held obvious in the field of corporate finance, namely that there was a unique value maximising debt ratio. Until this ratio was reached, it would in fact be possible to reduce the average cost of capital by increasing the debt, the interest rate due to creditors being lower than the returns required by shareholders as remuneration for risk capital. It was therefore considered self-evident that the firm's financial managers had the primary task of achieving an optimal degree of leverage.

It is precisely this possibility that MM denies, demonstrating that the market value of a firm is given by the capitalisation, at the appropriate rate for its class of risk, of the expected operating income, or in other words the profits expected before deduction of interest. Or, to put it another way, the average cost of capital is given by the appropriate rate for the firm's risk class and does not depend on its leverage. In fact, as the latter increases, the cost of equity capital rises so as to leave the average cost unchanged. If, then, we consider the investment decisions as given, it follows that distribution or non-distribution of dividends does not change the value of the firm: the only effect of distributing them is to increase the debt, while it remains unchanged if they are not distributed.

It also appears that, when deciding whether or not to implement an investment project, its expected return should be compared not with the rate on loans, but with the appropriate rate for the class of risk, which measures the effective cost of capital however the firm decides to obtain it, whether by borrowing or by issuing shares.

From the macroeconomic point of view, this conclusion points up another hiatus between monetary policy and investment decisions – a hiatus that has to do with the risk premium, but this time for investments in real activities and not in debt instruments. This is an aspect we should not, I believe, lose sight of, as does Gertler (1988) when he asserts that the demonstration of the irrelevance of the financial structure to the real decisions of firms has contributed to concentrating the attention of macroeconomists on money alone, with the effect of neglecting credit and the other financial variables.

2.2. Criticisms

Obviously, the MM theorem is based on highly restrictive hypotheses, and therefore cannot fully reflect what is actually happening on the markets. Nevertheless, it does still represent a precise reference point – a benchmark – for the purpose of comparison with reality. If, then, as indeed is often the case, a change in financial structure is seen to have a significant effect on the market value of a firm, the first question to ask is which of the MM hypotheses have been violated. After all, as Miller (1988, p. 100) points out with reference to the irrelevance proposition, “showing what *doesn't* matter can also show, by implication, what *does*”. I strongly feel that many agents, especially bankers, forget the importance of this point when they deny the practical validity of the MM theorem, without bothering to go deeper into the argument.

2.2.1. Perfect substitutability between individual and corporate debts

The first and most obvious objection to MM concerned the hypothesis that firms and individual investors can borrow at the same conditions. Actually, there can be no doubting that individual borrowing often costs more and that many agents may actually be credit-constrained. However, it is also true that a considerable number of individual investors are able to obtain credit from banks or brokers at relatively low rates, offering the bought shares as collateral. Above all, it can hardly be argued that the credit conditions applied to hedge funds, mutual funds or insurance companies are less favourable than those applied to other firms. It is surely significant that modern finance theory has no great difficulty in accepting the MM hypothesis.

2.2.2. Homogeneous risk classes

Rather more to the point is criticism of the hypothesis that the shares of different firms can be grouped in homogenous classes of yield and risk. As Stiglitz demonstrated,¹⁰ this hypothesis is not strictly neces-

¹⁰ Stiglitz (1969 and 1988).

sary. In fact, it can easily be eliminated "provided only that firms do not issue so much debt that they incur a positive probability of bankruptcy" (Stiglitz 1988, p. 122). It is, however, precisely here that the problem lies: as debt grows, sooner or later the markets will take account of the risk of bankruptcy, as a matter of sheer common sense. It is not a small criticism, although Miller argues that it should be made against the hypothesis of considering the debt as riskless, which is not strictly necessary since it is also perfectly possible to obtain the MM results with low risk debts. However, since it is not clear at what level of debt the probability of bankruptcy would begin to be felt, such a hypothesis differs little from the no-risk hypothesis.

Could the introduction of high-risk debt bonds undermine the conclusions of MM? So it might seem if we consider the appreciable increases in value obtained in many cases of debt-financed share repurchase or of corporate restructuring achieved with leverage buy-out operations entailing issues of junk bonds.

Miller holds that accounting for these increases in value solely as effects of change in the financial structure is, at least, dubious. There must be some other element in the explanation. Might it not be that the markets are not so perfect as the theory assumes? So it would seem since, in the next pages,¹¹ he goes on to underline the point that the modern theory of finance, which interprets stocks and shares in terms of options,¹² leads to the conclusion that the MM theorem remains valid. In fact, the put-call parity relation ensures that leverage, while affecting both the value of stocks and bonds, has no influence on their *sum*, which measures the value of the firm, precisely as the MM theo-

¹¹ Miller (1988, pp. 109-10).

¹² Shareholders have a call on the firm with strike price corresponding to the end value of the debt, while the bondholders own the firm and have sold the call. If at expiration the value of the firm exceeds that of the debt, then shareholders exercise their call – that is, they repay the debt – and become owners of firm. On the other hand, if the value of the debt exceeds that of the firm, then the call expires worthless, and the firm remains in the ownership of the bondholders. There is an alternative interpretation which has it that the shareholders are both owners of the firm and of a put on the firm with strike price corresponding to the value of the debt, while the bondholders have sold the put and are creditors of the firm. At expiration, if the value of the firm exceeds that of the debt, the shareholders do not exercise put and so remain owners of the firm, while the bondholders receive the payment of their credit. If, on the other hand, the debt exceeds the value of the firm, then the shareholders exercise the put and the bondholders must pay it but, since they have a credit corresponding to the value of the put, they have no payment to make and simply assume ownership of the firm.

rem states. Thus debt riskiness is not in itself an element undermining the validity of the invariance proposition. Significantly, Black and Scholes applied the theory of arbitrage just like MM to determine the value of the options.

2.2.3. Taxation effects

Taxation of business income, entailing that interest be considered among costs, generates an incentive to borrow. In fact, the levered firm enjoys a fiscal benefit (tax shield) that increases its value. The apparently – but actually not so very – paradoxical conclusion would be that there exists an optimal financial structure consisting solely of debts¹³ – provided, of course, that the risk of bankruptcy and related costs are for the sake of argument ruled out. Without going so far, the conclusion remains that the value of the fiscal benefit could prove very considerable, and thus sufficient to deprive the MM theorem of much of its practical relevance.

From the outset, the main focus has been on determining the effective value of the tax shield for the firm. Both our authors have returned to the issue on many occasions, although the evaluations they come to do not tally too closely. From the conclusions of a 1963 paper¹⁴ a fairly high value could be deduced, but what had been disregarded were the effects of personal taxation on different assets' returns. Their considerations lead to the conclusion that borrowing within certain limits enhances the value of the firm, but probably not to a substantial degree.¹⁵ Obviously, much depends here on the peculiar characteristics of each country's tax system. However, taking all the elements into account, including bankruptcy risks, it seems that Modigliani's conclusion on a substantial reduction of the advantages a high debt level holds for shareholders remains valid.

¹³ Miller (1988, p. 112).

¹⁴ Modigliani and Miller (1963).

¹⁵ Modigliani (1982, p. 257). Cf. also Modigliani (1988).

2.2.4. Perfect markets

An important requisite for perfect markets, clearly restated by MM (1961, p. 412), is that "all traders have equal and costless access to information about the ruling price and about all other relevant characteristics of shares". Thus all forms of asymmetric information are ruled out. But asymmetries are there and this fact holds potentially destructive effects for the MM theorem. It is precisely on this point that the strongest criticisms have come to concentrate.

Managers have greater and better information on the firm than the current or potential shareholders, and are thus able to profit both by taking decisions to their own advantage, at the expense of the shareholders, and by convincing potential investors that the firm is worth more than the market values it.

A high level of debt limits the managers' chances of taking advantage of their position, driving them to pursue greater efficiency. However, it also prompts them to take on greater risks in the attempt to gain higher returns. At the abstract level we may therefore define an ideal financial structure from the shareholders' viewpoint as that which best combines the opposite needs of pursuit of efficiency and containment of risks. A substantial bank debt is a particularly advantageous solution for the shareholders in that the banks are quite likely to excel them in keeping the managers under control – by threatening to withdraw credit, to start with. However, to escape the conditioning of the banks managers can decide to increase the internal resources, reducing the distribution of profits as far as possible. Investment decisions, too, could be affected by a greater or lesser availability of self-finance: an observation, however, that clashes with the hypothesis – necessary to demonstrate the irrelevance of dividend distribution policy – that investment decisions are given. It thus appears that between shareholders, managers and banks a sort of game is played with possible relevant consequences on the value of the firm.

For its part, the market interprets changes in the financial structure as signalling future income and risk prospects, thus able to affect the value of the firm. Investors tend to think that managers who decide to take on debts show no particular worries about the firm's future trends. Consequently they are prepared to accept lower returns, thereby reducing the cost of capital and increasing the stock price. On the other hand, issue of new shares is often interpreted in a negative

sense: if they are on offer they are probably overvalued, and they may even be issued now because the management knows that, in the near future, the firm will possibly get into trouble.

Most important is the informational content of the firm's dividend policy. An announced increase in dividends normally raises stock prices, quite sharply in some cases. It can be argued that this does not necessarily imply violation of the theorem. If the announcement is interpreted as signalling improved prospects of profitability, it is to this aspect that the increase in the stock prices is to be attributed, and not to the higher dividends announced. However, this does not seem to be a particularly strong line of defence.

Even more relevant is the observation, anticipated by MM themselves (1961, p. 430), that owners or managers may decide to use dividend policy to manipulate the market price. The same observation can also apply to falsifying the accounts or issuing deceptive business reports. Suffice it to recall the emblematic case of Parmalat, which distributed dividends on 19 May 2003, just a few months before collapsing!

In a perfect market not characterised by information asymmetries such events could rarely if ever occur. In practice, however, they do happen, and quite often – and, of course, they invalidate the conclusions of MM.

3. Inflation and rational valuation of shares

3.1. Two evaluation errors

As stated in the MM theorem, the rational valuation of the firm is given by the present value of the perpetual stream of profits gross of interests (also known as the operating income) at the rate appropriate to its risk class. There is no particular difficulty in defining these magnitudes if there is no inflation. But when there is, then considerable complications arise. In fact, Modigliani and Cohn¹⁶ argue that inflation leads investors into committing two evaluation errors. The

¹⁶ Modigliani and Cohn (1979 and 1982) and Modigliani (1980c).

first derives from the fact that they fail to take due account of the role inflation plays in effectively reducing the real value of the firm's nominal liabilities, with the result that the book profits prove lower than the actual values. The second error concerns the rate of discount they apply to expected profits, which are real and should therefore have a real rate applied, and not the nominal rate that seems to be the practice.

Thus investors use erroneous values for both the variables applied for rational assessment of the value of shares, and both errors lead in the same direction, to an appreciable undervaluation of the share prices.

As far as correct evaluation of profits in the presence of inflation is concerned, it is necessary to add to reported profits the reduction in the real value of the financial liabilities. But it is also necessary to deduct the distortion produced by calculating both depreciation and inventory allowances at historical costs, and not at replacement costs. According to Modigliani and Cohn, the first of these effects proves greater (or at least no less) than the other two. Consequently, once corrected for the effects of inflation, the true profits result higher than the reported ones. However, real value accountings have not found much room. As for taxation, something have been decided for allowing depreciations and inventories to be valued at replacement costs. This should have strengthened the authors' point. Nevertheless, undervaluation remained the rule – at least until inflation started to fall.

As for the second error, which accounts for about 2/3 of the overall undervaluation, financial analysts have maintained their habit of using a nominal rate of discount rather than a real one. Modigliani and Cohn made an informal survey, contacting some of the major brokers on the subject and reviewing the evaluation procedures underlying the recommendations they made to the big investors. The information they received duly confirmed that use of a nominal rate of discount was to be seen as the prevalent practice.

Various other authors pursuing different lines have arrived at the same conclusion. Summers (1983, pp. 231-32) came up with the particularly interesting finding that in the 1970s the pronounced undervaluation of shares pushed the spread between debt and equity yields to very high levels, without any justification for increased risk.

It is also interesting to note that the Modigliani and Cohn model forecasts that a reduction in inflation with stabilization at low levels

would lead to a strong rally of the stock prices, and even that the process of correction “may well end up overshooting the mark” (Modigliani 1980c, p. 330). All this is precisely what actually happened: the market was pushed into a speculative boom and eventually collapsed in October 1987.

3.2. *Are these errors still with us?*

Has the Modigliani’s lesson left its mark in the world of the financial analysts? Alas, it really does not seem the case. Of course, the actual and forecasted inflation are not the main problem for our economies today, and so it is hardly surprising that stock prices do not appear to be particularly affected by it. However, reading the reports of many a financial analyst leaves the distinct impression that Modigliani’s lesson has gone leaving hardly any trace. Moreover, as a matter of fact, the practice of comparing the earnings/price ratio with the nominal yield of long-term bonds is more popular than ever in the financial press.

But also far more refined analyses leave us somewhat perplexed. We may take in particular a scholarly paper published by the Federal Reserve in 1997¹⁷ where direct comparison is made between the earnings/price ratio of the S&P 500 index and the yield on 30-year government bonds. Again, we are faced with a comparison between real and nominal magnitudes, and moreover aggravated by the conclusion that, when the yield exceeds the earnings/price ratio, we must expect a reduction in the share prices since agents will be induced to change the composition of their portfolios, favouring bonds against shares.

On the other hand, the model used by the ECB (2004, pp. 77-80) does not come in for this type of criticism: in fact, it discounts the expected real dividends at a real rate augmented, of course, by a risk premium. Perplexities arise when we see this premium calculated as a residual, and characterised by marked volatility. But, by doing so, any price – however low (or high) – can be judged as rational: it is sufficient to affirm that, for some reason or other, the risk premium has increased (or decreased).¹⁸ In this way not only do we have market rationality hypothesised *a priori*, but the way is also barred to any

¹⁷ Lander, Orphanides and Douvogiannis (1997).

¹⁸ Cf. Modigliani and Cohn (1979, p. 36).

possibility of advancing the alternative hypothesis that markets can behave irrationally for long periods of time. If rationality is accepted as a dogma, then the answer is always there for the incredulous that they are missing some element of explanation, yet to be identified but surely able to guarantee the validity of the dogma. Modigliani, averse as he was to all forms of dogmatism, held it necessary to recognise that markets can be characterised by marked degrees of irrationality, and even for very considerable periods of time, without ruling out the possibility that sooner or later rationality will be restored. But the investors betting on sooner "would be more likely to lose their shirts".¹⁹

4. Conclusions

Before the MM theorem, economic theory showed very little interest in corporate finance: the two worlds were almost completely apart. True, the financial markets represented a link, but only a slender one since the aims of analysis were very different, not to speak of the methodologies employed. The economists took an interest in the financial markets in order to account for the instability of the aggregate investment function and to evaluate the effects of monetary policy. For their part, the business economists delved into it to determine the best financing opportunities, debt or equity, for the individual firms. The then far from numerous financial analysts only sought to compare bond yields with the yields on particular shares.

One of Modigliani's great merits lay in drawing the two worlds closer, although the overall result came up against opposition and proved, alas, all too short-lived. However, a mark had been left, and it is surely significant that both the American Economic Association and the American Finance Association elected him president – a unique circumstance, to my knowledge.

As we know, the MM theorem stirred a flurry of controversy that took a long time to die down. Stiglitz (1988, p. 121) aptly remarked on the irony of the fact that an article written to argue the irrelevance of financial structure had the effect of focusing the atten-

¹⁹ Modigliani (1983, p. 243).

tion of economists on finance. We also know that the business economists and financial analysts reacted no less intensely or vigorously. Different as the positions may be, however, the fact remains that the two worlds have in practice drawn closer – at the very least, for some time they spoke a similar language. And even today the MM theorem is universally recognised as a *locus classicus*, a landmark, of finance theory.

On the other hand, the term structure of interest rates theory came in for quite a different reception from the world of finance. For an appreciable period of time – in other words, as long as the forecasts obtained with the models of Modigliani *et al.* proved reasonably sound – managers and financial analysts seem to have embraced them and made effective use of them to decide what debt maturities were favourable for firms and what was the most promising composition for bond portfolios. It was in fact only later that the interest of analysts turned in the direction of favouring very different approaches from those taken by the macroeconomists.

Modigliani's theses on irrational market evaluation in periods of inflation met with rather less favour: indeed, the world of finance does not appear to have deigned it serious consideration. No controversy raged over them, and no theoretical clashes ensued. In fact, financial agents stuck to the traditional motto "the market is always right".

In the background, evidently, there is the issue of financial market efficiency. The agents tend to consider it practically perfect: market prices rapidly incorporate all the information available, and are therefore perfectly rational. The position taken by the economists is rather less uniform. They do recognise many elements making for efficiency, especially for the long period, but they can raise many doubts about the short period, arguing, for example, that the information can be misinterpreted, or that rational use of it may not be made instantaneously, possibly taking quite a long time.

Modigliani openly affirmed that he had long preached "the gospel of efficient markets";²⁰ probably ever since, having presented an initial formulation of what was to become the MM theorem, he added (1988, p. 149): "I didn't really believe my result and there probably was something wrong". Here, however, the incredulity did not concern the hypothesis of efficiency, which was indeed postulated but

²⁰ Cf. Modigliani and Cohn (1979, p. 35).

together with various other aspects including exclusion of the bankruptcy risk, absence of taxation, identical aims for shareholders and managers, etc. It was, in fact, precisely these aspects that MM wanted later on to probe into, while the critics for their part raised major objections from the outset. By contrast, all seemed to grant a special status to the efficiency hypothesis, practically beyond criticism.

In the case of undervaluation of shares, however, no other hypothesis seemed able to account for the incapacity of agents to lift the veil of inflation in order to evaluate the real effects without letting the nominal effects get in the way. Irrationality was the only plausible explanation. And yet, while Modigliani and Cohn (1979, p. 35) confessed to being nagged by the "hypothesis of a long-lasting, systematic mistake in a well-organised market, manned by a large force of alert and knowledgeable" agents, the agents themselves showed no concern and continued to carry on regardless.

The explanation is probably to be sought in the different time horizons considered by financial managers and economists, and in the different conceptions they have of efficiency. The former are interested in the very short term, and reason thus: since no one can tell whether prices will be higher or lower tomorrow, today's must 'rationally' be held to be correct, and the market is therefore to be considered efficient. If, then, something were to change, there would be time to register the fact and act accordingly. On the other hand, what matters for economists is the long period and the efficiency of the markets in channelling the financial resources to the most promising productive uses.

Economic efficiency is therefore different in nature from the efficiency that financial managers are interested in, the main focus being on the long-run prospects of the real economy and not on the immediate portfolio returns. However, the market is not oriented to the efficiency that economists are interested in or at least it may not be so for rather long periods. Keynes's famous observation (1936, p. 159) that the essential job of the financial markets "is likely to be ill-done" finds an indisputable proof in Modigliani's analysis.

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