FRANCO MODIGLIANI

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In 1985, the American economist of Italian origin Franco Modigliani became the twenty third economist to win the prestigeous Nobel Prize for Economics. He was also the second economist from the Massachusetts Institute of Technology to win this prize. The award reflected the positive evaluation of the works of F. Modigliani, which contained original findings enriching economic theory and creating space for a new solution to many practical problems. Further findings led to an enrichment of the theory of money, interest and interest rates, the theory of national and international financial markets, the theory of consumption, the theory of investment, the theory of inflation and the theory of unemployment. F. Modigliani also contributed to the analysis of macroeconomic proportions, lending rationalization, consequences of high budget deficits, stabilization policy in open economies as well as to formulation of an extensive macro-economic model for the USA. His works represent the core of the neoclassical synthesis of post-war macro-economics.

Franco Modigliani was born on 18 June 1918, in Rome as the son of Enrico Modigliani and Olga Flaschelová. His father was a children's doctor and his mother a voluntary social worker. He studied at a prestigeous school – the Liceo Visconti in Rome, where he successfully passed the difficult examinations, which enabled him to leave secondary school early and begin his studies at the University of Rome at the age of 17. He decided to study law. In his second year of study, he entered a competition directed towards economic problems and won first prize, which stimulated his interest in the study of economics. He registered at the Sorbonne in 1939, but he did not consider the teaching of economics sufficiently inspiring and he continued his individual study. He gained the degree of doctor of law from the University of Rome in 1939. He emigrated to the USA in the same year and gained a free place in the New School for Social Research, specifically in the Faculty of Political and Social Sciences. He gained solid foundations in economics, especially mathematical economics and econometrics thanks to J. Marschak. Informal seminars in the years 1940-1941 also had great importance for F. Modigliani. They enabled him to participate in discussions with such economists as O. Lange, T. Koopmans and A. Lerner.

His debut as a teacher of economics and statistics was associated with the New Jersey College for Women. In 1942, he taught economics and statistics at Bard College, and from 1944 to 1949 at the New School for Social Research, where he gained the academic degree of PhD after successfully defending his thesis. The content of the thesis was an organic part of the first article published by F. Modigliani in English in 1944 under the title Liquidity Preference and the Theory of Interest and Money.

In 1949-1950, he left New York to work at the University of Chicago and later at the University of Illinois, where he began to cooperate with the outstanding student Richard Brumberg. From 1952 to 1960, he worked at the Carnegie Institute of Technology, now the Carnegie – Mellon University, in 1961-1962 at Northwestern University, and from 1962 at the Massachusetts Institute of Technology, where he became a professor in 1970. He is still active there as an emeritus professor.

Academic – research activity

Apart from teaching, he devoted himself to academic research activity. He worked as a research consultant for the Cowles Commission for Research in Economics at the University of Chicago, he accepted an attractive position as director of the research project, Expectation and Business Fluctuations, at the University of Illinois. He was also involved in research at the Institute of World Affairs and as president of the American Economic Association (1976). He actively participated in the formation of practical economic policy, specifically as a consultant of the Federal Reserve System and the US Treasury Department or of the Bank of Italy and Bank of Spain. He devoted extraordinary attention to the negative effect of high public deficits.

The first original contribution of F. Modigliani concerned the creation and development of the theory of household savings, known as the life cycle hypothesis.

F. Modigliani thoroughly analysed the various theoretical approaches to individual and national savings, as well as empirical studies. He stated that intensive interest in the behaviour of households from the point of view of savings, paradoxically, started from analysis of the consumer function, from an understanding of consumption as a basic

determinant of aggregate demand and from the assumption that excessive savings cause cyclic development and long-term stagnation. He also stated that the dominant approach was the empirical approach. Little attention was devoted to the questions of why rational people devoted part of their income to savings.

In 1949, F. Modigliani and J. S. Duesenberry attempted to reconcile the cyclic variations of the rate of savings with its long-term stability, by stating that current consumption is determined more by current and past income or relative income than by current income. This is called the Duesenberry – Modigliani theorem. It is worth mentioning in this context that F. Modigliani devoted primary attention to the reasons why the level of savings changes in connection with the economic cycle.

In the course of the years 1952 to 1954, F. Modigliani and R. Brumberg wrote two essays together. The first was published in 1954 under the title: Utility Analysis and the Consumption Function: an Interpretation of Cross Section Data. The second essay, with the title: Utility Analysis and the Aggregate Consumption Function: an Attempt at Integration, appeared only in 1979. From further works devoted to this problem, it is possible to mention: The Life-Cycle Hypothesis of Savings. Aggregate Implications and Tests, written in cooperation with A. Ando from 1963 or the work from 1966: The Life-Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital. When he received the Nobel Prize, he presented a lecture on the theme: Life Cycle, Individual Thrift and the Wealth of Nations.

F. Modigliani attempted to perfect the consumption function of J. M. Keynes by working out a theory of consumption based on the life-cycle hypothesis. First, he presented a simplified variant, and later he left out individual assumptions and analysed their influence. The simplified variant contains the following assumptions:

- Individuals create life-time plans of consumption. An optimum life-cycle plan of consumption enables them to maximize the utility of consumption. The given assumption is also accepted in the formation of the macro-economic theory of consumption and savings.
- Consumption is conditioned more by the size of total wealth than by the level of income in the current period.
- There is an attempt to maintain a constant level of consumption in the course of the whole life-cycle.
- Income from work changes in the course of the life-cycle. It is low, when the person starts work, gradually increases and stabilizes at a certain level. It declines before retirement and ends on retirement.
- There are no profits from savings (zero interest rates on deposits).
- The length of life and of productive life are perfectly known.
- The individual consumes the whole income of his life, leaving no property.

F. Modigliani together with A. Ando estimated the consumption functions for the USA after the Second World War. The consumption function showed that every increase of assets by 1 USD increased consumption by 6 cents, while each increase of income by 1 USD increased consumption by 70 cents. He came to the conclusion that the average tendency towards consumption is constant, if the ratio of assets and work income to national product is constant.

Later he removed some assumptions and analysed their influence, which enriched the theory.

The life-cycle hypothesis produces clear conditions for consumption and savings. The contribution of F. Modigliani lies precisely in the adaptation of this theory into the form of aggregate savings of households. He came to these main conclusions:

- The aggregate level of savings is completely independent of the size of income of one person.
- Differentiated national levels of savings are consistent with identical individual behaviour.
- Between countries with identical individual behaviour, the aggregate level of savings will be higher in countries with a higher long-term rate of economic growth.
- The proportion of wealth to income is a declining function of the rate of growth, it will be highest at a zero rate of growth.
- An economy can accumulate a very substantial stock of wealth in relation to income, even in the case that no inheritance is left.
- The proportion of wealth to income and the level of savings for a giving rate of growth are linked to the prevailing duration of income.

F. Modigliani analysed these conclusions both in a stationary economy and in a dynamic economy. In this way, he more closely specified the character of growth.

The second original contribution of F. Modigliani, as stated by the commission for awarding the Nobel Prize for Economics, concerns determination of the market value of corporations and the theory of financing of corporations.

Several years of cooperation between F. Modigliani and Merton H. Miller, who won the Nobel Prize in 1990, led to formulation of several theorems, which are known as the Modigliani-Miller theorems and are contained in two joint articles from 1952 and 1953, and in an article published in 1958 under the title: The Cost of Capital, Corporation Finance and the Theory of Investment.

The first theorem demonstrates that with certain pre-conditions (an ideal world of perfect capital markets, which are in equilibrium, complete and symmetrical information between all participants in the market, zero taxation of companies), the market value of a corporation will not depend on the method a corporation chooses to finance its investment. A corporation has three basic ways to gain finance: issue of new shares, loans and undistributed profits. In other words, the market value of a corporation, which is characterized as the total market value of its capital and debts, is independent of the relationship of debts to the corporation's own capital. The theorem can be briefly presented as the cost of capital, that is, the costs – debt instruments in relation to own capital, or the theorem of the

irrelevance of capital structure. The market value of a company is conditioned by the assets of the corporation, not by how the assets are financed. In the ideal world of a perfect capital market, the financial strategy of a corporation has no influence on the market value of the corporation or on the wealth of the shareholders. The shareholders can create investment portfolios according to their own judgement without any costs. Their evaluations of risk and the limits of indebtedness are factors, which influence the choice of their portfolios. The choice of a corporation with regard to financial strategy has no substantial influence on equilibrium.

The second theorem demonstrates that the market value of a corporation is not dependent on its dividend policy.

The theorems were worked out with the aim of providing basic norms for comparison, but they are valid under the above mentioned simplified pre-conditions. The authors themselves considered more realistic pre-conditions and opened discussions, for example, about the effects of tax on the validity of the theorems. The scientific value of the Modigliani – Miller theorems does not lie only in their formulation, but especially in the fact that they create space for seeking and applying new analytical methods.

These two original contributions of F. Modigliani are mutually connected, because they help the formation of the wealth of households and they can be understood as part of Modigliani's research of financial markets.

The monetarist controversy

The relationship between money supply and nominal income, known as the monetary transmission mechanism, can be described as the basic relationship of monetary analysis. Views on its activity differ, and so we encounter the problem in economic theory known as the monetarist controversy. Franco Modigliani dealt with this problem in the articles: The Monetarist Controversy: Presentation, The Monetarist Controversy: Discussion (with M. Friedman), The Monetarist Controversy or Should We Forsake Stabilization Policies? of 1977 and The Monetarist Controversy Revisited, Contemporary Economic Policy, of 1988. It may be said that F. Modigliani had a leading place in the controversy, which dominated between the Keynesians and the monetarists for decades.

F. Modigliani, like other Keynesians, did not identify with the views of M. Friedman on the monetary transmission mechanism and is one of his critics. M. Friedman in 1956, like J. R. Hicks in 1935, integrated decisions about the size of savings and about their allocation between assets in the portfolio into one decision. Allocation decisions were conditioned by the size of income, expected levels of profit from individual types of asset and expectations about the rate of inflation. Raising of the expected rate of inflation led to people changing money into other assets, specifically into goods of long-term consumption. In this case, changes in the structure of the portfolio directly influenced output. Expansion of the money supply did not cause an inevitable excess of demand for obligations, but an imbalance in the financial market could be balanced by excessive demand for goods. Growing demand for goods led to growth of demand for money and so to renewal of equilibrium. In this way, M. Friedman proved that money supply can influence the economy, not only through direct influence on interest rates for investment, but also through the purchase of goods of long-term consumption as assets. However, he understood the purchase of goods of long-term consumption only as one possibility. Another possibility was the purchase of bonds.

The monetary transmission mechanism has the result that if the quantity of money grows while the speed of circulation of money is relatively stable, nominal income has a tendency to grow, as the quantity of money grows. F. Modigliani denies the claim that the money supply directly influences nominal income.

In F. Modigliani's opinion, under the assumption that money is a quantity, which can be simply defined, measured and effectively controlled by the monetary authority, the key question is how changes in the exogenously defined money supply influence nominal income. He pointed out basic changes and innovations in the financial markets, which lead to new dimensions of the relationship between money supply and nominal income. The new dimensions are conditioned by the existence of a large number of different financial mediators, a wide range of financial assets and so the identification of money, the mechanism of money creation and the need for control of the money supply by the central bank are becoming ever more important. F. Modigliani poses the question of whether the conventional approaches are enough for the monetary authorities, or whether it will be necessary to seek new approaches, for example, to secure control of the stocks of all financial assets or to be concerned with the determination of interest rates. He states that the application of new approaches leads to endogenous determination of the money supply.

In view of F. Modigliani, theoretical analyses contribute to determination of the basic conditions and factors, which condition the relative effectiveness of alternative forms of monetary control and empirical analyses again confirm the need to implement a flexible monetary policy.

In 1979, F. Modigliani published an article with the title: Inflation, Rational Valuation and the Market. In it, he poses the questions connected with the determination of the alternative costs of the holding of money and analyses various views. His analyses show that on the one hand, there are views, which suppose that in the case of developed capital markets it is possible to determine the alternative costs of holding money on the basis of interest rates reflecting inflationary expectations, and in the case of regulated capital markets (regulation of interest rates, setting of ceilings) on the basis of the rate of inflation. F. Modigliani presents his own view that the appropriate measure of the alternative costs of the holding of money is the highest of the available figures.

The article also includes an analysis of the causes and results of inflation and analysis of the possibility to eliminate or disrupt the inflationary spiral. He says that there are two basic possibilities. One means the reduction of wages and decline of production, which leads to slower and more expensive recovery of the economy, that is, the policy applied by the government of R. Nixon. The second possibility is rapid raising of unemployment, which is more painful, but also more effective. It was applied by the administration of R. Reagan.

The contribution of F. Modigliani to analysis of deficit financing of government spending and analysis of the effects of economic stabilization policy

F. Modigliani was concerned with the problem of deficit financing of government spending and economic stabilization policy, both in his lecture presented, when he was awarded the Nobel Prize, and in a series of articles, especially in the period from the 1970s to 1990s. He analysed the short-term and long-term effects of deficit financing, concerned himself with the problem of the crowding-out effect and proposals for the elimination of negative tendencies.

F. Modigliani studied the economic history of the USA, presented his views on applied economic policy, and pointed to the need to solve deficits in the federal budget. He proposed that reducing the spending of the federal government should be given priority over raising taxes. He also pointed to the fact that if government spending is used to finance productive investment, future generations would benefit from it, as well as having to pay the debt. He called this inter-generational justice.

However, he did not identify with the view that deficit financing of government spending leads to a growth of savings, as the Barro – Ricardo hypothesis claims. That is, savings would increase so that it would be possible to repay the debt in future. He supposed that private savings are almost independent of the state of the federal budget, and that private wealth is independent of the size of the national debt.

In connection with analysis of the problem of pushing-out of private investment as a result of deficit financing of government spending, he stated that the pushing-out of private investment need not happen in the event of application of an accommodating monetary policy. On the other hand, it can lead to growth of incomes and growth of savings, so that debt can be beneficial. In spite of this, the pushing-out effect occurs if the economy has full employment. Elimination of the pushing-out effect can be achieved, in his view, by an orientation to a cyclically balanced budget.

F. Modigliani worked for 5 years on an extensive model of the economy of the USA, sponsored by the Federal Reserve System, which applied the findings from the model with the aim of achieving the expected effects of economic policy.

During his life, F. Modigliani has remained in close contact with the Italian political scene and with the Italian central bank (the Bank of Italy). It can be said that he has greater popularity in Italy than in the USA. He has given many recommendations to Italian politicians and to the central bank. His great influence can also be documented by the fact that he attracted outstanding Italian students to the Massachusetts Institute of Technology, and he also succeeded in gaining some of the Italian students studying at Cambridge in Great Britain.

Conclusion

F. Modigliani can be described as an many-sided and erudite economist, who was able to launch many passionate discussions between economists from various theoretical schools, as well as between his closest colleagues. He is an economist, who has cooperated with a series of other important economists, which is reflected in their joint authorship of many articles and works.

The main works of F. Modigliani:

- Liquidity Preference and the Theory of Interest and Money, Econometrica, Vol.12, No1, 1944.
- Fluctuations in the Saving – Income Ratio: A Problem in Economic Forecasting. In Studies in Income and Wealth, No11, 1949.
- The Predictability of Social Events (with E. Grumburg), Journal of Political Economy 62, pp. 465 – 78, 1954.
- The Cost of Capital, Corporation Finance and the Theory of Investment (with M. H. Miller), American Economic Review, 1958.
- The Pasinetti Paradox in Neoclassical and More General Models (with P. Samuelson), RES 1969.
- Central Bank Policy, the Money Supply and the Short – Term Rate of Interest (with R. Rasche, J. P. Cooper), Journal of Money, Credit and Banking, Vol.2 (2), pp. 166 – 218, 1970.
- Inflation, Rational Expectations and the Term Structure of Interest Rates (with R. J. Shiller), Economica, Vol. 40(157), pp. 12 – 43, 1973.
- Collected Papers of Franco Modigliani, Vol. 1 Essays in Macroeconomics (with A. Abel, S. Johnson), Vol. 2 The Life Cycle Hypothesis of Saving (with A. Abel, S. Johnson), Vol. 3 The Theory of Finance and Other Essays (with A. Abel, S. Johnson), 1980.
- Collected Papers of Franco Modigliani, Vol. 4 Monetary Theory and Stabilization Policies (with A. Abel), Vol. 5 Savings, Deficits, Inflation and Financial Theory (with A. Abel, S. Johnson), 1989.
- Government Debt, Government Spending and Private Sector Behaviour : A Further Comment (with A. G. Sterling), American Economic Review, Vol. 80 (3), pp. 600 – 603, 1990.
- The Age – Saving Profile and the Life – Cycle Hypothesis (with T. Jappelli), CSEF Working Papers 09, Centre for Studies in Economics and Finance, University of Salermo, Italy, 1998.