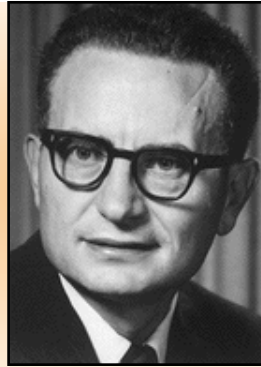


PAUL ANTHONY SAMUELSON

FIRST AMERICAN NOBEL LAUREATE IN ECONOMICS

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P. A. Samuelson, one of the most significant economists of the second half of the 20th century, was perhaps most renowned for his *Economics*, which justifiably is considered to be the most successful economics textbook of all time. According to Assar Lindbeck, Samuelson more than any other contemporary economist contributed to “increasing the general analytical and methodological level of economic science”. Samuelson wrote of himself: “In



this age of specialization, I sometimes think of myself as the last ‘generalist’ in economics, with interests that range from mathematical economics down to current journalism. My real interests are research and teaching”. In his research work Samuelson dealt with the modern welfare economics, linear programming, Keynesian economics, economic dynamics, the theory of international trade and finance, logic choice and maximisation.

P. A. Samuelson was born on 15 May 1915 in Gary (Indiana). He attended several schools in Gary, Indiana, Chicago and Florida. In January 1932, he began his studies at Chicago University, received his bachelor degree in 1935 and master's degree in 1936. He received his doctorate of philosophy at Harvard University in 1941, where his teachers included the greats of American economics at the time – A. Hansen, W. Leontief, J. A. Schumpeter as well as the mathematical physicist and mathematical economist E. B. Wilson.

Samuelson wrote his first article “A Note on the Measurement of Utility” (1937) as a 21 year-old graduate student. By 1938 he had already published five articles, a rate which he then continued almost unflinching for half a century. The article which first brought Samuelson international recognition was “The Interactions between the Multiplier Analysis and the Principle of Acceleration” (1939). His first major work “Foundations of Economic Analysis” (1947), which was received to great scientific acclaim, was based on his 1941 excellent dissertation.

Samuelson's scientific and teaching career is connected with the Massachusetts Institute of Technology (MIT), where he began working in 1940. He was appointed an associate professor in 1944 and in 1947 professor at MIT. P. A. Samuelson has gathered almost all honours the profession can offer. The first award was the David A. Wells prize, granted to him by Harvard University in 1941. In 1947 he was the first economist to be awarded the prestigious John Bates Clark Medal, granted by the American Economic Association. The greatest

award for Samuelson was, naturally, the Nobel Memorial Prize in economics, which he received as the first American economist in 1970. In 1971 he received the Albert Einstein Memorial Prize. P. A. Samuelson was the president of the American Economic Association (1961), the Econometric Society (1951) and the International Economic Association (1965 to 1968). Various universities honoured Samuelson, granting honorary doctorates and other scientific awards.

Professor Samuelson often served as a consultant and adviser at various economic and political institutions. He often appeared as an expert in Congress, was an informal consultant to the American Treasury and the Council of Economic Advisers. He was also J. F. Kennedy's adviser, where his “Samuelson Report on the State of the American Economy to President - elect Kennedy” of 5th January 1961 brought him especial praise. Samuelson was one of that rare type of scientist who was able to communicate with the lay public. For many years (1966 - 1981) he contributed regularly to the Newsweek economic column, alternating with professor M. Friedman in commenting on important economic issues. Samuelson's form of argumentation was convincing in particular because he always believed in “Common sense economics”. In the 16th edition of *Economics* he wrote: “If economics does not agree with common sense, then it is not good economics”. In terms of economic philosophy, professor Samuelson calls himself “a ‘modern’ economist in the right wing of the Democratic New Deal economists”.

Foundations of Economic Analysis Consumer theory and welfare economics

The work which brought Samuelson greatest international scientific acclaim was the *Foundations of Economic Analysis*, published in 1947. The work's content is

partially described by the motto taken from J. Willard Gibbs “Mathematics is a language”. Samuelson started from the idea that mathematics is essential for a renaissance of economic science. He saw mathematical language as a prerogative in the fact that it opens doors to an exact science, and he saw mathematics an instru-



ment for resolving the contradictions and errors that accompany the use of the “classical language of economics”. Samuelson’s contribution lies primarily in the fact that with the help of new analytical and methodological instruments he reworked a significant part of economic theory. Here Samuelson pointed to the “principal unity of problems on the one hand and analytical techniques in economics on the other, partially by the fact that he systematically used the methodology of maximisation for a wide spectrum of problems”.

Samuelson in this work worked from the fundamental principle of “generalization by abstraction”, which had been formulated by the excellent American mathematician E. H. Moore. The essence of this principle may be characterised as: if analogies exist between central features of various theories, then according to the generalization principle a general theory can be created, “which is the basis of the particular theories and unifies them with respect to those central features”. Each specific area of economics (for example, consumer’s behaviour, international trade, public finance, business cycles, income analysis) is in Samuelson’s view merely a specific manifestation of this general economic theory. The task of the economist is then to prove that in each of these fields there exist formally identical meaningful theorems, derived by an essentially analogous method. In his analysis he started from two general principles, that of maximization and his own correspondence principle which he understood as the interdependence between a static model and the stability conditions necessary from the aspect of dynamics. According to this principle the hypothesis of dynamic stability of a system yields restrictions, allowing questions of comparative equilibrium to be answered. This principle has the same importance for macroeconomic statics as the principle of maximization has for the individual or firm.

A characteristic feature of the Foundations of Economic Analysis as well as his later works is the attention Samuelson devotes to theoretical concepts of his predecessors - both older (e.g. Jevons, Böhm-Bawerka, Walras, Pareto, Marshall), as well as contemporaries (e.g. Keynes, Hicks, Leontief, Kalecki, Schumpeter, Lange, Pigou, Hansen, Wald, Bergson). Thus Samuelson realised fully what great advantage the cumulative aspect of scientific knowledge holds for science. In this he referred to Newton, according to whom “a scientist sees further than his predecessors because he stands on the shoulders of earlier giants”.

Samuelson’s contribution to economic science extends across a wide range of fields. The first is undoubtedly dynamic theory and stability analysis, contained primarily in Foundations. Statics are, according to Samuelson, simply one single case of dynamics. In contrast to a static system, a dynamic system always

includes the functional relationship between variables and the rates of their change. Dynamic analysis is not limited to equilibriums. On the contrary, emphasis is given to the question of how a system in disequilibrium behaves. Samuelson’s contribution lies in the fact that he made more precise the conditions in which an economic system is stable, in the sense that from itself it has a tendency after a period of disorder to return into equilibrium.

Another field to which Samuelson contributed is the consumer theory and welfare economics. His major achievement in consumer theory was the hypothesis of revealed preferences, and which was to “cleanse demand theory of the last traces of the utility concept”. All consumer theories were as a rule based on the assumption that households reveal a well-defined structure of consumer goods preferences in the sense that they can determine how they value alternative baskets of consumer goods. Samuelson approached this problem from the other side in the way that he determined preferences on the basis of comparable behaviour. In such a case it is no longer required that a household is able to assess all possible sets of goods, but merely those it actually encounters on the market. It is assumed that the household reveals its preference through its own behaviour. Revealed preferences link the theory of demand, index numbers and parts of welfare economics. As regards welfare theory, Samuelson made a link to the work of his Harvard fellow student, A. Bergson whose social welfare function he regarded as the best way of understanding social welfare issues.

Capital theory, international trade and finance

Of the other fields Samuelson significantly enriched, it is necessary to mention capital theory. One branch of criticism of traditional capital theory rested on the assumption that the term “aggregate capital stock” may be created, i.e. to express in money the total value of all capital goods. Samuelson however (in co-operation with R. Solow) showed that logical capital theory may be developed also without adopting the term aggregate capital. A further contribution for capital theory was his elaboration of the economic efficiency condition in time. “In connection to this it is necessary to look at his famous turnpike theorem, which shows that it can be optimal for a country to choose a growth trajectory having the maximum rate of growth - which is termed a turnpike - where proportions between the productive sectors are quite different from the initial proportions, as well as from terminal proportions expected to be achieved”. In his Nobel Memorial lecture Samuelson described the importance of “the turnpike theorem” in this way: “So in economics: to develop a country most efficiently, under certain circumstances it should proceed



rather quickly toward the configuration of maximum balanced growth, catch a ride so to speak on this fast turnpike, and then at the end of the twenty year plan move off to its final goal”.

One of Samuelson's most important contributions to the development of economic theory are those which had an influence on the theory of international trade. This concerns primarily his analysis of gains from trade, the analysis of the transfer problem and contributions dedicated to Ricardian, Heckscher-Ohlin and also the Viner-Ricardo model. His first contribution in this field was the article Protection and Real Wages (1941), written in cooperation with W. Stolper. Samuelson proved that from the imposition of a tariff will benefit the factor of production that is relatively scarce (in relation to the other country). The opening of trade on the other hand benefits the relatively abundant factor. Economists have long been occupied with the question of whether a country as a whole gains from foreign trade. Samuelson showed that the individuals who gain through this trade will be richer, even if they were to have to wholly compensate the losses of those whose position has in consequence of international trade worsened. “In this sense free trade is potentially superior to protectionism”.

In current literature in analysing the determinants of a real exchange rate there is often mentioned the Balasa-Samuelson effect, which should be a long-term source of real appreciation of domestic assets. If a certain country starts on a successful transformation and moves to a course of growth having faster productivity growth in comparison with the country it is catching up on, then wages in both tradable and non-tradable goods sectors in the country will grow faster. Prices in the tradable goods sector grow slower, or fall, since the growth of wages is compensated for by productivity growth. In the non-tradable goods sector however prices rise more quickly, because growth in wages is accompanied by only slight productivity growth. In consequence of this inflation in a transitional economy grows faster than in a developed economy, whereby its currency appreciates in a real terms.

One of his most significant contributions up in the field of finance was his article of 1965, entitled “Proof that properly anticipated prices fluctuate randomly”. In this article Samuelson provides the first precise formulation of the consequences of market efficiency for speculative prices. He returns to this question in Economics, where he writes: “The theory of market efficiency explains why share price movements seem so irregular. Prices react to new information, to surprises. Surprises are however unforeseeable events, ... since share price movements are a reaction to irregular events, share prices too move irregularly, randomly”. Samuelson also covered the field of public finance, contributing to this field through his

articles on the pure theory of public expenditure. Samuelson tabled and also partially resolved key problems of normative public finance theory. This concerns these questions: 1. How can public goods be defined analytically? 2. How can the optimal allocation of resources for the production of such goods be characterised? 3. What can be said about the project of an efficient and just taxation system that enables the financing of public sector expenditure?

Macroeconomics

Most of Samuelson's works that we have described concern microeconomics, where prevalingly he takes a neoclassical approach. Despite this, in his works devoted to macroeconomic topics - perhaps with the exception of the neoclassical consumption loans model - the influence of Keynes comes through. The same can also be said of his breakthrough article, in which he presented the multiplier-accelerator model. This model was actually an algebraic generalization of a numerical example used by A. Hansen in clarifying the recession in 1938. Samuelson proved that at various values of the propensity to consume and accelerator various business cycles are possible. The interaction of the multiplier and accelerator appears as something of a Dr Jekyll during a period of expansion who can then change to a Mr Hyde seen from a period of depression. This model shows that the interaction of the multiplier and accelerator can induce regular changes in aggregate demand. Samuelson's analysis showed that the accelerator is not the decisive factor of the national income dynamic, but rather that it supplements and strengthens the multiplier effects.

Thanks to Economics the 45-degree diagram depicting the basic macroeconomic variables became very popular. Through this model, which provided the apparatus for developing an effective fiscal policy, Samuelson justified his opinion that the key determinant of output is aggregate demand. Samuelson was always convinced of the need for certain government interventions in the economy. In his view the economic system, “is not perfect and frictionless so that there exists the possibility of unemployment and under - utilization of productive resources”. Samuelson always worked from the assumption of price and wage stickiness and also his policy advice relied on this basis. Samuelson - similarly as Keynes - did not to agree with Pigou's thesis that the flexibility of nominal wages can be an alternative to an active flexible monetary policy and he never regarded the Pigou effect, which expresses the consequences of a fall in prices on the real purchasing power of money as being of real world significance.

In connection with Samuelson's contribution to macroeconomics mention is often made of the so-called



neoclassical synthesis, the basic content of which he outlined in articles in the early Fifties and in some editions of *Economics*. J. Tobin even described the neoclassical synthesis as Samuelson's greatest contribution to macroeconomic theory. In the 4th edition of *Economics* Samuelson spoke of "the grand neoclassical synthesis" like the synthesis of the real kernel of the modern determination of incomes with classical economic principles. In his view the neoclassical synthesis should remove the contradiction between aggregate macroeconomics and traditional microeconomics and bring them together in a complementing complex theoretical system, which should serve as the starting point of an effective combination of monetary and fiscal policy. He argues that monetary and fiscal policy can be used to keep the economy close to full employment, and the monetary-fiscal mix can be used to determine the rate of investment. One important component of the "neoclassical synthesis" concept is the Samuelson-Solow "Analytical aspects of anti-inflation policy" (1960). The authors in this work constructed a Phillips curve for the USA, warning explicitly however that their analysis of the inflation and unemployment relationship is short-term and cannot simply be taken as representative in the longer run.

As regards economic policy, Samuelson preferred rather targeting than rules, which accords to the spirit of the neoclassical synthesis. Samuelson on the one hand warned against weakening market forces, which leads, "to a stiffening of the economic arteries and to macroeconomic inefficiency". He did not however idealise the market and understood well its limitations. His statement "In the end, we render two cheers for the market, but not three", may be seen as bearing witness to this.

Samuelson's neoclassical synthesis represents the views of mainstream macroeconomics up until the 1980s, where its activist spirit manifested most during the Kennedy administration (the so-called new economy). The neoclassical synthesis however did not ensure a thorough theoretical integration of the macroeconomics and microeconomics, nor did it resolve all problems of the optimal combination of monetary and fiscal policy.

Money in Economics

Prvé vydanie *Ekonomie*, ktoré vyšlo roku 1948, začal Samuelson began to work on the first edition of *Economics*, published in 1948, soon after the Second World War when he returned to MIT. The sixteenth (and probably the last) edition, which he wrote jointly with Prof. W. D. Nordhaus, came out in 1998, i.e. its golden anniversary. *Economics*, which has been translated into many languages, including Slovak, became the new long-term successful model for textbooks, influencing

many other authors. As with each great work *Economics* too had its trials and tribulations. In the reactionary times of Senator McCarthy conservative MIT graduates, for example, asked the university president to not allow Samuelson to publish his apology of the "mixed economy". The university president Dr Compton however declared that, the day his academic teachers undergo censure, will be the day of his resignation as president. In the Sixties the situation repeated itself; the blow however came from the other side. Two volumes of *Anti-Samuelson* appeared, in which radical economists blamed Samuelson as an apologist of *laissez-faire* and a pander of capitalism. Samuelson took a lesson from these cold showers. "As far as I am concerned I learnt to pay special attention when dealing with controversial issues". The content of Samuelson's work has developed and gradually changed over time, reflecting the changing problems of the American and global economy, as well as their theoretical reflections. In the first edition, where he did not even use the term macroeconomics, for example, the post-war worry of a possible return to mass unemployment dominated, whereas later the approach from the aspect of the "neoclassical synthesis" was applied, he clarified the relationship of monetary and fiscal policies, placed greater emphasis on international issues and on clarifying new economic problems and warring schools of economic thought. Samuelson devoted great attention both to the "eternal" truths of economics, as well as innovations in the economy and economics.

A characteristic feature of all editions of *Economics* has been the attention Samuelson devotes to money, commercial and central banking, monetary policy, inflation, the money and financial market, and the international monetary system, foreign exchange rates and several theories of money. Samuelson understood money in the traditional sense, as a means of payment, or means of exchange. He often compared it to a lubricant, facilitating exchange. On the other hand however he warned: "But like other lubricants, money can get gummed up". It can also get out of control and cause a hyperinflation. Therefore Samuelson considered proper money supply management as one of the main macroeconomic policy tasks of a government.

His introduction to the analysis of money begins with the statement by J. K. Galbraith: "Over all history, money has oppressed people in one of two ways: either it has been abundant and very unreliable, or reliable and very scarce" (*The Age of Uncertainty*). Following a brief outline of the history of money, in which he draws attention to rapid innovations in the development of forms of money, he examines in detail the various types of money, i.e. transactions money (M1) and broad money, i.e. asset money (M2). From this he then moves to a clarification of interest rates and the difference bet-



ween nominal and real interest rates. An important part analyzing the demand for money is influenced by Keynes' approach, where Samuelson points out that assets other than currency or checking deposits - such as government securities or safe money market mutual funds are just as safe as M1 and besides have higher interest rates.

Samuelson's exposition of commercial banking, which has been developed from goldsmith establishments, is very interesting. In connection to this he mentions that a banking system with 100 % reserves "has a neutral effect on money and the macroeconomy, because it has no effect on the money supply". Modern banking however functions with fractional reserves, which enable the creation of money (the money-supply multiplier). From these fundamental issues Samuelson then goes on a "tour of Wall Street" into the fascinating world of the financial economy, where from stock market, bubbles and crashes he arrives to the efficient market theory mentioned earlier, in which he outlines the principles of a personal financial strategy.

One of the peculiarities of the economic history of the USA is the relatively late establishment of central banking in the form of the Federal Reserve System (1913), at the head of which there presently stands the perhaps most acclaimed personality in the banking world Alan Greenspan. Here the formulation of the FRS goals merits our attention. These goals differ partially from, for example, the ECB's monetary strategy. The Federal Reserve's objectives include economic growth in line with the economy's potential, a high level of employment, stable prices and moderate (or low) long-term interest rates.

After an examination of the basic building blocks of the theory of money and monetary policy he links to an analysis of the monetary transmission mechanism, i.e. the way by which changes in the money supply are translated into changes in output, employment and inflation. Samuelson describes this as a sequence of five steps, beginning with changes in commercial bank resources brought about by the FRS, then to a multiplied change in the total M, to changes in interest rates and credit availability, to changes in investment spending, that shift aggregate demand, and finally to the response of output, employment and inflation. This five-step sequence is vital to the determination of output and prices.

Samuelson analyses monetary policy in the AD-AS framework, by means of which the effects of both an expansionary, as well as a restrictive monetary policy can be shown. Monetary expansion bids market interest rates down, which stimulates interest-sensitive spending: business investment, housing, net exports etc. Aggregate demand is increased via the multiplier mechanism, in consequence of which output and prices

rise above the levels they would otherwise attain. Monetary contraction, however, is the opposite case and its consequence is a lowering of output and prices. Samuelson, however, points out that the role of unemployed resources must not be neglected, since the effect of a shift in the AD curve in an economy with full employment is different from that in an economy with unemployment.

As regards the effects of changes in the money supply in the long run, only the nominal variables change - nominal GDP, wages, prices, the nominal value of wealth etc. In the long run, however, monetary policy does not affect real GDP, real wages, real incomes etc. In such a case we say that money is neutral.

Questions of macroeconomic (and thus also monetary) policy are dealt with also in other parts of Economics, for example in the chapter Open-Economy Macroeconomics. Samuelson discusses two cases, the functioning of monetary policy in a system of flexible and fixed exchange rates. Monetary policy, of course, cannot be avoided either in the chapter entitled The Warring Schools of Macroeconomics, which deals with Keynesian economics, monetarism and new classical macroeconomics. In the description of Keynesian economics Samuelson states that Keynesians do not believe in the existence of a self-regulating forces, i.e. the invisible hand, which would lead an economy from disequilibrium back to full employment. Keynesian economists desire "to supplement growth policies with appropriate monetary and fiscal policies, to curb business cycles excesses".

The essence of monetarism, which on the contrary believes in the effectiveness of the self-regulating forces, may be characterized by means of three central theorems: 1. The money-supply growth is the prime systematic determinant of nominal GDP growth. 2. Prices and wages are relatively flexible. 3. The private sector is relatively stable. To this he then links an exposition of monetarist economic philosophy and an evaluation of the monetarist experiment in the USA. This experiment, which began to be implemented in October 1979, was undoubtedly successful in slowing economic growth and reducing inflation. Not everything however developed according to monetarists' predictions and monetary aggregates in the USA ceased to be used as signals for monetary policy.

In several editions of Economics Samuelson deals with the interaction of monetary and fiscal policies. In a large economy (like the USA) the optimal combination of monetary and fiscal policies in his view depends on a) the need for demand management and b) on the desired fiscal-monetary mix. The most important factor that needs to be taken into consideration is the overall state of the economy and the need to adjust aggregate demand, i.e. whether the economy is threatened by



stagnation, recession or inflation. According to the nature of the disorder fiscal and monetary policies can either stimulate (in the case of a recession) the economy or contribute to its slowdown (in the case of an overheating boom) and dampen inflationary fires.

The second factor affecting fiscal and monetary policy is the desired fiscal-monetary mix, which refers to the relative strength of fiscal and monetary policies and their influence on various sectors of the economy. The basic idea lies in the fact that fiscal and monetary policy are substitutes in demand management. But while alternative combinations of monetary and fiscal policies can be used for stabilising the economy, their influence on the composition of output (i.e. the share of GDP devoted to business investment, consumption, net exports and government purchases of goods and services) is however different depending on the mix of taxes, government spending and monetary policy.

Samuelson comes to the conclusion that fiscal policy is no longer a major tool of stabilisation policy in the USA. Over the foreseeable future, stabilization policy

will be primarily handled by FRS monetary policy, which however is influenced also by other factors - in particular the exchange rate system and the degree of the economy's openness.

P. A. Samuelson was an exceedingly resourceful and humorous person, as can be seen in his numerous presentations at various conferences and symposiums, as well as in his reactions to journalists' questions. For example to the question, "How can one win a Nobel Prize?", he answered with a straight face that it is necessary to work hard, know great teachers and great contemporaries at important university centers and have excellent students. Finally, in a crescendo of becoming modesty, he concluded by stressing the indispensable role of simple Luck. The final word must be left to Laureate of Nobel Memorial Prize in Economics (1985) Franco Modigliani, who after the speeches at the 1983 party in Samuelson's honour walked over to the seated Samuelson, wagged his finger at him, and said "You" and after a pause added: "You have enriched our lives".

The most significant works of P. A. Samuelson

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| <ol style="list-style-type: none"> 1. Foundations of Economic Analysis (1947). 2. Economics: An Introductory Analysis (1948). 3. Linear Programming and Economic Analysis (1958, spoluautori R. Dorfman a R. M. Solow). 4. Maximum Principles in Analytical Economics. Nobel Memorial Lecture (1970). | <ol style="list-style-type: none"> 5. Pure Theory of Public Expenditures and Taxation (1969). 6. The Interaction between the Multiplier Analysis and the Principle of Acceleration (1939). 7. Analytic Aspects of antiinflation policy (1960, spoluautor R. M. Solow). 8. Consumption Theory in Terms of Revealed Preference (1943). |
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