

## JAMES TOBIN

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*On 12 March 2002 at the age of 84 the Nobel laureate for economics and one of the leading representatives of current neo-Keynesianism American economist James Tobin died. He was awarded the Nobel Prize for economics in 1981 for his portfolio theory, for analysis of the ways by which changes in financial markets (i.e. on the money and financial markets) influence real markets, in*



*which entities take decisions on consumption, production and investment. The Nobel Prize was awarded to James Tobin just at a time when for many it was a surprise, since the start of the Eighties was characterised by an intensive growth in conservatism and the rise of anti-Keynesianism, while Tobin was essentially in opposition to the neo-conservative approach to economic policy.*

James Tobin was born in 1918 in Champaign, USA. His father was a journalist and his mother a social worker. In 1946, James Tobin married Elizabeth Fay Ringo, an economics graduate at MIT (Massachusetts Institute of Technology), where her teacher was P. Samuelson. Together they raised four children – a daughter and three sons.

James Tobin studied economics at Harvard University (1935 – 1939). Many of Tobin's colleagues later became leading personalities in economics – Paul A. Samuelson, Lloyd Metzler, John Kenneth Galbraith, Richard Musgrave, Paul Sweezy and others.

During the Second World War Tobin worked for some time in Washington in the Office of Limiting Civil Consumption of Metals and later on for four years in the US Navy. After the end of the war he returned to Harvard, completing his doctorate in 1946 – 1947. His doctoral dissertation was a theoretical and empirical analysis of the consumer function, which

came to be a long-term interest of his. In 1947 he was elected Member of the Society of Fellows. From 1950 onwards he worked at the School of Econometrics at Yale University.

By the end of the Fifties James Tobin had begun to write occasional articles on economic issues current at that time and which were intended mainly for the lay public. In 1966 to 1970 he worked as Chairman of the Planning Commission for the town of New Haven, though J. Tobin's main contribution in public life was primarily his membership in the Council of Economic Advisers to President J. F. Kennedy in 1961 – 1962. He was also an active consultant to the Council later following his return to Yale. He worked at Yale University for more than 50 years as teacher and scientist. Even following his retirement he continued to take an interest in current developments in macroeconomics, as is documented by his books "Full Employment and Growth" and "Money, Credit and Capital" of 1997.

### Modern Keynesian approaches to the demand for money

The Keynesian theory of the demand for money was elaborated in the Fifties by several authors (primarily W. Baumol and J. Tobin), who reached the conclusion that not only the speculative motive of holding money is a function of the interest rate, but that also the transaction and precautionary motive are derived from the interest rate. J. Tobin further elaborated also the speculative demand for money.

#### a) The Baumol-Tobin model of the transaction demand for money.

In contrast to the original Keynesian approach this model proves the transaction demand for money to be dependent on the interest rate. The model as a whole is based on the fact that income, which a subject retains for a period (usually one month),

can be held either in the form of money, bearing no yield (or only a minimal yield on a current account) or in the form of bonds with a positive yield.

The Baumol-Tobin model considers the hypothetical individual, who receives an income paid at the start of a period and expenditures incurred evenly throughout the period. Income that the subject gets at the start of the period can be deposited to a greater or lesser extent in various assets – in the model bonds bearing a fixed income are considered. The rest of the income is used for expenditures. As soon as the un-saved part of the income is consumed, bonds are periodically sold and the proceeds is used to cover expenditures until the end of the period. At the start of the following period the subject again receives income and the situation is repeated.

Each conversion (sale or purchase of bonds) is necessarily connected with certain transaction costs



(brokerage fees for mediating the sale, loss of time expressed in money) and also the loss of income, which alternative assets bear. If the subject decides to hold a large amount of money, and thus converts non-cash assets into money less often, then expenses for conversion are reduced, but large opportunity costs arise to him (the costs of a sacrificed opportunity), which are actually losses due to the fact that the money was not stored in alternative income assets.

Conversely, if the subject decides to hold less money, then he/she will have to convert bonds to money more often. His opportunity costs will be lower; on the other hand however the period, for which money is consumed, will be shorter and thus he will have to sell bonds more frequently, in consequence of which costs for conversion will rise.

The outcome? The subject behaves rationally, i.e. he/she chooses an amount of money that minimises total costs, which are the sum of transaction costs (costs for conversion) and opportunity costs (loss of alternative income).

It is clear that the amount of money reserve depends not only on income, but also on the interest rate which influences the level of opportunity costs. Holding bonds is more attractive for the subject when the interest rate is higher. The interest rate thus operates indirectly proportionally not only on the speculative demand for money (Keynes' position), but also on the transaction component of the demand for money. Against this brokerage costs necessary for purchasing securities influence the transaction demand for money proportionally - the higher they are, the greater the wish to hold cash, money. The mathematical derivation of subject's behaviour is shown in the following equation, which expresses the transactions demand for money:

$$M^D = \sqrt{\frac{b \cdot Y}{2r}}$$

where:

$b$  = transaction costs for intermediating a sale (including transport, loss of time)

$Y$  = amount of money which the subject will receive at the start of a given period

$r$  = rate of return on the bond

Synopsis: from the Baumol -Tobin model it results that the transaction demand for money is a growing function of income and a declining function of the interest-rate. The significant finding of this model is the conclusion that the level of the interest rate influences money holding (also) for transaction purposes.

### b) Portfolio selection theory. (Tobin's theory of the speculative demand for money)

J. Tobin elaborated on Keynes' theory of the speculative demand for money and developed into a form of the portfolio selection theory (the structure of financial assets by subjects).

In his portfolio theory Tobin attempted to avoid some of the weak (and criticised) points of Keynes' theory - mainly the too high level of the model's abstraction. A necessary shortcoming of the original Keynes' analysis of speculative demand for money was the claim that subjects hold all their wealth either in the form of money or in the form of bonds (in the case of high interest rates). It is thus clear that he did not consider the possibility of diversification.

Keynes' theory of speculative money holding assumed that subjects hold only bonds, if their expected yield is greater than the expected yield of money (which is, according to Keynes, nil), or only money, if the expected yield of bonds is less than the expected yield of money. Only in an exceptional case, where the expected yield of bonds as well as of money are identical, would people hold bonds as well as money. From Keynes' theory it thus results that practically no one would hold concurrently money and bonds (i.e. would not hold a diversified portfolio), which however does not correspond to reality.

J. Tobin attempted to counter these weak points. He worked from Keynes' assumptions that subjects hold wealth in money or in bonds, where money bears a zero yield. At the same time he elaborated on the Markowitz portfolio theory (1952), which shows that the variability of yields (rate of risk) may be reduced by investing in assets whose prices do not move in conjunction.

J. Tobin constructed a model of the speculative demand for money for the situation when an individual considers not simply the yield of assets, but also the level of their risk. Money is an asset with in usual circumstances a zero yield, but also with zero risk (*ceteris paribus*). On the other hand bonds may show a positive yield, but also represent a certain level of risk (potential loss).

People have different levels of aversion to risk, and so it is also probable that they decide to hold a certain diversified portfolio of money and bonds and not solely money or solely bonds.

On the basis of a comparison of yields and risks connected with various alternatives of securities holdings and - speculative money balances Tobin created an optimum portfolio structure model. An important rule is the diversification of a portfolio into vari-



ous assets types, or put differently, “don't put all your eggs in one basket”. The optimum portfolio is as a rule a combination of low risk and high risk assets. Rational investors therefore diversify their wealth across various assets with varying degrees of risk. It is in this that Tobin's theory differs significantly from Keynes' approach. The main conclusion of both theories is however the same: the speculative demand for money remains a declining function of the interest rate.

Tobin's theory of risk aversion is a new interpretation of why in the asset portfolios of rationally behaving subjects there can be found money which does not directly bear any yield.

As F. Mishkin points out, Tobin's efforts to perfect Keynes' explanation of speculative demand was only partially successful, since there remains open the question of whether indeed there does exist a speculative demand at all. If there exist assets having zero risk (similarly as money), but which promised a higher yield - and such assets do exist in the USA, for example treasury bills, mutual fund shares on the financial market and other assets where there is no threat of non-payment - then an individual will give priority to holding these assets. This relativises money holdings as holders of wealth (Mishkin, 1991, page 379).

### Consumption theory

J. Tobin throughout his life devoted great attention to the theoretical and empirical analysis of the consumption function. He continued on from Keynes' theory of absolute income, according to which current consumption is a function of current income.  $C_t = f(Y_t)$ , as well as Duessenberry's theory of relative income, according to which current consumption is affected by current income as well as the highest income achieved in the past  $C_t = f(Y_t, Y_{max})$ . In 1951 he proposed the introduction liquid assets (LA) among the arguments of the consumption function  $C_t = f(Y_t, LA_t)$ . From his consumption function it results that the consumption function is conditional upon income as well as assets owned by a household. This equation now documents the combination of flow and state variables together, meaning an effort to interconnect short-term and long-term effects.

After the publication of Friedman's book “Theory of the Consumption Function” (1957) Tobin was the first to attempt an interpretation of Friedman's concept of permanent income, which is characterised by its approach to analysing the question of consumption from a long-term perspective. This concept differentiates the normal (permanent) component of current

income from the transitory component and understands consumption as a function of only permanent income, whereas transitory income is saved.

On the basis of research Tobin reached the conclusion that there exists an apparent short-term instability of the propensity to consume, but at the same time there is indisputable long-term stability of the propensity to consume. This conclusion also corresponds fully with Modigliani's life cycle model, which also contains long-term influences and still represents an authoritative basis for the analysis of consumption (or saving as its counterpart). The starting point is the long-term “life-long” considerations of subjects: consumers give preference to stable consumption against volatile and therefore save (or reversely draw on their savings) in order to balance out irregularities in their income.

Tobin's consumption theory is innately connected with his portfolio theory, since the decisions of individual subjects on the structure of their assets and the rate of risk they are willing to bear in order to increase the total volume of their assets is at the same time a decision on their consumption.

### Tobin's Q-Theory – the search for new transmission mechanisms of the monetary impulse

The traditional Keynes money mechanism takes the form:

$$M \uparrow \rightarrow i \downarrow \rightarrow I \uparrow \rightarrow Y \uparrow.$$

Nonetheless the influence of interest rates on investment was doubted. Later, as monetarists proved the fundamental role of money, many economists began to look for new channels through which the money supply influences economic activity. In the first works on the transmission mechanisms of the monetary impulse emphasis was placed on investment processes (since Keynes' had several times emphasised the role of investment in the business cycle).

Economists expected that monetary policy may have an effect upon investment expenditure via share prices. Tobin in his Q-theory connected the level of investment expenditure with stock prices. In 1969 he defined the variable  $q$  as the share of the market value of an enterprise (the sum of share prices) and the replacement cost of capital. Through aggregating the value  $q$  of individual businesses is reached the value  $Q$  for the whole economy. In the case of a growth in share prices there occurs a growth in the value  $Q$ , which individual companies means that it is relatively cheap to replace capital (for example through issuing shares to gain more



funds). This leads to a growth in investment with an impact on growth of the nominal product.

The main conclusion of our reasoning of Tobin's Q-theory is a confirmation of the existence of a mutual link between the coefficient  $q$  and investment expenditure.

The question arises: how can monetary policy influence share prices? This may be explained as follows: if the money supply grows, people realise they are holding more money than they want to. Therefore they try to "get rid of it" (spend). Some people use the money to buy shares, thereby the demand for this type of security grows, and similarly does their value (price). The growth in share prices ( $P_A$ ) increases the market value of firms and thus leads to a growth in the coefficient  $q$  and a growth in investment expenditures.

The transmission mechanism of monetary policy then looks as follows:

$$M\uparrow \rightarrow P_A\uparrow \rightarrow q\uparrow \rightarrow I\uparrow \rightarrow Y\uparrow.$$

Tobin's analysis documents the important role played by the stock market as a source of information and as an allocation mechanism of savings and investment in the national economy as well as at the international level.

### Macroeconomic policy – problems of inflation and unemployment (the Tobin mix)

J. Tobin was a great adherent of Keynes's theory which for him meant the basic starting point for economic thought. Tobin significantly modernised J. M. Keynes' theory, rejecting the orthodox *laissez-faire* concept and promoting state intervention in the economy, where he retained its objective (economic growth and full employment) and the logic for achieving them (active application of fiscal and monetary policy by the state). Many of Tobin's significant works are devoted to the application of macroeconomic theory in the field of economic policy. Noteworthy is his critical attitude to over-simplified monetarist approaches and recommendations. In the field of monetary policy in contrast to M. Friedman, who emphasised the influence of quantitative changes in the money supply on economic growth, Tobin mainly devoted attention to the qualitative aspect of this process, specifically analysis of the structure of the money supply and its effect over time. He was involved in elaborating macroeconomic econometric models, in which modelling operations of financial and monetary policy are placed at the centre, with the aim of achieving general economic equilibrium. His model of portfolio investment, encompassing a

wide spectrum of securities, provides economic policy with a much enriched arsenal than did previous models. Tobin's model also lent itself to examining the effect of fiscal policy on the economy.

J. Tobin described Keynes' approach to macroeconomic policy, requiring the active use of state measures for reduction economic cycles, as: "Keynes' policy is firstly the explicit use of macroeconomic policy instruments for real economy aims, specifically full employment and real growth in the national income. Secondly, Keynes' demand management is activist. Thirdly, Keynes wants to combine fiscal and monetary policy into a consistent and coordinated set of instruments for pursuing macroeconomic aims" (cited from Samuelson 2000, pg. 473).

Tobin as a disciple of Keynes considered the need for regulating demand as theoretically justified. He saw the main failure of the present market economy as being incomplete employment (under-employment), and not in inflation. He was convinced that unemployment brings with it huge losses and therefore rejected outright the view interpreting long-term recession (fall in production) as a means of fighting inflation.

Tobin often proposed a more active approach, aimed at expanding economic activity and proposing the adoption of measures for reducing unemployment even below its "natural" level. Often he focused on adjustments, since the advantages achieved through expanded employment are offset by losses brought about by inflation. When in 1970 he was elected president of the American Economic Society in an important inaugural lecture he focused on the issue of inflation and unemployment. He wholly rejected an increased combating of inflation to the detriment of unemployment. As one of the ways of solving the problem of unemployment he recommended the use (as a temporary measure) of a wage regulation policy. He emphasised the need for state control of wages and prices; he was convinced that this will contribute to overcoming a recession.

Tobin realised that for stabilising the economy there is needed a certain mix of fiscal and monetary policies, regarding their relative weights and impacts on various sectors of the economy. The basic idea lay in the fact that fiscal and monetary policy are substitutes in regulating demand.

The finding that changes in fiscal and monetary policy have different effects on the composition of the real GDP is important. It tells us that the conceivers of economic policy can select a certain combination of both policies. It is apparent that in solving the problem of an appropriate stabilisation policy different political preferences apply. Since Tobin was

always a fiery advocate of Keynes' economic theory it is no surprise that he was one of the most active critics of President R. Reagan's economic policy and the strict financial policy pursued by the Fed.

### Economic Growth

Even though the issue of economic growth was not the main focus of Tobin's interest, here he made a contribution, too. For example, in the article "Money and Economic Growth" (1965) he was one of the first in modern economics to seek a connection between monetary phenomena and the growth process. Although he approached the matter from the position of Keynesian economics, his approach differs from the static Keynes' theory (assumption of a constant supply of capital as a state variable), as well as from the dynamic variant in the form of Harrod and Domar's neo-Keynesian model (focus on flow variables as well as savings and investment). Instead of Keynes' investment function J. Tobin incorporated in his model a so-called demand for capital function. This enabled him to examine the variability of capital intensity in the production function, where in Tobin's view capital intensity depends on the interest rate, which is determined by money and the whole structure of financial assets.

Another of Tobin's important articles was in 1972, in which together with W. Nordhaus defined a new index for measuring economic welfare (Net Economic Welfare - NEW). NEW can be gained through an adjusting GDP, if we add to GDP activities (or, more precisely estimates of these activities) with a positive value—for example working for oneself, free time, quality of production, etc. and discount estimates of negative activities – negative externalities (environmental pollution), the illegal part of black economy, expenditures on weaponry , etc.

This indicator is aimed at better expressing the benefit of the economy for a person as opposed to the standard measure by means of GDP. It is however necessary to acknowledge that the problem of quantifying its components, which in fact are merely estimates, markedly devalues its significance.

### The Tobin Tax

James Tobin also 30 years ago (in the Seventies of the 20th century) proposed the taxation of international financial operations. The aim was to counter speculative international operations through a small tax of 0.1 – 1% of a transaction in the conversion of currencies in order to prevent financial crises and reduce the fluctuation of exchange rates, which afflicts mainly developing countries.

This proposal for long remained pure theory. The idea, which was largely ignored by central banks as well as leading economists, has now been adopted by antiglobalists and had a new element appended to it: that of money gained through the tax being used for the development of poor countries.

According to calculations by the UN a "Tobin tax" in the amount of 0.25% would allow USD 300 billion to be raised annually. (In these estimates there is already taken into account the reduction in the volume of foreign currency operations due to the tax's introduction). Were this money to be used for development it would allow the funds that developed countries currently spend on developing country aid to be increased by several times over.

Recently leading politicians in developed countries have begun to take this idea seriously. Any possible consideration over implementing a Tobin tax in the future however will not be realistic outside the context of seeking a new global financial architecture.

#### Important works of J. Tobin

James Tobin is one of the most important Keynesian theoreticians of the twentieth century. Through his work he continued on from J. M. Keynes, further developing and modernising it. He was known in the economics world as the founder and foremost advocate of the Yale School theory of money and portfolio selection theory. The most significant field of his scientific interest was money and finance, as well as the theoretical research and statistical analysis of consumption functions. Some of the most important works, in which Tobin examined these problems, are:

- Consumer Survey Statistics, A Report of Consultant Committee on Consumer Survey Statistics, Board of Governors of the Federal Reserve System (July 1955).
- National Economic Policy (Essays), New Haven: Yale University Press (May 1966).
- Risk Aversion and Portfolio Choice, J. Tobin and D. Hester, eds., Cowles Foundation Monograph No. 19, New York: J. Wiley & Sons (1967).

- Studies of Portfolio Behavior, J. Tobin and D. Hester, eds., Cowles Foundation Monograph No.20, New York: J. Wiley & Sons (1967).
- Financial Markets and Economic Activity, J. Tobin and D. Hester, eds., Cowles Foundation Monograph No. 21, New York: J. Wiley & Sons (1967).
- The New Economics One Decade Older, Princeton University Press (1974),
- Essays in Economics, Macroeconomics, Vol. I, Markham Pub. Co. (1971). (No.-Holland, 1974).
- Essays in Economics: Consumption and Econometrics, Vol. II, North-Holland Pub. Co., Amsterdam (1975).
- Asset Accumulation and Economic Activity (Reflections on Contemporary Macroeconomic Theory), Yrjö Jahnsson Lectures, Oxford: Basil Blackwell (1980).
- Essays in Economics: Theory and Policy, Vol. III, forthcoming, MIT Press (1982).