James Tobin, while universally acknowledged as one of the leading macroeconomists of the twentieth century, is less well remembered as a growth economist, despite his continuing interest in growth throughout his career. His early work placed him near the origins of modern growth economics. Robert Solow (2004, 657) recalls that Tobin “published ‘A Dynamic Aggregative Model’ at just the time when I was working on economic growth, so I recognized a master hand.”

According to Tobin, “My 1955 piece, ‘A Dynamic Aggregative Model,’ may be my favorite; it was the most fun to write. It differed from the other growth literature by explicitly introducing monetary government debt as a store of value, a vehicle of saving alternative to real capital, and by generating a business cycle that interrupted the growth process” (Breit and Spencer 1990, 130–31). That said, Tobin's analysis has failed to claim a place as a classic in the literature. Although the model in his 1955 paper has “the key features of the one-sector neoclassical growth model (a neoclassical two-factor production function in capital and labour, smooth capital-labour substitution, competitive factor markets),” and although “it includes several other features (outside fiat money in the asset menu, money wage inflexibility and
business cycle fluctuations),” Tobin’s model “has not received the credit it deserves” (Buiter 2003, F596).

Tobin’s (1965, 1968) subsequent work on long-run economic growth and capital formation in a monetary economy (see also Haliassos and Tobin 1990 and Tobin with Golub 1998) proved more influential, even though it was less ambitious. Tobin’s Fisher Lecture to the Econometric Society, “Money and Economic Growth” (1965), attracted considerable attention (see Johnson 1967; Solow 1970, chap. 4; Foley and Sidrauski 1971; Stein 1971; and Patinkin 1972). According to Athanasios Orphanides and Solow (1990, 257),

Tobin’s 1965 paper succeeded in framing the question that has dominated the literature since: Does the rate of monetary growth have any long-run effect on the real rate of interest, capital-intensity, output and welfare? He also established the framework within which the question would be debated: portfolio choice, where fiat money is one of several competing assets. It has turned out to be difficult to assess the “practical” relevance of the Tobin effect precisely because equally plausible models of portfolio balance can yield quite different answers. . . . Once again, we observe that seemingly small variations in a model change the conclusion regarding the effect of inflation on capital accumulation.

This facet of Tobin’s work generated a literature, but it is not a major component of current growth economics.

In this article, we review Tobin’s main contributions to growth economics and discuss some reasons why they have not, so far, proved of lasting influence. Tobin’s efforts to integrate short-run and long-run macroeconomic phenomena, an objective echoed in a number of current approaches to macroeconomics, rely on very different assumptions than these newer approaches. Hence current growth theory does not reflect Tobin’s overall vision. Yet this vision may still prove to be important.

**A Dynamic Aggregative Model**

The state of the art when Tobin (and Solow and Trevor Swan) turned to growth theory was represented by Roy Harrod (1939, 1948, 1952) and Evsey Domar (1946, 1957). The models of Harrod and Domar were widely interpreted as assuming fixed factor proportions and savings propensities, resulting in an unstable, “knife-edge” equilibrium. While Nicholas Kaldor (1956) proposed to eliminate this instability by making the propensity to
save endogenous, depending on the distribution of income between wages and profits, Tobin (1960) found the implications of this device untenable. Harold Pilvin (1953), Tobin (1955), Solow (1956), and Swan (1956) eliminated the knife-edge property of the equilibrium path via a richer specification of the aggregate production function: substitution between capital and labor rendered steady-state growth a stable equilibrium (although Swan denied that Harrod’s theory led to a knife-edge equilibrium and argued that he was only formalizing Harrod’s adjustment mechanism).

Tobin (1955, 103) objected that contemporary theoretical models of the business cycle and of economic growth typically possess two related characteristics: (1) they assume production functions that allow for no substitution between factors, and (2) the variables are all real magnitudes; monetary and price phenomena have no significance. Because of these characteristics, these models present a rigid and angular picture of the economic process: straight and narrow paths from which the slightest deviation spells disaster, abrupt and sharp reversals, intractable ceilings and floors. The models are highly suggestive, but their representation of the economy arouses the suspicion that they have left out some essential mechanisms of adjustment. The purpose of this paper is to suggest a simple aggregative model that allows for substitution possibilities and for monetary effects.

Tobin (1955) had factor substitution possibilities in common with Solow (1956) and Swan (1956), but the introduction of money in growth models was distinctively Tobin’s contribution, in keeping with the central role of money in his life’s work in economics. While the models of Solow and Swan yielded only steady-state paths of capacity growth in a fully employed economy, Tobin’s 1955 model had three possibilities: steady growth, cycles, or “continuing underemployment—‘stagnation’ during which positive investment increases the capital stock and possibly the level of real income. This outcome, like the cycle, depends on some kind of price or monetary inflexibility” (103).

Tobin assumed that the aggregate production function exhibited constant returns in capital and labor, so that the marginal products of the factor inputs depend only on the proportion in which inputs are used. Tobin’s model was thus in line with Solow’s and Swan’s. Tobin moved beyond their single-asset world by introducing money. There are only two stores of value:
physical capital ($K$) and currency ($M$). $M$ has an exogenous own-rate of interest (assumed to be zero), and the quantity of $M$ is also exogenous, with changes in the money supply level generated by government budget surpluses or deficits. Letting $p$ denote prices, real wealth ($W$) is equal to $K + M/p$, and portfolio balance (owners of wealth are content with the division of their wealth between capital and money) is determined by the standard money market equilibrium condition $M/p = L(K, r, Y)$. The partial derivatives of $L$ (the liquidity preference function) with respect to its three arguments are nonnegative, strictly negative, and strictly positive, respectively. “Requirements for transactions balances of currency are assumed, as is customary, to depend on income. . . . Given their real wealth, $W$, owners of wealth will wish to hold a larger amount of capital, and a smaller amount of currency, the higher the rent on capital, $r$. Given the rent on capital, owners of wealth will desire to put some part of any increment of their wealth into capital and some part into currency” (Tobin 1955, 105). Wealth owners are assumed to be risk averse: “The principle of ‘not putting all your eggs in one basket’ explains why a risk-avoiding investor may well hold a diversified portfolio even when the expected returns of all the assets in it are not identical. For the present purpose it explains why an owner of wealth will hold currency in excess of transactions requirements, even when its expected return is zero and the expected return on capital is positive” (106–7).

Tobin identified portfolio balance as “the one of the four building blocks of the model that introduces possibly unconventional and unfamiliar material into the structure” (105). Several of his section headings look unconventional from the vantage point of what has become the neoclassical growth model: “Technical Progress and Price Deflation,” “Monetary Expansion as an Alternative to Price Deflation,” “Wage Inflexibility as an Obstacle to Growth,” “Wage Inflexibility and Cyclical Fluctuations,” and “Wage Inflexibility and Stagnation.” In their 1956 articles on the neoclassical growth model, both Solow and Swan assumed that full employment was maintained by appropriate Keynesian policies operating offstage. Tobin (1955) incorporated both cyclical fluctuations and long-run capacity growth in one model. Because his article covered so much ground, the role of capital-labor substitution in a one-sector growth model stood out more clearly in Solow 1956 and Swan 1956, where it was the central theme, than in Tobin 1955, which aimed to “provide a link, generally absent in other models, between the world of real magnitudes and the world of money and prices” (113). The portfolio balance
framework (along with assuming that the supply of labor depends on the real wage, rather than being exogenous) led Tobin, unlike Solow or Swan, to a model in which “growth is possible at a great variety of rates and is not necessarily precluded when the labor supply grows slowly or remains constant” (113) because an appropriate inflation rate can induce capital deepening.

Tobin reached further conclusions beyond the scope of the neoclassical growth model: “In the absence of monetary expansion and technological progress . . . growth with stable or increasing employment cannot continue if the money-wage rate is inflexible downward. Given wage inflexibility, the system may alternate between high and low levels of employment and, concurrently, between periods of price inflation and deflation. . . . Alternatively, the system may ‘stagnate’ at less than full employment, quite conceivably with capital growth and reduction of employment occurring at the same time” (113).

Although Tobin 1955 was reprinted in such widely read collections as Stiglitz and Uzawa 1969 and Sen 1970, it proved to play little role in growth economics. This lack of impact is reflected in the single textual reference to the paper in Frank Hahn and Robin Matthews’s (1964) classic survey of growth theory.

Why did Tobin’s 1955 paper, despite its scholarly brilliance, fail to influence growth economics? One reason is that the range of topics covered and the multiplicity of possible outcomes lessened its impact, as compared with Solow 1956 or Tobin 1965, each of which had a clear, unmistakable central message. Buiter (2003, F596) shares this view: “It is probably the vast ambition of the paper and its failure to deliver on all of its objectives that account for the too limited recognition it has received.”

A second reason may involve the model’s utility in terms of empirical analysis. Solow’s model has proved extraordinarily useful for interpreting empirical patterns, of which Kaldor’s famous stylized facts are the best-known example. It is important to recognize that the link between the Solow model and empirical growth patterns emerged after the publication of the paper; Solow 1970 provides links between theory and empirics that are absent in Solow 1956. Perhaps equally important, Solow’s theoretical analysis was quickly followed by “Technical Change and the Aggregate Production Function” (1957), which played a key role in empirical growth work in the 1960s through early 1980s (see, e.g., Denison 1967, 1985) and indeed continues to be relevant. In contrast, the theoretical success of Tobin’s “Dynamic Aggregative Model” concerned issues whose empiri-
cal salience was unclear. The capacity of a model to produce stagnation, for example, was of empirical interest from the perspective of the Great Depression, but not for the postwar economic experience. More generally, “A Dynamic Aggregative Model” did not provide new insights on the growth/Fluctuations relationship beyond an approach in which long-run phenomena are modeled via the Solow model and short-run phenomena are modeled via IS-LM analysis.

Tobin’s major influence on growth economics came later in “Money and Economic Growth” (1965).

**Money and Economic Growth**

Tobin (1965) returned to analyzing the effect of monetary factors on the capital intensity of a growing economy. The message of this paper is clearly summarized in its concluding paragraph:

> In classical theory, the interest rate and the capital intensity of the economy are determined by “productivity and thrift,” that is, by the interaction of technology and savings propensities. This is true both in the short run, when capital is being accumulated at a rate different from the growth of the labor force, and in the long-run stationary or “moving stationary” equilibrium, when capital intensity is constant. Keynes gave reasons why in the short run monetary factors and portfolio decisions modify, and in some circumstances dominate, the determination of the interest rate and the process of capital accumulation. . . . a similar proposition is true for the long run. The equilibrium interest rate and degree of capital intensity are in general affected by monetary supplies and portfolio behavior, as well as by technology and thrift. (684)

Although Tobin was concerned with finding a long-run analogue to John Maynard Keynes’s short-run integration of real and monetary factors, this analysis, unlike his paper of a decade earlier, excluded “the familiar possibility . . . that downward stickiness of money wages prevents or limits deflation and substitutes underproduction and underemployment” (684). In “A Dynamic Aggregative Model,” much had depended, or appeared to depend, on money wage rigidity, diverting attention from the importance of having two assets rather than one in a growth model, which stood out unmistakably in “Money and Economic Growth.” Eliminating price rigidities from the analysis, Tobin directly addressed the distinction between neutrality and superneutrality of money, and argued that
superneutrality fails because of portfolio substitution effects. As Don Patinkin (1987) noted, by doing this Tobin challenged Irving Fisher’s (1896, 1907) classic arguments, which concluded that superneutrality, via the Fisher effect on interest rates, will be violated only if economic actors suffer from expectational errors (as Fisher believed they did); interestingly, Tobin did not highlight this disagreement in his Irving Fisher Lecture or in a biographical sketch of Fisher (Tobin 1987).

Tobin (1965, 676) noted that “in a closed economy clearly the important alternative stores of value are monetary assets. It is their yields which set limits on the acceptable rates of return on real capital and on the acceptable degree of capital intensity.” He treated money and capital as substitutes from the viewpoint of the wealth holder, that is, they are alternative stores of value. A higher rate of monetary expansion and hence of inflation raises the opportunity cost of holding real money balances (reduces the real rate of return on holding money) and so leads to portfolio balance with a lower real rate of return on capital and a greater capital intensity. A somewhat similar analysis, for an increase in the inflation rate in a short-run IS-LM model rather than a long-run growth model (and hence dealing with the flow of investment rather than the stock of capital), had been made by Robert Mundell (1963), who pointed out that investment depends on real interest but money demand on nominal interest, so that a change in the expected rate of inflation changes the level of output and real interest at which the IS curve intersects the LM curve.

Tobin’s 1965 conclusion challenged economists used to thinking of the nonneutrality of money as a short-run phenomenon, attributable to rigid money wages: in the long run, inflation had real costs, but somehow did not affect real behavior or real variables (see Stein 1971 and Foley and Sidrauski 1971 on responses to Tobin 1965). As Solow (1970, 69–70) put the matter, “It appears, then, that money is not neutral in a growing economy, at least not in this very long-run sense: the real characteristics of the steady state depend on the rate of monetary growth. . . . The study of the non-steady-state behaviour of a monetary economy raises questions more difficult than any we have seen so far. They have only begun to be studied in the literature and there is still a lot to be found out” (see also Orphanides and Solow 1990, 233–34).

2. Tobin (1968) remarked, “An economic historian would be puzzled by the implication of section 1 that the development of monetary and financial institutions is in some sense bad for real investment. Without the safe assets made available by these institutions, how would the thrift of the cautious saver have been mobilized? The conflict is largely superficial. Financing of capital accumulation is the story of inside money, not of outside money.”
The key to Tobin’s result that a higher money supply growth rate leads to greater capital intensity was his treatment of capital and money holdings as substitutes in wealth portfolios (perfect substitutes in Tobin 1968), together with the assumption that real private saving is a given fraction of real disposable income. With those two assumptions, an inflation-induced reduction in the holding of money increases capital. This general finding has not proved robust across economic environments. Different results were obtained by Stanley Fischer (1974, 1979) who instead considered the demand for money by business firms, which are assumed to hold cash balances as a way to reduce transactions costs rather than as a store of wealth. For firms, money functions as a factor of production, and Fischer suggested that money and capital, considered as factor inputs, would be complements, rather than substitutes. In that case, smaller real money balances (because of inflation) would mean a lower marginal product of capital at any level of the capital stock, and so a lower real rate of return that would cause savers to hold a lower level of real wealth. Further, it has proved that what might appear to be innocuous changes in model specification can reverse the long-run effects of changes in money growth on output. For example, an overlapping generations model with agents who live for two periods can provide explicit optimizing foundations for the Tobin effect (Drazen 1981), with higher inflation increasing the capital stock, provided that the seigniorage from money creation is given to the young, but the reverse is true if the seigniorage is given to the old—but in another overlapping generations model, the Tobin effect dominates even if all the seigniorage is given to the old (Orphanides and Solow 1990, 245–46; Haliassos and Tobin 1990, 300–301).

On the Costs and Benefits of Alternative Money Growth Rules

Tobin (1986b, 10) stated that in 1965, “I did not introduce explicitly the real costs of keeping money scarce but simply emphasized the gains from

3. Tobin (1968) also demonstrated that, if technology is changing, a steady state with a transactions requirement for money will exist only if technical progress is Harrod-neutral and occurs at the same steady rate for both transactions technology and production of goods.


5. Tobin (1980) expressed strong reservations about how overlapping generations models incorporate fiat money, so he might not have welcomed such support (although, as Buiter [2003, F590–593] notes, Tobin found the overlapping generations framework useful for analyzing social security systems).
capital accumulation. One purpose of this paper is to remedy the imbalance of the old paper.” After reviewing criticisms of his earlier paper by authors such as Miguel Sidrauski and Fischer, Tobin (1986b, 10–11) observed, “Clearly the infinite horizons attributed to savers are a crucial element in models which deny that money and capital are substitutes in wealth holdings. Savers with shorter horizons, for example, mortal life-cycle savers, will have finite capacities for accumulating wealth. They will not be willing to hold whatever amounts of every asset provide returns that meet some constant threshold of time preference. . . . In my paper here, wealth demand is modeled as life-cycle savings theory.” Tobin 1986b also differed from his 1965 article by having a government budget constraint (which returned to the modeling assumption of “A Dynamic Aggregative Model”), with budget deficits financed by creation of fiat money, so that he could model “the long-run tradeoff between ‘taxation’ of money balances by inflation and explicit taxation of the earnings of capital and labor” (1986b, 14).

Friedman (1969, 1–50) had earlier examined the social loss from scarcity of real money balances when fiat money (unlike gold) is socially costless to produce, taking capital intensity as unaffected by monetary policy, and so found that it would be optimal to satiate the economy with real balances by having deflation equal to the real rate of return on capital, so that the private opportunity cost of holding real cash balances (nominal interest) is equal to zero, the social cost of creating real balances. Edmund Phelps (1979, vol. 1, chaps. 6–8) argued that, in the absence of nondistorting lump-sum taxes, it would not be optimal to set the inflation tax to zero when other distorting taxes were imposed to pay for public goods.6 The “golden rule” literature found that the level of capital intensity that maximizes steady-state consumption occurs when the real rate of return on capital equals the growth rate of the economy (Allais 1947; Phelps 1979). Tobin (1986b) brought these two literatures together, analyzing the tradeoff between deviations from real balance satiation and deviations from golden rule capital intensity, and concluded that in some cases it would be optimal to have positive inflation, increasing capital intensity at the cost of reducing real balances.

Tobin’s analysis of the joint effects of money growth on real balance levels and capital accumulation had relevance to policy debates at the time.

6. However, for models that view money as an intermediate good (rather than, e.g., putting money in the utility function as Sidrauski did), there is a public finance argument against taxing intermediate goods.
Martin Feldstein (1979) had argued that, as long as the growth rate of the economy is at least as large as the discount rate, any finite temporary loss in output is worth paying to achieve a permanent reduction in inflation, but Tobin’s trade-off sidestepped Feldstein’s result, because the gain in output from increased capital intensity is just as permanent as the reduction in shoe-leather costs from increased real cash balances. Tobin (1986b, 23) concluded, “The main point is that the position of the economy may be . . . one characterized simultaneously by: positive inflation, after-tax real interest rate less than the growth rate, and steady-state consumption less than it would be with a lower tax rate and higher inflation. . . . It cannot be excluded a priori as Feldstein has done.” While Tobin won this particular theoretical argument, debates over trade-offs of this type have become relatively unimportant in the modern macroeconomic literature, which typically assumes away the possibility of Tobin’s type of long-run nonneutrality when deciding on monetary policy. But it does accommodate the view that reducing business cycle volatility can be justified even if it requires long-run inflation.

Economic Growth as an Objective of Government Policy

Tobin’s subsequent growth writings are very much policy driven. Tobin (1964, 1) told the American Economic Association, “Growth has become a good word. And the better a word becomes, the more it is invoked to bless a variety of causes and the more it loses specific meaning. At least in professional economic discussion, we need to give a definite and distinctive meaning to growth as a policy objective. Let it be neither a synonym for good things in general nor a fashionable way to describe other economic objectives. Let growth be something it is possible to oppose as well as to favor, depending on judgments of social priorities and opportunities.” In keeping with his articles on how expansionary monetary policy could increase the capital intensity of steady-state growth, Tobin (1964, 10–11) argued “(1) that the government might legitimately have a growth policy, and indeed could scarcely avoid having one, even if private markets were perfect; (2) that capital markets are far from perfect and that private saving decisions are therefore based on an overconservative estimate of the social return to saving; and (3) that the terms on which even so advanced an economy as our own can trade present for future consumption seem to be very attractive.” Tobin began his concluding paragraph by remarking
cautiously that “the evidence is uncertain and there is a clear need for more refined and reliable estimates of the parameters on which the issue turns.” But he promptly moved on to a much more definite statement: “I believe the evidence suggests that policy to accelerate growth, to move the economy to a higher path, would pay. That is, the return to a higher saving and investment ratio would be positive, if evaluated by a reasonable set of social time preference interest rates. This seems to me the strongest reason for advocating growth policy.”

Tobin (1964) underlines his belief that real variables were not independent, even in long-run growth, of monetary variables, which monetary and fiscal policy could alter. He felt that imperfect capital markets and overly cautious savers would, in the absence of government policy to promote capital accumulation, keep capital intensity below the golden rule level that would maximize consumption per capita. Positive externalities of investment (not just investment in research and development, but any form of Arrow’s “learning by doing” in which B can learn from A’s doing) make the social return on capital accumulation greater than the private return. Tobin argues that government can and should improve social welfare by raising steady-state per capita consumption by using monetary policy and (since the two are linked through money creation to finance budget deficits) fiscal policy to increase capital intensity. This theme in Tobin’s work carried over to long-run growth theory the concerns of two works that deeply influenced Tobin from the start of his career: the first economics book he ever read, Keynes’s *General Theory* (1936) on the role for government to improve the welfare of a monetary economy by offsetting shortfalls in investment, and John R. Hicks’s “Suggestion for Simplifying the Theory of Money” (1935) on applying economic analysis to understand why people hold money even though other assets pay higher returns (see Dimand 2004 on these influences).

While Tobin’s writings on growth became increasingly policy oriented, he did not stray far from his earlier theoretical contribution. Among his later writings, Tobin (1986a, 1986b) and Haliassos and Tobin (1990) formalized the welfare trade-off between capital intensity and scarcity of real money balances. In these papers, Tobin posed the question of the effect of financial factors on long-run economic growth, the interrelatedness of real and monetary variables, that was central to his work in monetary economics. He did so in a style consistent with his other work, using asset demand functions with restrictions on partial derivatives and linking markets through the adding-up constraint on wealth rather than through the budget.
constraint of an assumed representative agent (see Solow 2004 and Dimand 2004 on Tobin's methodology). But the answers to the questions Tobin posed on the growth effects of monetary policy proved very sensitive to seemingly minor modifications in how models are specified, so that Orphanides and Solow (1990, 257) found that “we end where Stein ended 20 years ago.”

**Tobin as a Growth Theorist from the Vantage Point of Modern Macroeconomics**

Tobin’s efforts to integrate short-run and long-run macroeconomic outcomes, as developed in “A Dynamic Aggregative Model” and “Money and Economic Growth,” are remarkably prescient in terms of subsequent general methodological developments in macroeconomics, while the specific ways he proposed to achieve this synthesis have not generally been adopted. The real business cycle approach of Finn Kydland and Edward Prescott explicitly attempts to achieve this integration, but does so in a way that is the converse of Tobin’s. While Tobin’s objective was to integrate what are conventionally regarded as short-run factors such as wage and price rigidity and portfolio balance requirements into the long-run determination of output, the Kydland-Prescott program attempts to interpret short-run fluctuations via traditional long-run factors such as shocks to the aggregate production function. This strategy is reflected in the key role that the Brock-Mirman (1972) stochastic growth model and associated generalizations play in the real business cycle literature. Tobin never found the methodology of real business cycles persuasive,7 nor did he accept that it had consistent microeconomic foundations in any meaningful way. He was critical of representative agent models that avoid Keynesian coordination problems only by assuming that the economy behaves as if there were only one agent, of overlapping generations models that provide rigorous foundations for a positive value of fiat money only by assuming that no other assets exist, and of modelers who claim consistent microeconomic foundations while neglecting stock/flow consistency (Tobin 1980; Colander [1999] 2007; Solow 2004; Dimand 2004).

In contrast, the primary legatee of Tobin’s views on short-run fluctuations, the new Keynesian macroeconomics school, generally avoids

addressing growth issues. This literature very much focuses on explaining short-run data patterns and evaluating alternative policy rules, with a primary focus on monetary policy. This school of thought explicitly distinguishes between cyclical and trend components to data, whether the trend is based on a deterministic function of time, unit roots, or some distinction between more and less smooth data components such as the cycles produced by the Hodrick-Prescott filter. Michael Woodford’s monumental *Interest and Prices* (2003) does not contain any discussion of growth issues (or any reference to any of Tobin’s work). The evaluation of monetary policy is conducted entirely on the basis of cyclical behavior.

Relative to the time period in which Tobin worked, economic growth plays a much more prominent role in contemporary macroeconomics. The new growth literature, as initiated by Robert Lucas and Paul Romer, does contain facets that are reminiscent of Tobin’s ideas, though these are often indirect. To focus our discussion of the contemporary literature, we consider the papers published in a 1996 issue of the *Federal Reserve Bank of St. Louis Review*, which contains the proceedings of one of the bank’s annual economic policy conferences, this one titled “Price Stability and Economic Growth.” This issue well summarizes macroeconomic thinking about the inflation-growth nexus at the end of the first decade of the new growth economics via two theoretical papers (Chari, Jones, and Manuelli 1996; Choi, Smith, and Boyd 1996) and two empirical studies (Barro 1996; Bruno and Easterly 1996). V. V. Chari, Larry E. Jones, and Rodolfo E. Manuelli (1996, 56) conclude that

inflation rates per se have negligible effects on growth rates, but financial regulations and the interaction of inflation with such regulations have substantial effects on growth. This analysis suggests that researchers interested in studying the effects of monetary policy should shift their focus away from printing money and towards the study of banking and financial regulation.

In isolation, this sounds very much similar to the style of macroeconomics pioneered by Tobin. However, the formal analysis both in Chari, Jones, and Manuelli 1996 and in Choi, Smith, and Boyd 1996 uses very different microeconomic foundations from Tobin’s. Chari, Jones, and Manuelli employ cash-in-advance and shopping time models (in which there is a trade-off between time spent shopping and the use of money) to understand money demand; Tobin-style portfolio considerations do not arise. Sangmok Choi, Bruce D. Smith, and John H. Boyd employ a framework closer in spirit to Tobin, but focus on how inflation can exacerbate adverse
selection problems in financial markets. When these considerations are absent, their model produces results similar to Tobin’s. However, in a market where default on the part of borrowers is a problem, greater inflation leads to selection toward riskier types. For our purposes, what is important is that both of the papers emphasize how inflation can lower growth, in direct opposition to Tobin’s focus on how inflation, by making capital a more attractive asset, can enhance growth.

This emphasis on how inflation can reduce growth reflects the consensus in the empirical growth literature that this is in fact the case. Both the Barro and the Bruno and Easterly contributions to the 1996 conference find a negative relationship between inflation and growth, although this effect appears to be nonlinear: the evidence is stronger when one isolates the effects of very high inflation rates, rates outside the experience of the OECD economies. This evidence appears to be relatively robust in the sense that evidence of a negative relationship between inflation and growth survives in the presence of a range of competing explanations (see Durlauf, Kourtellos, and Tan 2008 for a recent study of this type). While interpreting the cross-country growth regressions underpinning this conclusion is problematic (see Brock and Durlauf 2001 and Durlauf, Johnson, and Temple 2005 for a delineation of the issues), the consensus that inflation is not growth enhancing has been associated with theoretical approaches very different from that employed by Tobin. On the other hand, Tobin’s emphasis on financial intermediation as fundamental to understanding the monetary transmission mechanism is reflected in the modern money-growth literature.

Finally, there is an important sense in which Tobin’s views on growth reflect a different orientation than that of the contemporaneous growth literature. Tobin’s writings did not make broad claims about the growth differences between economies but rather focused on growth in contexts such as the United States; this orientation is also found in Solow’s classic growth papers. Further, Tobin’s focus was typically not on the determinants of steady-state growth; his analysis of a positive relationship between money and growth has to do with equilibrium levels of capital intensity, which influence the steady-state level of output (suitably normalized by population and the state of technology) but not the steady-state growth rate of per capita output per se. For steady-state behavior, Tobin (1998, 149) wrote,

A list of sensible policies, one might say conservative policies, includes basic science, research and development, education and training, public
infrastructure, and carefully designed incentives for both private and public sectors to consume less and invest more. If everyone is patient with gains measured in tenths of a percentage point over the coming decades, these policies can pay off. With luck, new technologies may bring dramatic improvements in the growth rate. The computer and communications revolutions may well bear fruit in the next century.

The analysis of knowledge and technical progress as endogenous outcomes had to wait for another generation of macroeconomists, exemplified by Philippe Aghion and Peter Howitt (1999), in addition to Romer and Lucas.

**Conclusion**

The questions Tobin raised about money and long-run economic growth are still important, but definitive answers to them remain elusive even in light of the new growth economics. Tobin’s vision of the integration of short-run and long-run macroeconomic phenomena is, ironically, primarily accepted by the real business cycle view of macroeconomics, one that is antithetical to Tobin’s perspective on economic fluctuations. We conjecture that this may not prove the case in the next decades of growth analysis, as efforts to integrate the shorter and longer run move toward a more balanced view of supply and demand factors.

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