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Macroeconomics, History of From 1933 to Present

Kevin D Hoover, Duke University, Durham, NC, USA

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Abstract

The history of modern macroeconomics begins when much older economic questions were reclassified by Ragnar Frisch under the headings 'microeconomics' and 'macroeconomics.' The history of macroeconomics related here is importantly a history of the relationships of macroeconomics to microeconomics, and econometrics. The emphasis is on the development of macroeconomics as an interplay among economic theory, empirical investigation, and public policy.

The Origins of Modern Macroeconomics

The problems addressed by the field now called 'macroeconomics' are ancient (*see* Macroeconomics, History of up to 1933); yet the modern era begins in 1933 only with the coinage of the terms *macroeconomics* and *microeconomics* (almost certainly) by Ragnar Frisch, who also coined the term *econometrics* at about the same time (Velupillai, 2009). All three terms circulated informally – first, through the newly formed econometric society – before slowly becoming accepted as defining the broadest conceptual divisions of economics. For Frisch, microeconomics concerned the behavior of individual firms or consumers, whereas macroeconomics concerned the economy in its entirety. Practically, macroeconomics must give up on fine detail and deal with aggregated data. The history of modern macroeconomics is importantly a history of its relationships to microeconomics and econometrics.

Econometrics for Frisch was scientific economics and involved the cooperation of economic theory, mathematics, and statistics (Bjerkholt, 1998; Louçã, 2007). Like many others at the time he was concerned especially with *dynamics*, accounts of the movements of economic quantities over time. Jan Tinbergen gave life to the econometric project with the first macroeconomic model, a model of the Dutch economy in 1936. The worldwide Great Depression brought the problem of business cycles into the forefront of economics and debates over a correct understanding of the crisis raged throughout the 1930s. Tinbergen's approach had been pragmatic and not deeply committed to a particular theory.

While John Maynard Keynes never used the term 'macroeconomics,' it was only with the publication of his *General Theory of Employment, Interest, and Money* (1936) that its common theoretical core began to take shape. Keynes argued that earlier 'classical' economists failed to offer a theory of output as a whole, believing that market coordination was sufficiently effective that full employment of labor and capital

failed only when market 'imperfections,' such as government regulation or unions intervened. In contrast, Keynes argued that, in complex, monetary economy, perfectly functioning markets may fail to be self-adjusting.

As a matter of accounting logic, aggregate savings in an economy (mainly lodged in financial assets) had to equal aggregate investment (mainly in the form of machinery and other physical means of production). But savers and investors were typically distinct actors: individuals, motivated by thrift, caution, and habitual psychology, made savings decisions; while firms in the face of a radically uncertain future, motivated by subjective expectations of profits, made investment decisions. Interest rates, representing the opportunity cost of real capital relative to financial assets were an important determinant of investment; while income was the most important determinant of consumption and savings. Formal financial markets operating through interest rates were inadequate by themselves to bring the plans of investors and savers into line. When savings plans exceeded investment plans, firms would find themselves with unsold goods and would be forced to cut back production and lay off workers – reducing incomes and bringing aggregate demand (i.e., planned total expenditure) back into line with aggregate supply (i.e., the value of total production), but at the cost of increased unemployment. Highly heterogeneous labor market inhibited the ability of workers effectively to offer to work for lower wages at times when demand for the products of firms fell short of their expectations, resulting in unemployment. The economy could be stuck for long periods in recession. The government could start a virtuous circle, directly stimulating demand through direct purchases, generating incomes that, in turn, generated further demand – a *multiplier* process. More important, the improved estimation of future profits would increase private investment and push the economy toward full employment. Keynes' position was, contrary to Marxist criticism, not that capitalism was doomed to failure. Rather it often – and

sometimes severely – underperformed. Yet, helpful policy interventions were possible.

Immediately on publication, the economics profession began to try to understand and interpret Keynes' *General Theory*. What ultimately came to be called the IS-LM model, due to John Hicks (1937), became the most influential interpretation. Hicks stripped the *General Theory* down to its architectural bare bones, stressing its commonalities with its 'classical' precursors and downplaying its more radical elements, such fundamental uncertainty and coordination failures. Hicks' simple model proved to be easily taught and a useful framework for econometric modeling and mathematical elaboration. While it clearly captured some of the essentials, Keynes, himself trained as a mathematician, was skeptical of the value of detailed formal modeling.

In 1938 and 1939, Tinbergen published a two-volume study based on the first econometric model of the United States economy. Utterly convinced of the wrongheadedness of the econometric project, Keynes published a scathing review (Morgan, 1990).

The World War II and Keynesianism

The *General Theory* laid the intellectual groundwork for government intervention in the economy; the World War II made it a reality. The war greatly expanded the size of government and the scope of its direct management – over prices, production, labor markets, financial markets, and foreign trade. Such direct management required better data. The theory and practice of national income accounting had been begun in the 1930s by Colin Clark and Simon Kuznets, among others (Kendrick, 1970). The war gave it an enormous practical boost, so that the United States and Great Britain began to publish official accounts shortly after the war with countries around the world quickly falling into line. Electronic computers, originally developed for military purposes, proved a godsend for the development of both data collection and the practical implementation of econometric modeling.

The fear of a postwar depression and the practical success of economic intervention during the war convinced governments that it was both feasible and necessary to take Keynes' advice to actively manage the macroeconomy. The Beveridge Report in Great Britain and the Employment Act of 1946 in the United States committed their governments to a policy of aiming at high rates of growth and low levels of unemployment. Abba Lerner (1943) coined the term 'functional finance' to argue that government policy should not be judged by whether the budget is balanced but by the state of the economic variables that directly affect welfare: income, employment, inflation. Government debt in the US, the UK and many other countries, which had historically been paid off after being run-up in wartime, was in fact maintained at higher levels after World War II than after earlier wars.

Economic management was extended to international trade and finance through the Bretton Woods Conference of 1944, in which Keynes was a key player, that led to the creation of the World Bank and the International Monetary Fund. These institutions in turn gave a boost to the development of international macroeconomics as a distinct discipline.

Microfoundational Programs and Macroeconometric Models

Frisch viewed the macroeconomic context as indispensable for microeconomic analysis. Most economists, however, viewed microeconomics as prior to macroeconomics: the economy as a whole being built out of individuals – explanation most ultimately be grounded in individual behavior. In the second half of the nineteenth century, Leon Walras had provided a vision of an agent-by-agent model of economic interdependence, based on the assumptions of perfect competition. From the 1930s to 1970s, substantial progress was made in formalizing Walras' vision of *general equilibrium*. One program of 'microfoundations' for macroeconomics aimed at discovering what assumptions would be necessary to formulate general equilibrium models that displayed 'Keynesian' features: unemployed resources, scope for beneficial policy intervention, and so forth (Weintraub, 1979; Hoover, 2012). This theoretical program made closest contact to practical macroeconomics in the 'general disequilibrium' models associated with Don Patinkin, Robert Clower, Robert Barro, Herschel Grossman, and Edmund Malinvaud (Backhouse and Boianovsky, 2012). These models emphasized the consequences of *rationing*: firms see potential profit in greater production provided that there is demand; unemployed workers would be willing to buy goods provided that they are hired; but neither is a position to act unless the other acts first; so the economy is stuck.

A second microfoundational program, whose central player was Lawrence Klein, also sought a marriage of Walrasian general equilibrium with Keynesian insights, but was empirically oriented (Hoover, 2012). Klein adopted an aggregate general equilibrium macroeconomic architecture similar to Hicks' IS-LM model, which lent itself especially to quantification and estimation using the new econometric tools developed mainly by the Cowles Commission (Morgan, 1990). Klein's ideal, however, was disaggregation as far as the data would allow. By 1950, Klein had estimated a series of small macroeconometric models of the United States (Bodkin et al., 1991). The twenty-five equation 'Klein–Goldberger' model became the paradigm for later macroeconometric models. Macroeconometric modeling became a 'big science' enterprise, involving large research teams with substantial division of labor over long periods of time. Klein was involved in a series of modeling projects, the Brookings model (about 200 equations in its 1959 version and 400 equations in its 1972 version), the Wharton model, the MPS model (a joint effort of the Massachusetts Institute of Technology, the University of Pennsylvania, and the Social Science Research Council), which later evolved into the FMP model (with the Federal Reserve replacing the Social Science Research Council). Many similar models were developed by other teams – academic, governmental, and commercial – for many countries. Project LINK, which Klein directed under the auspices of the United Nations, attempted to integrate national models into a worldwide model.

The increasing size of the models reflected increasing disaggregation. A major microfoundational effort – both explicitly within macroeconometric modeling teams and as stand-alone research – aimed to provide individual optimizing accounts for each of the main elements of the Keynesian

model. Reacting to empirical findings of Simon Kuznets, for example, alternative microeconomic accounts of the consumption function were developed and evaluated on microeconomic and aggregate data: Duesenberry's (1949) relative-income hypothesis, Friedman's (1957) permanent-income hypothesis, and Modigliani and Brumberg's (1954) life-cycle hypothesis. Some typical instances of similar efforts made for other Keynesian functions, include the demand for money (Baumol, 1952; Tobin, 1958), investment (Jorgenson, 1963), the production function (Fisher, 1969), and labor supply (Lucas and Rapping, 1969).

The ultimate function of macroeconomic modeling in the eyes of Keynesian was to provide the basis for policy guidance. Tinbergen (1956) laid out the 'targets-and-instruments' framework for policy analysis: policymakers set goals and economists, using macroeconomic models, guide their setting of monetary and fiscal policy tools to reach those goals. The economy is viewed as a machine to be manipulated. Keynesian economists widely concurred with the view that the ultimate resolution of the relationship between microeconomics and macroeconomics was less a matter of establishing a theoretical connection than of achieving in Paul Samuelson's (1955: p. vi) phrase "a grand neoclassical synthesis," in which macroeconomic policy would maintain full employment of resources, at which point all the old verities of microeconomics with respect to efficient resource allocation would apply.

Economic Growth

As postwar macroeconomic management appeared to be successful and fear of another 1930s-scale depression faded, macroeconomists turned their attention from business cycles to economic growth (Boianovsky and Hoover, 2009). The turn was, in part, a reaction to the Cold War, which could be framed as a competition between the Soviet Bloc and western democracies – both over economic dominance and over providing a persuasive and workable model for developing economies. Harrod's (1939) dynamic Keynesian model was interpreted as sharing a formal structure with Domar's (1946) growth model, which became a workhorse of development economics. The 'Harrod-Domar' model pointed to high rates of investment as the key to growth in economies with unemployed resources.

In 1956, Robert Solow and Trevor Swan independently criticized the 'Harrod-Domar' model for its assumption of fixed technology and offered a flexible-technology model in which the mixture of inputs can respond to the relative price of labor to capital. A surprising consequence of the Solow-Swan model is that the long-term, sustainable rate of growth does not depend on the rate of investment but only on the underlying rates of growth of the labor force and technology and on the rate of depreciation of capital. The *level* of per capita income nonetheless does depend on the rate of investment. In an empirical study framed by this model, Solow (1957) showed the surprising result that technological progress, rather than capital investment, explained by far the largest part of the actual growth of the United States economy.

Macroeconomists throughout the 1960s elaborated the Solow-Swan model, trying to give compelling theoretical

accounts of technological progress and of 'optimal growth,' conceived of as either policies that maximized consumption per head ('golden rule policies') or ones that maximized intertemporally discounted social utility. With the rise of the environmental movement, which challenged growth as a social goal, and with the severe recessions of the early 1970s, growth economics moved to the back burner. By the end of the 1980s, as the business cycle moderated in developed countries, growth economics was revived. The attention was again placed on technological progress, but also on the apparent failure of developing economies to converge toward the performance of developed economies – a prediction of the Solow-Swan model. The 'new growth models' stressed production involving increasing returns to scale in which growth rather than exhausting productive opportunities expanded them, so that the more an economy grows the faster it can grow.

The Monetarist Challenge

Keynes and the postwar Keynesians saw fluctuations in aggregate demand, largely owing to the investment behavior of firms, as the main source of the business cycle, and they saw government policy (mainly fiscal policy) as necessary remediation. *Monetarism* (a term coined in the late 1960s) offered an anti-Keynesian alternative analysis (Mayer, 1978). Unlike Keynesians, monetarists, led by Milton Friedman, presumed that the private sector left to its own devices was fundamentally stable and that ill-conceived government policy was the main source of business cycles.

Friedman revived the quantity theory of money, which is the ancient doctrine of the *neutrality of money* – i.e., the price level in the economy in the long-run is directly proportional to the stock of money. One implication is that a policy that works through increasing the supply of money will ultimately affect only prices and not the quantities of real goods and services or employment, which are the sources of genuine economic welfare. But Friedman offered an important twist: in the short-run transitions between one long-run price level and another, changes in the stock of money could have powerful real effects. Friedman and Anna J. Schwartz's *Monetary History of the United States* (1963) – exhibit number one in the monetarist case – convinced many that the Federal Reserve's having allowed the money stock to fall precipitously was the principal cause of the Great Depression and that smaller recessions generally could be laid at the feet of central banks.

Under the metallic monetary standards that prevailed before World War II, high rates of inflation were largely wartime phenomena. After the war, the world experienced unprecedented secular increases in the price level, and macroeconomists sought the cause. They distinguished, for example, between price increases owing to rising costs of inputs (cost-push inflation) and rising expenditure on output (demand-pull inflation). The Phillips curve documented empirically an inverse relationship between the level of unemployment and the rate of inflation (Wulwick, 1987). Some economists read the Phillips curve as a trade-off: unemployment rates could be lowered provided that we are willing to tolerate higher inflation rates.

Friedman (1968a) argued, first, that there was ultimately only one kind of inflation. Cost-push inflation and inflation owing to changes in the demand for real goods (e.g., increases in government expenditure) were essentially *relative* price changes that provided the information about supply and demand of productive inputs and were essential to the smooth functioning of the economy. They were self-limiting. Only demand owing to increases in the money supply had no natural upper bound and could account for the postwar inflation: "inflation is always and everywhere a monetary phenomenon" (Friedman *inter alia* 1968b: pp. 18, 98, 105). Friedman argued that the Phillips curve resulted from workers mistaking the rise in all prices (including their wages) for an increase in their real wage, so that they were willing to work at what firms understood actually to be a lower real wage, thus lowering the unemployment. Friedman argued that workers' expectations of inflation would catch up with actual inflation rates and the real effects would vanish. The expectations-augmented Phillips curve (developed independently by Edmund Phelps) displays only a short-term trade-off, and policymakers cannot suppress unemployment below its *natural rate*. Even nonmonetarists rapidly adopted this model of inflation, although sometimes substituting the *nonaccelerating inflation rate of unemployment* for the 'natural rate' to avoid the implication that it was impervious to every kind of economic policy and not just to the management of monetary aggregate demand.

Monetarists argued that the short-term real effects of monetary policy, as they resulted from confusions about price signals, mainly misallocated resources. The economy was too complex, the channels from policy to real outcomes were too inscrutable, and the processes of individuals forming expectations were too unstable for policymakers to calibrate their interventions in reliably beneficial ways. Monetarists therefore advocated that policy should follow simple rules. For example, Friedman proposed that the supply of money should grow at a steady rate of X percent a year, where X was related to the underlying long-term growth rate of gross domestic product.

Monetarism triggered active, and sometimes acrimonious, empirical debates. Gradually, monetarists' views came to dominate at the Federal Reserve and, subsequently, at central banks around the world. Although not a pure implementation of monetarist doctrine, Chairman Paul Volcker's reform of Federal Reserve monetary policy, starting in 1979, and the subsequent collapse of US inflation rates was largely counted as a monetarist triumph. Nonetheless, monetarism remains controversial on theoretical, empirical, and policy grounds – not least, because financial innovation undermined a conceptually stable definition of the money stock, rendering empirical evidence equivocal and money-supply policy difficult to implement.

The New Classical Macroeconomics and the Challenge to Macroeconometric Modeling

One way or another, expectations play a part in each of the principal elements of the Keynesian model, and it was understood early on that empirical measures of expectations would

be essential for successful macroeconometric modeling. Early efforts were based on mechanical extrapolations of past data, but these proved to be inconsistent in the sense that the best predictions of the model – i.e., the expectation that the model itself generated – would typically differ *systematically* from the expectation assumed to hold in the model. A systematic error could be easily reduced and might even be profitable to someone who was able to bet in the market against a policymaker informed by the model. John Muth's (1961) *rational-expectations hypothesis* is the simple idea that the expectation assumed to motivate agents in a model must coincide with the best prediction of that same model. Lucas and Rapping in the context of models labor markets and Thomas Sargent in the context of financial markets introduced the rational-expectations hypothesis into macroeconomics around 1970. Model consistency implied that all relevant aspects of the model must be considered simultaneously, which is a daunting technical challenge in models as complex as the macroeconometric models in the tradition of Klein. Early rational-expectations macromodels were small and assumed that all markets clear at all times. Clearing markets and rational expectations typically implies that money is neutral even in the short run: the only real effects of monetary policy are unsystematic, so that policy can add noise to the system but not achieve systematic improvements. Policies that adopt simple, easily understood rules minimize the noise. The *policy-ineffectiveness proposition* and the commitment to policy rules suggested to some that the new approach was a radical 'monetarism mark II.' Initially, some referred to it as the 'rational-expectations school,' but it was soon seen that the characteristic results depended on clearing markets and that the rational-expectations hypothesis could be used even in models with typically Keynesian outcomes, so that *new classical macroeconomics* is a better term for the new approach (Hoover, 1988).

Monetarism had accepted the aggregative structure of Keynesian models, differing over more specific details (Gordon, 1974). Robert Lucas (1976) offered a more radical objection – the *Lucas critique*. Tinbergen saw macroeconometric models as a tool for policymakers guiding their use of policy instruments. Lucas argued that policymakers must be thought of not as standing outside the economy, as Tinbergen's framework suggested, but on a par with other actors within the economy. Those actors observe and anticipate the policies and adjust their behavior accordingly. The aggregate relationships of the macroeconometric model are not, therefore, likely to remain stable in the face of alternative policies. Lucas proposed that the only solution to this problem of *policy noninvariance* is to model explicitly the decisions of individual agents reacting to policy.

The Lucas critique shifted the landscape of macroeconomics. Despite a long history of trying to understand the microeconomics behind macroeconomics, mainstream macroeconomists for the first time insisted explicitly that only models with appropriate 'microfoundations' would be acceptable. The piecemeal approach of the Klein program was rejected in favor of a systemic approach based on a general equilibrium with rational expectations. The technical challenges were, however, insurmountable, and, without much reflection or critical discussion, the profession adopted the

representative-agent model, an approach in which a single (or sometimes a few types of) agent, who maximizes a utility or profit function in the manner of a microeconomic agent is taken to stand for all agents in the economy (Hartley, 1997). The representative-agent model simply ignores the conceptual and technical problems of aggregation and, in fact, provides the simulacrum of microfoundations and not the genuine article.

Keynesians quickly adopted key planks of new classicism: rational expectations, the Lucas critique, representative-agent microfoundations. They challenged the assumption that markets clear rapidly and suggested various 'frictions' – institutional or economic features that inhibit rapid adjustment of prices or wages to external 'shocks' or to policy actions. Frictions were supposed to provide the microeconomic underpinning of short-run nonneutrality. *New Keynesian* approaches emphasize a range of frictions, including contracts, menu costs, efficiency wages, imperfect competition, informational asymmetry, and coordination failures (Mankiw and Romer, 1991). Some approaches require going beyond strictly representative-agent models, but the departures are rarely very large. The payoff is to better identify sources of aggregate fluctuations and to preserve a scope for beneficial policy intervention.

The weakest point of early new classical models was the inability to explain business cycles, which was the main opening for the new Keynesian challenge. Lucas constructed a new classical monetary business-cycle model in 1975. Random shocks make some periods more productive than others, and forward-looking workers and producers are more active in these periods – a boom. Long-lived capital goods add dynamics, transmit transient booms to the future, and smooth the transitions, so that booms and busts are stretched over longer periods. Lucas' model was not empirically successful, but it provided the template for further developments. Most notably, Kydland and Prescott (1982) developed a model in which random shocks to the productivity of technology was the main driving force of the cycle. For some time, such *real-business-cycle models* dominated the new classical research agenda, with successful modifications trying to improve the empirical match (Hartley et al., 1998).

The New Neoclassical Synthesis

By the mid-1990s the debate between new classicals and the new Keynesians had cooled. The effort to improve the empirical fit of real-business-cycle models had forced new classicals to consider additional sources of fluctuations than technology shocks and to integrate price adjustment or other frictions into their models. But the larger theoretical template of the real-business-cycle model – rechristened the *dynamic, stochastic general equilibrium* (or *DSGE*) model – became the workhorse for business-cycle analysis (Duarte, 2012). Soon a *new neoclassical synthesis* was declared.

For practical monetary-policy analysis, the new neoclassical synthesis focused on a simple, aggregate model that was regarded as a kind of summary for a microfoundationally adequate business-cycle model. The paradigm model included a forward-looking investment–savings relationship (IS curve), an expectations-augmented Phillips curve, and a monetary-

policy rule governing the setting of short-term interest rates. The main use of the models was to evaluate counterfactually the performance of alternative monetary-policy rules. These models, along with the DSGE models, found widespread acceptance in central banks around the world, sometimes coexisting uneasily with older-style macroeconomic models, which had fallen out of favor with academic economists in the 1970s.

The development of macroeconomics has frequently been shaped by events in the world: the Great Depression, World War II, the oil price shocks of the 1970s and 1980s. The worldwide recession and financial crisis beginning in December 2007 appears to be another such shock. It exposed weaknesses in currently popular macroeconomic models. Models frequently lacked a financial sector, limiting their relevance to the main element of the crisis. The assumption of rational expectations and the absence of heterogeneity among agents made it difficult to capture or to characterize the mechanics of the asset price boom that preceded the crisis or its sudden collapse. The radical reaction among economists is that the financial crisis challenges the fundamental basis on which modeling – at least since the 1970s – has proceeded: fundamentally new macroeconomic thinking is in order. The conservative reaction acknowledges the incapacities of current models, but sees their foundations as essentially sound: extension and development of the existing lines of macroeconomic thinking will suffice. Research proceeds along both lines. It is too early to offer a historical assessment.

See also: Data Bases and Statistical Systems: Economics (Macroeconomics); Economic Growth; Economics, History of; Expectations, Economics of; Macroeconomics, History of From 1933 to Present; Monetary Policy Since the 2007–2009 Financial Crisis; Unemployment: Structural.

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