

## Macroeconomics With and Without Keynes

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*If those givens of economic theory, technology, tastes, endowments, and institutions change over time, we might learn something about the durability of our models and the way in which they can be applied to policy by studying a little history. And if agents' behaviour depends upon their understanding of the way of the way in which the economy functions, and if it is true, as I believe, that our discipline is in fact the source of that understanding, not just for policy-makers but for society at large, then the study of the history of that discipline might also yield some dividends.*

David Laidler (in Vercelli and Dimitri 1992, 459)

### Introduction

The influence of John Maynard Keynes pervades the last sixty years of macroeconomics, whether by force of attraction or of repulsion. In Milton Friedman's frequently half-quoted remark, "We are all Keynesians now, and no-one is any longer a Keynesian." New Keynesians considering nominal rigidities, Post Keynesians stressing fundamental uncertainty, non-Walrasian equilibrium theorists rejecting some variant of Say's Law, all built on some aspect of the *General Theory*, while monetarists and New Classical economists reacted to the book's concept of involuntary unemployment and its treatment of long-period expectations as given. The Keynesian terminology of aggregate supply and demand, propensity to consume, and marginal efficiency of capital, and J. R. Hicks's IS/LL (now IS-LM) diagram, shape undergraduate teaching and textbooks even where the content taught is now quite different, determining such pedagogical habits as writing down an equilibrium condition and drawing an equilibrium locus for the money market rather than the bond market (a distant echo of the nearly-forgotten, ill-posed liquidity preference vs. loanable funds debate).

This widespread reference in modern macroeconomics to Keynes and the use of terminology and diagrams due either to the *General Theory*, or to Hicks's IS/LM representation of an aspect of it, does not establish what Keynes contributed to modern macroeconomics, or that what he happened to contribute would not have been developed in time from some other source. Axel Leijonhufvud (1969, 8), lecturing in the year when the first Nobel Prize in economics was to be announced, challenged his audience: "If you had to write the harangue motivating the posthumous award of the Nobel Prize to Keynes, what exactly would you say?"

To try and answer Leijonhufvud's challenge about a Nobel citation for Keynes, I will turn to the example of a recent Nobel Prize winner. To investigate whether railroads were indispensable to American economic growth and to see what the American economy in 1890 owed to railroads, Robert Fogel (1964) could not simply take the American economy in 1890 and erase all the rail lines. Instead he imagined counterfactually how other modes of transport might have developed to 1890 in the absence of railroads, with a fold-out map of hypothetical canals in Appendix A. Though no fold-out map accompanies this article, I propose to attempt the counterfactual exercise of imagining how macroeconomics (the economic analysis of aggregate income, employment and the price level) might have developed had the young John Maynard Keynes finished first instead of

second among 104 candidates on the civil service entrance exam in 1906, so snatching the year's only Treasury post from Otto Niemeier and becoming a permanent civil servant instead of an academic economist. (I shall ignore the possibility that Keynes might have duplicated Ralph Hawtrey's remarkable feat of combining monetary theory and Treasury service, or that Keynes, as a permanent official rather than a temporary wartime one, might still have resigned from the Treasury over the Versailles peace settlement.)

### Vixerunt Fortes Ante Agamemnona

Economists long before Keynes made important analytical contributions on questions now considered part of macroeconomics. Martin de Azpilcueta (Navarrus, in Grice-Hutchinson 1952) and Jean Bodin (in Monroe 1924) used the quantity theory of money to explain the "Price Revolution of the 16th Century" (now considered by some the only historical episode of inflation *not* explicable by the quantity theory). David Hume incorporated a trade-off between inflation and output in his specie-flow mechanism of international monetary adjustment in 1752 (Humphrey 1982, Berdell 1995; cf. Vickers 1959). The classical political economists (from Smith, Thornton, Say, J. Mill, and Ricardo to J. S. Mill and Bagehot, not Keynes's use of "classical" to include his contemporary Pigou) gave much attention to money, banking and prices (see Fetter 1965, Green 1992, and Anna J. Schwartz's *New Palgrave* article "Banking school, currency school, free banking school"). Together with such contemporaries as Thomas Attwood (of what is now called the Birmingham school) and Thomas Joplin, classical political economists debated issues of saving, investment, fluctuations and Say's (or James Mill's) Law of Markets (see Corry 1962, Link 1959, Sowell 1972). These discussions were more varied, complex, often sophisticated, and sometimes contradictory and confused than one might gather from Keynes's account of Say's Law: Jean-Baptiste Say himself endorsed public works as a response to unemployment, and criticized Ricardo for neglecting the possibility that savings might be hoarded instead of invested if investment opportunities were lacking (Hutchison 1980, 3n).

For the period following that covered by Frank Fetter (1965), David Laidler (1991) both admirably and admirably surveys "the golden age of the quantity theory," the contributions to monetary economics between 1870 and 1914 of Marshall, Wicksell, and the early writings of Fisher and Hawtrey. Formal empirical study of economic fluctuations as cycles was undertaken by Clement Juglar (1862) and by William Stanley Jevons (in papers posthumously collected as Jevons 1884), whose memorable sunspot theory of trade cycles has distracted attention from his lasting contributions on seasonality and on index numbers of the purchasing power of money. Karl Marx stood outside the mainstream of classical political economy and neoclassical economics, reflecting on the physiocratic *Tableau Economique*, composing schemes of simple and expanded reproduction, and rejecting Say's Law to consider realization crises, even while implicitly assuming it in other parts of *Capital* (see the essays reprinted in Part 2 of Horowitz 1968).

One way of discovering by what point a substantial body of work on macroeconomic topics had been produced is to check when it was found worthwhile to start publishing histories and surveys of the subject. Terence Hutchison (1953, 437) cites E. Bergmann's *Geschichte der Krisentheorien* (1895) as "still an outstandingly valuable work covering the nineteenth century and going well back into the eighteenth" and E. D. Jones, *Economic Crises* (1900), as "a short survey of the main theories with a useful bibliography." F. Isabel Taylor's *Bibliography of Unemployment and the Unemployed* (1909), compiled at the time of Beatrice Webb's Minority Report of the Poor Law Commission, had seventy-one pages of listings (not counting nineteen introductory pages including Sidney Webb's preface). One might recall in this context the remark of the editors of the *New Cambridge Modern History* that the proper dividing line between ancient and modern history was a hot topic in Rome in the first century C. E.

## A Review of the Troops

Apart from Keynes, who were the leading macroeconomists of the interwar period? Patrick Deutscher (1990, 1993) has done a citation count of articles (all in English) published between 1920 and 1939 that are listed in the American Economic Association's *Index of Economic Journals* under "Aggregative and Monetary Theory and Cycles" and the nonhistorical categories of "Money, Credit and Banking." Keynes, cited in 200 articles, tops the list (and already leads in the 1931-35 subperiod, before the *General Theory*). The next most cited macroeconomists, with at least a quarter as many references as Keynes, were Dennis H. Robertson (cited in 104 articles), Irving Fisher (73 citations), A. C. Pigou (72), Ralph G. Hawtrey (66), and Friedrich A. von Hayek (58). Alfred Marshall (cited in 43 articles), Wesley Clair Mitchell of the National Bureau of Economic Research (42), and Gustav Cassel (40, for his purchasing power parity theory of exchange rates) had at least a fifth as many references as Keynes. Citations of Stockholm School writings were spread across several economists associated with that approach: Knut Wicksell (31 citations), Bertil Ohlin (18), and Gunnar Myrdal (17).

Raymond Saulnier's Columbia dissertation and book on *Contemporary Monetary Theory* (1938) discussed only four economists, three of them Cambridge Apostles: Keynes, Hawtrey, Robertson, and Hayek. Five of the seven most-cited macroeconomists between 1920 and 1939 were educated at Cambridge, where four of them taught (counting Marshall, who retired in 1908). Alec Macfie's *Theories of the Trade Cycle* (1934) also discussed Hawtrey, Hayek, Keynes, Pigou, and Robertson, with a few additional references to Wesley Mitchell, John Maurice Clark, and the underconsumptionist John Hobson. To this list of leading interwar macroeconomists can be added three Continental European economists whose papers, presented to an Econometric Society session in Leiden in October 1933, appeared in *Econometrica* in 1935: Ragnar Frisch (18 citations, 1920-39) and Jan Tinbergen, who shared the first Nobel Prize in Economics in 1969, and Michał Kalecki (18 citations, 1940-44).

A similar view of available non-Keynesian sources of macroeconomics is implied by the American Economic Association *Readings in Business Cycle Theory* (Haberler 1944) which included articles by Hayek, Hawtrey, Kondratieff, Mitchell, Ohlin, Robertson, Schumpeter, and Tinbergen. Robertson, in keeping with his position as the only macroeconomist with half as many citations as Keynes between the wars, had articles reprinted in seven of the first nine volumes of American Economic Association readings. Fisher, who had been the most cited macroeconomist in 1920-30, was not represented in any volume of A. E. A. readings. The A. E. A. *Readings in Monetary Theory* (Lutz and Mints 1951) reprinted (in addition to Hawtrey, Robertson, and two papers by Pigou) Henry Simons on rules versus authorities in monetary policy, Clark Warburton arguing for a return to a monetary emphasis in business fluctuation theory, and an article by Milton Friedman. This draws attention to a surprising absence from Deutscher's citation list: although Chicago School monetarists were to take Fisher's (and Hawtrey's) place as upholders of the quantity theory of money, no economist from the University of Chicago appears among the 25 most cited monetary and cycle theorists of 1920-39 (or among the most cited macroeconomists for any of the shorter periods 1920-30, 1931-35, 1936-39, 1940-44).

Thus, the available non-Keynesian sources of monetary and cycle analysis from which macroeconomics might have developed in the interwar period later are: Wicksell's heirs in the Stockholm School, London-Austrian cycle theory (Hayek, Robbins, von Mises), National Bureau empiricism (Mitchell), Continental European econometricians (Frisch, Tinbergen and their students Haavelmo and Koopmans), Fisher, Hawtrey, Pigou, Robertson, Schumpeter, the Marxian tradition on which Kalecki drew, the Chicago oral tradition of monetary thought invoked by Friedman, and, outside the recognized economics profession, the underconsumptionist underworld of Hobson and of Foster and Catchings (cited in 18 journal articles 1920-39). To evaluate Keynes's contribution by Carl Menger's loss principle, imagine how the analysis of aggregate output, income and

employment and the price level might have developed from these sources had Keynes never written about economics. A simple review of the troops (to use Schumpeter's phrase) shows that, while the list is certainly finite and much of it derives from a few earlier sources (Marshall, Wicksell, Marx, and Menger's heirs in Vienna), there was a very substantial body of interwar research, more or less independent of Keynes, on topics now considered macroeconomic.

### Macroeconomics Without Keynes (I): Cambridge

Assuming away Keynes's career and writings removes more than the *General Theory* from the history of macroeconomics. A *Tract on Monetary Reform* (1923, Keynes 1971-89, *Collected Writings*, IV), and the articles leading to it, contributed the analysis of inflation as a tax on the holding of money, the resulting reduction of demand for real money balances (by 92% during the German hyperinflation) as a social cost of inflation, and the nominal interest rate differential as the forward premium or discount in the foreign exchange market to the Cambridge tradition of monetary theory (Dimand 1988, 4-20, cf. Flanders 1989, 160-69). These standards of later monetarist analysis do not appear in Pigou's articles on the value of money and the foreign exchanges. Other economists would have formulated them eventually (for instance, Shinsky analyzed the revenue from the inflation tax at about the same time) but it happened that it was Keynes who contributed them to the Cambridge cash-balance version of the quantity theory of money (see Eshag 1963 and Bridel 1987 on the Cambridge tradition of Marshallian monetary theory).

Keynes's former student Dennis Robertson noted in his *Banking Policy and the Price Level* (1926, 5), another major work of Cambridge monetary theory, that "I have had so many discussions with Mr. J. M. Keynes on the subject-matter of chapters V and VI, and have re-written them so drastically at his suggestion, that I think neither of us knows how much of the ideas therein contained is his and how much mine." In the 1928 second edition of *Money*, in the Cambridge Economic Handbook series edited by Keynes, Robertson asserted that much of the book, especially chapter VIII on banking policy in the cycle, should not have been published without Keynes's name alongside his own (Presley 1979, 78). That Robertson, the second-most cited interwar macroeconomist, disapproved of Keynes's break with Marshallian tradition in the 1930s does not detract from what Robertson's monetary theory in 1920s owed to Keynes, particularly on forced saving and banking policy. In Robertson's words, "In the early 1910s and again in the 1920s I did do a bit of scrambling towards the frontier (of economic thought), firmly roped to the man of genius who has perished there" (Presley 1979, 75, Presley's brackets).

Given Robertson's statement about Keynes's role in working out chapters V and VI of Robertson (1926), it is noteworthy that David Laidler (1995, 151) finds that "chapters 5 and 6 of *Banking Policy and the Price Level* present a subtle and varied treatment of the phenomenon of forced saving and its role in cyclical fluctuations, anticipating much of what Hayek was to say about these matters in *Prices and Production*, so much so, indeed, that this aspect of Robertson's work, taken by itself, would amply justify describing him as almost an Austrian", were it not for his policy activism and for his eclectic approach to other sources of fluctuation. Robertson's "induced lacking" in those two chapters derived from Keynes's 1923 inflation tax ("Induced Lacking belongs to Mr. Keynes" according to a footnote, Robertson 1926, 50n, to which Robertson drew attention in the preface to the 1948 reprint), although Robertson failed to take from Keynes's *Tract* the idea that a higher inflation tax would reduce the public's demand for real money balances (Laidler 1995, 170, reporting a point raised by T. K. Rymes).

While his monetary analysis of the 1920s was not independent of Keynes, Robertson did make a distinctly non-Keynesian contribution to macroeconomics which might have been developed further at an earlier date had it not been for the Keynesian revolution. Robertson's Cobden Prize essay and Trinity College fellowship dissertation, *A Study of Industrial Fluctuation* (1915), presented a real theory of fluctuations in real national income, based on technology shocks

and overinvestment, in contrast to the monetary theory of fluctuations advanced by Juglar (1862) and Hawtrey (1913), and held some fluctuation of output around trend to be "appropriate". Charles Goodhart and John Presley (1994) argue persuasively that Robertson (1915) prefigured important aspects of real business cycle theory. Models resembling modern real business cycle theory might well have been formulated, inspired by Robertson's theory and by Schumpeter's emphasis on bursts of entrepreneurial innovation, when the increasing mathematical level of the post-World War II economics profession began to be expressed in formal macroeconomic models, had not Keynesian and later monetarist approaches distracted attention from older cycle theories such as Robertson (1915).

On the other hand, I do not see any comparable development in macroeconomics stemming from *The Theory of Unemployment* (1933) by Arthur Cecil Pigou, Robertson's predecessor in Marshall's chair at Cambridge and the fourth most cited interwar macroeconomist. Pigou was unusual in the extent to which he treated the supply of and demand for labour in real terms, introducing monetary factors late in the book, and Keynes noted acutely that the book's theory did not support Pigou's policy views, which were close to those of Keynes. Even Mark Casson (1983, 16, 17, 157), who sees Pigou as the foremost pioneer of a "Pre-Keynesian" theory of structural unemployment, allows that Pigou's writing

degenerated into little more than analytical taxonomy in the 1930s. ... Thereafter he produced only 'pudding-like tomes' (Collard, 1981) such as *The Theory of Unemployment* (1933) and *The Economics of Stationary States* (1935). ... There is no standard work epitomizing Pre-Keynesian theory. Pigou was the person best equipped to write such a book, but instead he wrote *The Theory of Unemployment* (1933) -- a taxonomy of the subject which makes the reader wonder how anyone could write anything so tedious and abstract in the midst of an economic crisis. Pigou incorporated the most relevant parts of his structural theory of unemployment into the later editions of *The Economics of Welfare*, where they are buried in the middle of over 800 pages of dense economic analysis. The academic world is rarely set alight by material incorporated in a new edition of a standard text -- however distinguished the author, and however widely read the text.

Judging Pigou's theory of unemployment by the book that he wrote about it rather than by the treatise on "Pre-Keynesian theory" that neither he nor anyone else wrote, Pigou (1933) did not provide a basis for further advances in macroeconomics (beyond shaping the algebra of chapter 20 of the *General Theory*, through Keynes's acceptance of Pigou's form of the "first classical postulate" equating the real wage to the marginal product of labour).

This is not to say Keynes's critique of Pigou (1933) in the appendix of Chapter 19 of the *General Theory* is sound on all counts. Aslanbeigui (1992) presents textual evidence, notably a letter from Pigou to Keynes in May 1937 (Keynes 1971-89, XIV, 54), that Pigou intended a reverse L-shaped macro labour supply schedule, not the upward-sloping one attributed to Pigou by Keynes. As Hawtrey remarked at the time, "And how is any reader of the *Theory of Unemployment* to guess what Pigou has in mind, seeing that there is not a word about it from the beginning of the book to the end?" (Keynes 1971-89, XIV, 55). A reverse L-shaped labour supply schedule would not make Pigou (1933) any more useful as a basis for further developments.

### Macroeconomics Without Keynes (ii): Fluctuations as Cycles

The widespread empirical analysis of economic fluctuations as summations of truly periodic cycles, flourishing at institutions ranging from Wesley Mitchell's National Bureau of Economic Research and Warren Persons's Harvard Economic Service to the National Institute for Economic Research at the State University of Sofia, Bulgaria, and Nikolai Kondratieff's Conjecture Institute in Moscow, would also, I think, have proven a dead-end, Keynes or no Keynes. Tjalling Koopmans's 1947 critique of Arthur Burns's and Wesley Mitchell's careful empirical treatise,

*Measuring Business Cycles* (1946), as "Measurement Without Theory" has received a number of rebuttals, beginning with Rutledge Vining's debate with Koopmans. However, reference to Mitchell's 1927 survey of business cycle theory, his lectures on the history of economic theory, his failure to denounce abstract theorizing (as Beveridge did in his valedictory lecture at LSE in 1937), or to the lack of conflict between relatively atheoretical statistical and more formal econometric business cycle investigators in the interwar period, cannot refute claims that explicit economic theory is largely absent from NBER cycle studies of Mitchell's time, while claims that the selection of series to be measured or tried as leading indicators represents implicit theorizing simply underline the dangers of not modeling consciously and explicitly, so that the theory can be examined and criticized.

Koopmans's critique came when the empirical approach to fluctuations as periodic cycles was already floundering under the weight of the many cycles of differing periodicity and amplitude that had to summed up to approximate the data. Joseph Schumpeter (1939), for example, attributed the Great Depression to the coincidence of the downturns of several cycles of differing length (with recovery impeded by restrictive New Deal supply-side policies). William Beveridge (1920, 1921, 1922; Director of the London School of Economics 1919-37), using an ancestor of spectral analysis called the periodogram, found no fewer than nineteen periodicities in wheat prices ranging from 2.735 to 68 years, eleven of them very prominent (see Cargill 1974). Harvard's E. B. Wilson (1934) found the cycles revealed by a periodogram analysis of a monthly index of U. S. business activity to be statistically insignificant. Eugen Slutsky (1927), using winning lottery sums for an uncorrelated random series, showed that summation of random shocks could generate data that looked cyclical, and freed economists from searching for a periodic cause for economic fluctuations, which William Stanley Jevons and his son Herbert Stanley Jevons (1933) had sought in sunspot cycles, Beveridge in rainfall cycles, and Columbia University's H. L. Moore in the influence of the planet Venus on weather cycles (Morgan 1990, 18-37, 79-83). Such interpretation of fluctuations as true periodic cycles moved outside the economics profession to the quarterly *Journal of Cycle Research* and monthly *Cycles*, both published by Edward R. Dewey's Foundation for the Study of Cycles, of which Wesley Mitchell was a director until his death (see Louise L. Wilson 1964 for a comprehensive bibliography of this literature).

The Harvard Economic Service's forecasting service, based on analysis of leads and lags in time services, never recovered from its failure to forecast the coming, depth or length of the Great Depression, leaving behind its *Review of Economic Statistics* (now the *Review of Economics and Statistics*). Irving Fisher's Index Number Institute did no better forecasting from monetary data, building on Fisher's pioneering correlations of output and unemployment with distributed lags of price level changes. Dominguez, Fair and Shapiro (1988) have shown that modern time-series methods would have done no better in predicting the Depression, even augmenting the data set with some series not available to Fisher or the Harvard Economic Service. While the Harvard Economic Service and its business barometer suffered from a forecasting failure, the Conjunction Institute of the People's Commissariat of Finance in Moscow, directed by Tugan-Baranovsky's student, the long-wave proponent N. D. Kondrat'ev (Kondratieff), was closed in a political purge in 1928. Kondrat'ev was arrested as one of the supposed leaders of a Working Peasants Party and vanished after testifying at the trial of another group of political dissidents, while Slutsky, ironically, became a meteorologist studying sunspots (Jasny 1972, chapter 9 on Kondrat'ev).

### Macroeconomics Without Keynes (iii): LSE-Vienna

Macroeconomic discussion in the early 1930s centred on Keynes's *Treatise on Money* (1930, *Collected Writings* 1971-89, V and VI) and on *Prices and Production* (1931) by Friedrich Hayek, director of the Austrian Institute for Business Cycle Research. The spectacular success of Hayek's book as a series of four lectures at the London School of Economics in February 1931 led to his appointment at the age of thirty two to a chair there, to the championing of Austrian business cycle theory by another young LSE professor, Lionel Robbins (1934 and introduction to Hayek 1931), and, through Robbins's support, to the translation of the major monetary work of Hayek's teacher, Ludwig von Mises (1935). This monetary overinvestment theory of cycles argued that expansionary monetary policy made depression inevitable by encouraging excessive lengthening of the average period of production (see Ellis 1934, 335-56). The LSE-Austrian school was severely sceptical of reasoning in terms of aggregates such as the price level, yet a key Austrian concept was the average period of production, which became ensnared in the early 1930s in one of the recurring outbreaks of capital theory paradoxes and controversies. Modern real business cycle theory stresses shocks to an aggregate production function without much concern about capital-theoretic problems of aggregation, combining this absence of secure macroeconomic foundations with a rhetoric of consistent microeconomic foundations recalling the LSE-Austrian insistence on grounding theories in the maximizing behaviour of individuals (see Geweke 1985). Perhaps, if Keynes had not provided a distraction, some of these developments in real business cycle theory could have begun as soon as economists had forgotten what they learned from the capital controversies of the 1930s, instead of waiting for them to forget what they learned from the capital controversies of the 1960s.

The LSE-Vienna school was devastated by the loss to Keynesian economics or eclectic positions of such promising young Hayekians studying or teaching at LSE as John Hicks, Benjamin Higgins, Nicholas Kaldor, Abba Lerner, and G. L. S. Shackle, with a few, notably Paul Sweezy, moving beyond Keynes to Marx (McCormick 1992). Even Lord Robbins appeared to recant his deflationism of the 1930s in his autobiography in 1971, although the extent and meaning of his recantation is reconsidered in the biography of Robbins being written by Susan Howson. Hayek himself left trade cycle theory after the title essay of Hayek (1939), and left capital soon after, to concentrate on political philosophy and the theory of knowledge. Milton Friedman (in Gordon 1974, 162-63) argues that the *General Theory* had more appeal to young economists at LSE than at Chicago because at LSE

the dominant view was that the depression was an inevitable result of the prior boom, that it was deepened by the attempts to prevent prices and wages from falling and firms from going bankrupt ... that the only sound policy was to let the depression run its course, bring down money costs, and eliminate weak and unsound firms. By contrast with this dismal picture, the news seeping out of Cambridge (England) about Keynes's interpretation of the depression and of the right policy to cure it must have come like a flash of light on a dark night. ... It was the London School (really Austrian) view that I referred to in my 'Restatement' when I spoke of 'the atrophied and rigid caricature [of the quantity theory] that is so frequently described by the proponents of the new income-expenditure approach - and with some justice, to judge by much of the literature on policy that was spawned by the quantity theorists'.

If not Keynes's *General Theory*, then some other new approach would have carried the younger Vienna School economists at LSE away from arid capital controversies.

Robbins was also involved, first as a research assistant, then as official supervisor of studies, and finally as an examiner with the doctoral dissertation that William Beveridge wrote to become a full member of the University of London, of which he had already served as vice-chancellor, and which became Part II of *Unemployment, a Problem of Industry (1909 and 1930)*. This was a substantial descriptive work of some five hundred pages, the first part published while Beveridge

was the first director of the Labour Exchanges (established so that the labour market would behave more like a textbook market), but did not provide the basis of any theory of unemployment.

One important contribution from the LSE-Austrian approach, *The Theory of Idle Resources* (1939) by W. H. Hutt, an LSE graduate teaching at the University of Cape Town, might have attracted attention much earlier than it did had it not been for the "Keynesian avalanche", and could have been the foundation for search theories of unemployment decades before search-theoretic models of the labour market became fashionable (see Leijonhufvud 1969, 31n, Casson 1983, 24).

Hayek's later work on the use of knowledge in the economy and his shift of emphasis from equilibrium to market process raised questions about the coordination of the activities of individual economic agents related to the coordination problem posed by Keynes, although Hayek's approach to answering the question was very different from that of Keynes (see Garretsen 1992, O'Driscoll 1977). Hayek's insights into the coordination problem, like those of Keynes, could not easily be framed in convenient, tractable models for teaching, policy-making and article-generation, and remain to be incorporated in the mainstream of macroeconomics.

### Multiple Discoveries?: Stockholm and Kalecki

Robert K. Merton (1973), following William Ogburn and Dorothy S. Thomas, has argued that the rewards for priority in scientific research has led to failure to recognize how many discoveries are cases of multiple independent discovery, where several investigators each solve a problem posed by the current state of the literature or by external influences (e. g. Darwin and Wallace on evolution by natural selection, Newton and Leibniz on differential calculus). Had John Maurice Clark not published his well-known 1917 article on the accelerator theory that net investment depends on changes in output (reprinted in Haberler 1944), the concept of the accelerator would still have been available to the discipline in articles by Thomas N. Carver in 1903, Albert Aftalion in 1909, and Charles F. Bickerdike in 1914 and in passages in 1913 books by Aftalion, Hawtrey and Pigou, with an embryonic anticipation by Jevons in 1863 (see Jevons 1884, 207, Deutscher 1990, 64, Laidler 1991, 111-12, Niehans 1995, 8). No single contributor was indispensable to the accelerator theory.

The multiplier process (relating a change in equilibrium income to a change in autonomous spending) also had many discoverers, not just Richard Kahn in 1931, but their contributions can be distinguished. Recognition that increased demand for one industry or sector is transmitted to other sectors, causing a cumulative increase in income and spending greater than the initial round of spending can be found in Marx's *Theories of Surplus Value* (see Screpanti and Zamagni 1993, 222), slightly later in Walter Bagehot's *Lombard Street* (1873) and Alfred Marshall and Mary Paley Marshall's *Economics of Industry* (1879), and then in writings of Tugan-Baranovsky and Aftalion - there is even a hint of the idea from Pericles, as reported by Plutarch. Derivation of a finite-valued multiplier, apart from overlooked early contributions by Julius Wulff in 1896 and by N. A. L. J. Johannsen (1908), came in 1920s, with leakages into imports, from Fr. Johannsen in Copenhagen, Hawtrey in an unpublished 1928 Treasury memorandum, and L. F. Giblin, culminating in his 1930 inaugural lecture in Melbourne. Leakages into imports alone from each round of spending and income would not yield a finite-valued multiplier for the world economy as a whole. Kahn derived a finite multiplier with leakages into imports, reduced unemployment benefits (the dole), and unspent profits, but not personal saving or taxes. Hawtrey derived a finite multiplier from a savings propensity in a 1930 numerical example and in an algebraic analysis in his 1932 book, with Jens Warming and John Maurice Clark also contributing (see Copland 1960, E. G. Davis 1981, Deutscher 1990: 103-104, Dimand 1988: 101-18, 1994b, 1996, Topp 1981).

Unravelling the story of the multiplier reveals that discovery of a particular piece of apparatus need not entail grasping its implications or placing it in a particular context. Hawtrey remained opposed to expansionary public works on grounds of complete crowding-out. Giblin,



corresponding with Keynes about Keynes's 1933 pamphlet presentation of the multiplier, made no mention of his own 1930 multiplier (Keynes 1973, XIII, 414-17). Similarly, widespread support for public works as a response to unemployment in the Depression need not imply any understanding of the multiplier process or income-expenditure theory, contrary to the reaction of some reviewers of J. Ronnie Davis (1971): many supporters of expansionary public works in the 1930s wished to finance them by raising taxes or cutting other government spending, or to accompany them by restrictions on investment (Dimand 1990). J. M. Clark of Columbia and Paul Douglas of the University of Chicago, the prime examples used by J. R. Davis (1971, 47-60, 65-84) to demonstrate pre-Keynesian understanding of multiplier theory in the United States in 1934 and 1935, explicitly derived their accounts from Kahn's articles and Keynes's 1933 pamphlet *The Means to Prosperity*, with Clark, not mentioning his own less formal 1931 multiplier exercise, terming the income-expenditure theory "the Kahn-Keynes approach" in 1935 (Dimand 1990). (Mark Blaug 1991, 178n, following Stoneman 1979, remarks on Keynes's failure to cite Douglas and Clark in the *General Theory*, but not on their citation of Kahn and Keynes.) J. R. Davis and others have justly drawn attention to the expansionary policy recommendations of Jacob Viner (1933). Viner resigned his advisory position in the Treasury in 1938 to protest the dangers of heavy deficit spending in response to the recession of 1937-38. Given that the United States had swung from a cyclically-adjusted deficit of 0.57% of GNP in 1936 to cyclically-adjusted surpluses of 2.82% of GNP in 1937, 2.92% in 1938, and 2.21% in 1939, it seems that reports of Viner's devotion to countercyclical fiscal policy, like the early reports of Mark Twain's death, have been exaggerated (Garraty 1986, 159n, Peppers 1973).

No single contributor, Kahn or Hawtrey or Warming or Giblin or Clark, was indispensable to developing the finite-valued multiplier. Even though they made distinct contributions, and even though many other insights into the multiplier process did not extend to deriving one with a finite value, their analyses were so numerous and so close together in time and topic that the multiplier as it evolved by 1936 would have been much the same in the absence of any one of the contributors. It was Keynes who took the step from the multiplier determining changes in equilibrium income to the goods market equilibrium condition determining the level of equilibrium income, but, with so many economists thinking in multiplier terms, someone else would have taken the step eventually had he not done so. Similarly, someone would have combined the multiplier and accelerator with lags from Robertsonian and Swedish period analysis to produce a multiplier-accelerator model of the cycle, even in the absence of any single contributor to the literature.

Don Patinkin (1982, Part I) considered whether what he held to be the central message of Keynes's *General Theory*, the theory of effective demand (the determination of the level of equilibrium income), was a Mertonian multiple, with Kalecki and the Stockholm School as the other possible discoverers. He concluded that it was not. Following Wicksell, the Stockholm economists of the 1920s and 1930s (notably Erik Lindahl, Erik Lundberg, Gunnar Myrdal, Bertil Ohlin) concentrated on price-level dynamics, and did not develop a theory of aggregate output or employment, although they gave policy advice about unemployment. Bertil Ohlin emphasized changes in income rather than in prices in his 1929 *Economic Journal* exchange with Keynes about the transfer problem associated with reparations, and in a 1933 draft memorandum he summed a geometric series to find the multiplier effect of public works (Eskil Wadensjö, in Jonung 1991, 116 — the calculation was deleted from the published memorandum after criticism by Dag Hammarskjöld), but in the *Economic Journal* in 1937 he rejected the stability of the consumption function and the usefulness of the multiplier concept (Laidler, in Jonung 1991, 317-18, 324). The Stockholm economists produced a Wicksellian monetary analysis of price-level dynamics rather than a theory of aggregate output and employment (in addition to major contributions by Lindahl to public finance, Ohlin to international trade theory, Lundberg to the theory of long-run growth, and Myrdal to development).

The case of Michal Kalecki's macroeconomics is more contentious. Patinkin (1982) held that the central message of Kalecki's articles from 1933 to 1935 concerned investment cycles, while that of the *General Theory* was the principle of effective demand, interpreted as the IS goods market equilibrium condition: "the theory of effective demand is concerned not only with the mathematical solution of the equilibrium equation  $F(Y) = y$ , but with demonstrating the stability of this equilibrium as determined by the dynamic adjustment equation  $dY/dt = G[F(Y) - Y]$ , where  $G > 0$ " (from Patinkin's *New Palgrave* article on Keynes). Even Mario Sebastiani (1994, 61), arguing that "unemployment equilibrium is the core of Kalecki's thought about capitalism", accepts that "Only later -- probably after the *General Theory* was published -- did Kalecki seem to realise that the outstanding problem was the systematic waste of resources, and that dealing with it required separating the analysis of equilibrium from that of the dynamic process."

Simon Chapple (1991) argues that Kalecki determined aggregate output in a manner consistent with Patinkin's version of the theory of effective demand in a 1933 article in Polish, "On Foreign Trade and 'Domestic Exports'" (Kalecki 1990, 165-174) that Patinkin (1982, 69n) dismissed in one sentence in a footnote for arbitrarily assuming a fixed share of profits in national income. Chapple (1993) shows capitalist spending decisions determining aggregate income in another 1933 Kalecki essay, with a procyclical profit share, unitary marginal propensity to consume out of wages, and zero marginal propensity to consume out of profits. Most strikingly, Chapple (1995) examines Kalecki's 1934 Polish journal article "Three Systems" (Kalecki 1990, 201-19) which includes a three-equation system determining goods market equilibrium (again with all wages spent, and capitalist consumption independent of profits), money market equilibrium (with money demand depending on income and the interest rate), and aggregate supply (with marginal cost increasing with output and hysteretic adjustment of money wages). Keynes had presented his system similarly in four equations (but with given money wages and a single positive marginal propensity to consume less than one) in his autumn 1933 lecture course (see Rymes 1987, 1989) but had not published it. "Three Systems" was not chosen by Kalecki for translations of his selected articles in 1966 and 1971, and he did not refer to it later or develop its static equilibrium method, preferring dynamic models that recognized that investment alters the capital stock and that production of capital goods takes time. This may reasonably exclude "Three Systems" from Kalecki's "central message" to the economics profession, but the essays studied by Chapple remain of great interest as showing what Kalecki was able to produce working in a strand of Marxian tradition.

While Kalecki before 1936 (like Hawtrey in 1913) had read very few economists, he had read Rosa Luxemburg's *Accumulation of Capital* (1913), which developed Marx's reproduction schemes from Volume II of *Capital* into an (imperfect) model of capitalist breakdown due to insufficient demand, which could be staved off temporarily by finding foreign markets or such domestic equivalents of exports as military spending (Howard and King 1989, I, 106-115). Kalecki stated in 1939 that "the necessity of covering the 'gap of saving' by home investment was outlined by her perhaps more clearly than anyone else before the publication of Mr. Keynes' *General Theory*", remarked in the introduction to a 1966 translation of some of his articles that "it is worth noting that there is a certain affinity between these theories of mine and those of Rosa Luxemburg" (Chapple 1991, 254-55), and late in his career wrote on "The Problem of Effective Demand in Tugan-Baranovski and Rosa Luxemburg." Luxemburg (1913) provoked Otto Bauer's model of accumulation (Bauer 1913), in which, in the course of constructing a counterexample to Luxemburg's claim that stable equilibrium growth is impossible in a closed capitalist economy, Bauer devised a sophisticated macrodynamic model with affinities to later Harrod-Domar growth theory (Howard and King 1989, I, 115-20). Henryk Grossman (1929), then at the Frankfurt Institute for Social Research and formerly at the Free University in Warsaw, showed that Bauer's numerical example would run out of sufficient surplus value to finance the required accumulation after thirty-six periods (Bauer had examined only the first four periods), but built upon the

reproduction models of Luxemburg and Bauer to model capitalist breakdown and crises, albeit with arbitrary rates of accumulation of constant and variable capital (Howard and King 1989, I, 316-336).

Had it not been for Keynes's *General Theory* and later Keynesian economics, the mass unemployment of the 1930s might well have given Marxian economics even more prominence in interwar and postwar Western Europe and Japan than it achieved (though it seems unlikely that it would have had equal influence in North America). The strand of independent Marxian tradition reaching from Tugan-Baranovsky, Luxemburg, Bauer and Grossmann to Kalecki, despite all the arbitrary simplifying assumptions in their models, could have provided the basis for a macroeconomics based on Marx's reproduction schemes and on effective demand. Such an approach could have avoided, as Kalecki did, the tangles of the labour theory of value and the stultification of Stalinist conformity. Howard and King (1992, II, 19) conclude that "Marxist analyses of the Depression proved deficient, and the ultimate reason is similar to that applying in the case of bourgeois economics: they lacked an adequate theory of effective demand." Kalecki's "Three Systems" pointed a possible path to remedying this failing, a path that was not taken. Had Keynesian economics not attracted young economists who might otherwise have been attracted to Marxian economics (as well as attracted some, such as John Strachey, who were already Marxian expositors in the 1930s), postwar Marxian economics in Western Europe might well have done more on effective demand, realization problems, and multi-sector growth models.

Such formal theorizing would have been in keeping with the approach indicated by Marx in a letter to Engels on May 31, 1875: "You know the tables representing prices, discount rates, etc., in the form of zigzags fluctuating up and down. I have tried repeatedly to compute these 'ups and downs' -- for the purposes of business cycle analysis -- as irregular curves and thus to calculate the principal laws of economic crises mathematically. I still believe that the task can be accomplished on the basis of a carefully sifted statistical material." Wassily Leontief, quoting this letter in 1938, noted "Thus it seems that towards the end of his life Marx actually anticipated the statistical, mathematical approach to the business cycle analysis. An approach which, incidentally, only recently was declared by an authoritative Soviet Russian textbook on mathematical statistics to be nothing else but an insidious invention of the Intelligence Division of the French General Staff" (reprinted in Horowitz 1968, 91).

Even Lenin once used a variant of Marx's schemes of extended reproduction in a 1893 essay "On the So-Called Market Question" (thought to be lost until found in 1937) to refute Populist (*Narodnik*) claims that the development of capitalism was impossible in a poor peasant society such as Russia because of insufficient demand for consumption goods (Dadayan 1981, 44-52). Dadayan (1981, 52-61) shows that theorizing by Soviet economists about models of expanded reproduction was stimulated by the Central Statistical Board's publication in 1926 of an intersectoral balance for the Soviet economy in 1923/24, but makes no explicit comment on the abrupt end of his references in 1930. Materials and precedents existed for the construction of serious Marxian macroeconomics, but whether anything would have come of them is another matter.

Mass unemployment in the capitalist countries, and failure to realize the human cost of the forced collectivization of agriculture that accompanied the rising industrial output of the first Five Year Plan, made Marxism attractive to young intellectuals in the West during the Depression, including the younger Cambridge Apostles (such as Anthony Blunt and Guy Burgess), to the dismay of such older Apostles as Keynes and Roberston. Underconsumptionists and other monetary heretics also attracted attention in the 1930s, with much greater communication between professional economists and monetary heretics than before or after (Dimand 1991), as indicated by the appearance of Foster and Catchings on Deutscher's list of most cited authors in interwar macroeconomics articles (tied with Frisch, Ohlin and John Stuart Mill for 21st place). Fisher, Hawtreay and Keynes praised the stamped money proposals of Silvio Gesell. Robertson and Hayek

wrote extended critiques of Foster and Catchings, and Hawtrey reviewed Foster and Catchings and wrote at length against Social Credit. In 1935, the Social Credit Party, devoted to the monetary theories of Major C. H. Douglas and led by William Aberhart of the Prophetic Bible Institute, won fifty-six of the sixty-three seats in the legislature of the Canadian province of Alberta, and swept all fifteen of Alberta's seats in the federal House of Commons later that year. The monetary heretics raised important issues about the role of effective demand, but most were handicapped by a failure to distinguish a decision to save from a decision to invest.

### An American Keynes?

Irving Fisher of Yale University was the most cited macroeconomist in the 1920s but lost the profession's attention in the 1930s and 1940s (Dimand 1995). At Yale he had averaged only six students a year in the only course he taught in this period, and he supervised only six doctoral dissertations during his career. His forecast of continued high stock prices in October 1929, his loss of all the ten million dollars he had amassed in the stock boom of the 1920s (and another million besides), and his extra-academic crusades for American entry into the League of Nations (two books), against repeal of Prohibition (three books), for improved diet, and for a new world map projection (his last book) caused the public and the American economics profession to question his judgement. Increasingly, however, the later economics profession adopted many of approaches, including some considered highly eccentric when he proposed them. His doctoral dissertation and his first book in 1892 (Fisher 1997, I) introduced general equilibrium analysis and mathematical economics to the American economics profession, and explained his hydrostatic simulation model of the economy. *The Purchasing Power of Money* (1911 with Harry Gunnison Brown; Fisher 1997, IV) was a classic restatement of the quantity theory of money. His correlations of output and unemployment with distributed lags of price-level changes (articles reprinted in Fisher 1997, VII) pioneered econometrics in America while developing the monetary theory of economic fluctuations, and included an article reprinted as "I Discovered the Phillips Curve" (Fisher 1926/1973, cf. Dimand 1993). His two-period optimal consumption diagram in his 1907 *Rate of Interest* (1997, III) and 1930 *Theory of Interest* (1997, VIII) provided the basis for postwar consumption theories and a crucial diagram in international trade theory. His interpretation of the nominal interest rate as the sum of the real interest rate plus the expected rate of inflation (plus cross-product terms), with expected inflation estimated by correlating nominal interest with a distributed lag of past price changes presented what was later termed the adaptive expectations hypothesis. General equilibrium, the use of mathematics, correlation and distributed lags, the monetary theory of fluctuations, and the neoclassical theory of capital and interest all took their place in mainstream American economics, in part through institutions sponsored by Fisher, the Econometric Society and the Cowles Commission. Outside the mainstream, Fisher (1933, 1997, IX) contributed his debt-deflation theory of depressions (Dimand 1994a).

James Tobin (1985, 36-37) suggests that "Had Fisher pulled these strands together into a coherent theory, he could have been an American Keynes." Fisher's monetary economics was not cast in the general equilibrium framework of his dissertation, nor did not his monetary theory of fluctuations draw on what his books on capital theory had to offer about saving and consumption. Fisher never produced a synthesis of his theories of money, investment, saving and fluctuations comparable to Keynes's synthesis in the *General Theory*. Had Keynes never written, American economists might have continued to pay attention to Fisher at the time when he propounded his debt-deflation theory of depressions and might have developed his insights into consumption and saving and his monetary theory of fluctuations earlier than they did. Although Fisher lacked direct followers (except James Harvey Rogers of Yale to a limited extent), if Keynes had never written, American economists could have produced a synthesis of Fisher's quantity theory, monetary theory of fluctuations, and capital theory, adding Henry Simons's case for rules rather than authorities in monetary policy, that would have differed from the Chicago monetarism of Milton Friedman to the

extent that it incorporated Fisher's remarkable debt-deflation theory of depressions (which leads to doubts whether increased nominal flexibility is stabilizing). What this synthesis would have lacked would be a theory of unemployment and a treatment of the coordination problem. This omission could not have been removed from the interwar Chicago monetary tradition which, like any other American work on the quantity theory at the time, was influenced by Fisher's *Purchasing Power of Money* and other writings.

Something else that would be missing from a Fisherian synthesis is rather surprising. For all that he had to say in *The Purchasing Power of Money* and elsewhere about factors influencing the velocity of circulation, Fisher never explicitly formulated a money demand function with the interest rate as an argument, so that an agent's holding of money in equilibrium would be optimal with regard to holding of assets in the agent's portfolio, as well as with respect to the flow of transactions to be undertaken. Keynes did this in his liquidity preference function in the *General Theory*, taking the next step beyond the *Tract's* recognition that faster inflation (and hence higher nominal interest rates) reduced desired holdings of real money balances. This contribution by Keynes led Don Patinkin to consider Friedman a Keynesian, to Friedman's irritation (see Patinkin's comment and Friedman's reply in Gordon 1974). Patinkin (1982, 165-80) also shows that, despite occasional earlier references to the effect of the interest rate on money demand, Keynes's formulation of liquidity preference also marked an advance beyond the earlier Cambridge monetary theorists. Kalecki's "Three Systems" in 1934 included a money market equilibrium condition that made the interest rate a function of nominal income, given the stock of money, but Kalecki did not pursue that model, and it was not noticed by others at the time.

### Political Arithmetic

Keynes's aggregative theory of output and employment stimulated the development of macroeconomic models and of national income accounts. The stimulus to macroeconomic modeling is illustrated by the career of Lawrence Klein, who formulated and estimated his Model I of the United States economy while writing a thesis on the Keynesian revolution. Keynes directly encouraged the work of Colin Clark, Erwin Rothbarth, James Meade and Richard Stone on national accounts in Britain, while the use of Keynesian categories added to the demand for statistics on national income and its components. There would have been macroeconomic models and national accounts without Keynes, however. Vibha Kapuria-Foreman and Mark Perlman (1995) show how much had already been done on national accounts in the United States by Simon Kuznets of NBER, founder of the Conference on Income and Wealth. Jan Tinbergen's *Statistical Testing of Business Cycle Theories* (1939) was a League of Nations project aimed at modeling and testing the theories surveyed in Gottfried Haberler's *Prosperity and Depression*, with the model influenced by Frisch's 1933 "rocking-horse" model of the business cycle (in which the system oscillates as a result of random, nonoscillatory shocks). Tinbergen's methodological first volume received a chilly review from Keynes, as the volume applying the method to the interwar U. S. economy did from Friedman.

Tinbergen moved away from macroeconomic modeling to other fields such as the theory of economic policy and development planning after the discouraging reception of Tinbergen (1939) and the German occupation of the Netherlands. His two 1951 books give a misleading impression of his remaining in the field, since the volume on British business cycles was practically completed before the war, while his econometrics textbook was a translation of a 1940 work in Dutch. Tinbergen made several contributions ahead of their time in the 1930s: the first regression estimation of what came to be called the Phillips curve, the concept and even the name of rational expectations (in German), solution of the identification problem for the two-equation supply and demand case (also solved by Frisch). Macrodynamical modeling might have developed further from the work of Tinbergen, Frisch and Haavelmo had these pioneers not moved on to other interests in

economics after the war disrupted European research (see Andvig 1985, Epstein 1987, Morgan 1990 for the contributions of the econometricians). Instead, macroeconomic modeling was conducted in Keynesian terms by Klein and his students and imitators. One can only guess at the influence of Keynes's hostile review of Tinbergen (1939), as opposed to the calamities of war and occupation or the attraction of new intellectual challenges, in turning Tinbergen away from macrodynamics. Mary Morgan (1990, 124n) reports that "Neil de Marchi points out that one of the reasons Tinbergen found Keynes' comments peculiar was that he was influenced by Keynes' macroeconomic ideas" which raises the possibility that might have contributed less in the interwar period had Keynes never written.

### The Difference that Keynes Made

Without Keynes, the discipline of economics would still have had the accelerator, Kuznets's work on national accounts, Tinbergen's macroeconomic models of American and British business cycles, the strand of Marxian reproduction models leading to Kalecki, Fisher's monetary economics, Hutt's search theory of unemployment, and at least strong hints of real business cycle theory from Robertson and the Austrians. These last three items (apart from Fisher's debt-deflation) resemble later monetarist and New Classical macroeconomics more than they do the Keynesian economics of the postwar period. There would have less impetus to the development of national accounts and macroeconomic models without Keynes (not that Keynes thought highly of macroeconometrics), and the economics profession would have lost ground to Marxism in Europe and monetary heresies in North America. It is an open question whether Western Marxism would have become more macroeconomically sophisticated in a world without Keynes, drawing on Luxemburg, Grossman and Kalecki, or whether it would have sunk on economic issues to the dismal level of post-purge official Soviet political economy. The case for employment expansion by public works advanced by Keynes and Hubert Henderson in 1929, with its weakness of not showing why the secondary effects would be finite, directly stimulated Kahn's multiplier article, and Hawtrey's 1930 and 1932 multiplier contributions occurred in commentaries on Keynes's *Treatise on Money*, but there were enough people thinking about the multiplier process that it would have been worked out with or without Keynes. On the equilibrating role of changes in output, it was Keynes who took the step from determining changes in equilibrium income to determining the level of equilibrium income, but someone would have done so eventually.

Keynes's liquidity preference theory of the stock demand for money as an asset (rather than the liquidity preference theory of the interest rate as opposed to a loanable funds theory) stands as an important and distinctive Keynesian contribution (with Walras's treatment of desired cash balances as an anticipation that was ignored).

Some aspects of Keynes's *General Theory* only became effective contributions to macroeconomics when rediscovered independently by someone else. Thus, the argument in Chapter 2 that workers may quite rationally resist money wage cuts because of a concern with relative wages in a setting in which not all money wages would be reduced at once by the same amount (as real wages would be lowered by a price increase) became influential only four decades later when John Taylor reinvented it as his theory of the macroeconomic effects of staggered contracts. Until then, many economists kept insisting that Chapter 2 of the *General Theory* attributed an irrational money illusion to workers. More recently, macroeconomists have rediscovered Chapter 19 on "Changes in Money-Wages", which argues that wage and price cuts may be destabilizing through their effect on expectations and on the risk of bankruptcy from the increased value of inside debt (as in Fisher's debt-deflation model).

Keynes's great contribution was his theory of how insufficient effective demand due to a coordination failure can cause involuntary unemployment. A decision to save today does not effectively signal a demand for specific goods at a specific date in the future. Unemployed workers cannot effectively signal that, if hired, their wages would be spent in ways that would justify their

employment. An excess supply of labour does not mean an excess effective demand for something in another market to be produced by hiring those workers currently in excess supply. The labour that workers cannot sell, valued at the current wage rate that they do not get for it, is not part of their budget constraint for demanding goods and services. This analysis of why the labour market may not clear is due to Keynes in the *General Theory*. It cannot be derived from Kalecki, whose explanation of why money wage cuts do not raise employment depended on workers reducing their consumption by the full amount of the reduction in the wage bill (like the widow's cruse model of Keynes's *Treatise*). The Post Keynesian emphasis on fundamental uncertainty about an unknowable future is one way of looking at this failure of signalling and coordination; Robert Clower's argument that Walras's Law (the value of aggregate excess demand is zero summed over all market) applies to notional demands, but not to effective demands, is another. So is Keynes's distinction between a cooperative economy and an entrepreneur economy (in Keynes 1971-89, XXIX). Hayek also investigated coordination problems and the use of knowledge in the economy but from the standpoint of how markets grope towards coordination, rather than of how effective demand failures occur (see Dow 1985, Garretsen 1992). More recently, coordination problems are finessed in many New Classical models by assuming that the economy acts as if composed of identical representative agents, with a no-trade equilibrium (see Geweke 1985), leading to the conclusion that, since there is no involuntary unemployment in such models, it would be undesirable to try to reduce it.

Axel Leijonhufvud (in Vercelli and Dimitri, 1992, 20) shows how forgetting Keynes's message about coordination failure deprived Keynesians of a simple response to Barro's Ricardian equivalence theorem: "The natural Keynesian retort to this should have been to insist that the discussion keep to the original context for these characteristic Keynesian fiscal policy recommendations. That context was, of course, one of unemployment arising from intertemporal disequilibrium. With real interest rates at a level that will not allow saving-investment co-ordination at full employment [perhaps because money interest rates are bounded at zero], the result will be an excess supply of present factor services and an implicit excess demand for future goods. Spending now will reduce this excess supply; taxing later will reduce the excess demand. The temporal structure of the Keynesian policy fits the temporal maldistribution of the excess demands left uncorrected by intertemporal price adjustments."

Keynes was not the only important contributor to interwar macroeconomics, and one can imagine how macroeconomics might have evolved without him. His distinctive contributions included the demand for money as an asset, relative wages as a source of nominal wage rigidity, the possible destabilizing effects of great nominal flexibility, the role of the level of output in equilibrating saving and investment, and the coordination problem of effective demand that may cause saving and investment to balance at too low a level of output for full employment. Assume away his contributions and, even allowing for how other macroeconomic approaches might have developed further in a world without Keynes, the dismal science would have been poorer and even more dismal.

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