

The Keynesian Revolution

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The Keynesian revolution was launched by the appearance of Keynes's *General Theory* in early 1936. It is often considered as ushering in a period of direct government intervention in the economy. When the book appeared, the British economy had been in depressed conditions since the end of the 1914-18 war, while in the US the collapse in economic activity which followed soon after the stock market crash of 1929 showed no signs of ending. Bank holidays were declared in Germany in 1931 and in the United States in 1933 to prevent complete collapse of the financial system. Government intervention in economic affairs was by that time a common occurrence -- it formed the basis for the economic policy of the National Socialist, Fascist and Soviet governments, and Herbert Hoover, the Republican President from 1928-32, had employed government expenditure packages to offset cyclical movements in the economy. These had been formulated when he was Secretary of Commerce before being elected President.

Hoover's use of government expenditures to try to combat the slump was attacked by candidate Franklin Roosevelt. During his successful 1932 Presidential campaign he promised to reduce government intervention and balance the budget. Faced with the possibility of a collapse of the banking system on the eve of his inauguration in March of 1933, Roosevelt moved quickly to introduce government regulation of the financial sector, as well as other government policies in support of the economy, now known as the "New Deal", which went far beyond the measures envisaged by Hoover.

Direct government action to reflate the economy, including measures for loan financed public spending, was being recommended by economists as diverse as Irving Fisher of Yale, Keynes's colleague at Cambridge University, Arthur Cecil Pigou, and numerous members of the

revolution. Chamberlain suggested that demand curves faced by firms might be downward sloping so that they might be able to affect selling price by choosing their level of output, while Joan Robinson took a suggestion of Marshall's that supply curves might show increasing returns and be temporally irreversible, giving firms that expanded output more rapidly a pricing advantage over smaller, late starters which might allow them to dominate the market. In either hypothesis the absence of perfect competition might prevent the price adjustment process from operating. These considerations joined arguments concerning straightforward monopoly behaviour, such as the existence of labour unions who might be able to block the operation of the competitive mechanism to eliminate excess labour.

Even before the concerns for imperfect competition economists had granted increasing attention to the instability of credit and its role in generating cyclical fluctuations in the economy. The problem arose because of a potential conflict between the quantity theory of money, which argued that the general level of prices was determined by the effective quantity of money in circulation (i.e. the physical quantity of money adjusted for its speed of circulation), and the determination of the individual prices, which make up the general level of prices, by means of supply and demand. The resolution was that the quantity of money determined the level of nominal prices, in terms of a numeraire, while supply and demand set the ratios of exchange of goods, or the real relative prices. This could not, however, explain how a change in the quantity of money produced a change in the overall price level. Wicksell was the first to offer an analysis of this problem in terms of the relationships between nominal and real price adjustments producing instability.

This line of argument was at the basis of the arguments of the Chicago School in favour of government intervention in the credit process. They argued that the combination of provision of means of

at which the economy was in equilibrium. Indeed, he argued that unless action was taken to move the economy to a more acceptable utilisation of resources, public dissatisfaction would produce government interventions of precisely the type which had been applied in Russia or Germany, something he wanted to avoid at all costs.

Thus, if Keynes' approach can be called a revolution it was to suggest that the natural state of the economy was not full employment of all resources, but could occur at any level, and that it was the monetary factors which would be crucial in determining what this position would be. This naturally opened the way for direct government economic policy measures to try to improve on the existing income and employment equilibrium.

This approach was also revolutionary because it called into question the basic microeconomic theory of market adjustment of real relative prices which had been the basis of economics up until that time. The implications of Keynes's analysis were thus compatible with that of economists who believed that the causes of breakdown of the competitive mechanism would eventually be eliminated, but as a result of the experience of the 1920s and 1930s had become convinced that the process might not be sufficiently rapid, and thus proposed government intervention in aid of the natural adjustment process. These proposals generally took the form of buttressing the forces of competition by enforcing anti-trust laws, eliminating monopolies.

When the urgency of the depression was no longer present to impose broad policy agreement despite underlying analytical differences, economists started to investigate Keynes's theory more critically. Many argued that while they were justified in conditions of excess productive capacity and widespread unemployment, they were not general and could not be applied in normal conditions of the economy. In this respect it is paradoxical to recall that while Keynes' book appeared after most economies had already accepted the necessity of

in the economy which determine the value of these aggregates. He thus concentrated on decisions which determine the decisions to spend money to produce output or to purchase consumption goods. (1930, pp. 120). Keynes defined the motivation behind the "efforts of producers" as "whether it is expected to **pay** a firm in possession of capital equipment to spend money on incurring variable costs: i.e. whether the result of spending money on employment and of selling the output is expected to result in a larger net sum of money at the end of the accounting period than if the money had been retained. Other criteria, such as the relation between the real output which a given employment will yield and the disutility or real cost of that employment, or the relation between the real wages of a given employment and the amount of its marginal output, are not appropriate to the actual nature of business decisions in a world in which prices are subject to change during an accounting period, such changes being themselves a function **inter alia** of the amount of investment during the period" (Keynes, 1979, p. 66).

But, producers would not be satisfied with their efforts if they only recovered the money sums committed, they would require the highest possible returns available from committing their funds in any way, not only from the use of funds to finance the production of output. Keynes put the idea as follows: "The employment of the factors of production to increase output involves the entrepreneur in the disbursement, not of product, but of money. The choice before him in deciding whether or not to offer employment is a choice between using money in this way or in some other way or not using it at all. ... The only question before him is to choose ... that way which will yield the largest profit in terms of money. It must be remembered that future prices, in so far as they are anticipated, are already reflected in current prices, after allowing for the various considerations of carrying costs and of opportunities of production in the meantime which relate the spot and

forward prices of a given commodity. Thus we must suppose that the spot and forward price structure has already brought into equilibrium the relative advantages, as estimated by the holder, of holding money and other existing forms of wealth. Thus if the advantage in terms of money of using money to start up a productive process increases, this will stimulate entrepreneurs to offer more employment. ... For the entrepreneur is guided, not by the amount of product he will gain, but by the alternative opportunities for using money having regard to the spot and forward price structure taken as a whole" (Keynes, 1979, pp. 82-3).

Looking at the motivation of producers to commit funds to finance production in this way leads directly to the conclusion that there is no basis for a theoretical relationship between the outputs produced by physical capital assets employed with labour and the monetary return net of costs obtained by the entrepreneur operating the equipment and selling the output produced. It could be argued that this conclusion was not revolutionary, since it had been the basis for Irving Fisher's concept of 'rate of return over cost'. It was also present in observations in Marshall's Principles. But, these and other writers, aside from Marx and a few ignored economic heretics, all failed to draw the full implications for economic theory.

Keynes's conclusion was that Marx had been correct when he argued that the capitalist has no other interest in his monetary return. This meant that the operation of capital goods could be profitable, even without being "productive" in the sense of producing a larger amount of physical product than the amount of physical product used as inputs of capital and labour.

Keynes sought to highlight this conclusion when he argued that there was no more reason to believe capital earns a return because it is productive, than because of some other physical (or even metaphysical) attribute, such as being "smelly" or "lengthy" or

"risky". The conclusion was that in a monetary production economy in which decisions were taken on the basis of expected monetary returns there would be no general relationship between the difference between money costs of production and money receipts from the sale of output produced, and the physical conditions which characterise the production process.

Keynes thus broke away from the relation between real and nominal prices, or between a natural, or physically determined, rate of return and a nominal rate which had been the basis of Wicksell's criticism of the quantity theory. It also constituted a break from Keynes's Treatise on Money in which a natural rate which had played a role in the analysis of the relation between saving and investment and laid the basis for his attempt to view the economy from the point of view of what he called monetary production.

This shift in approach required a new specification of the decision to invest in terms of what Keynes called the marginal efficiency of capital, representing the monetary rate of return on an investment or production decision, and the returns on alternative investments, including the holding of money. The approach to the return on investment that Keynes employed, while a departure from the traditional approach, was similar to that of a number of earlier writers such as Veblen, Myrdal and Schumpeter. This approach requires comparing the money expenditures which must be undertaken today in order to acquire a future stream of income net of any future costs of procuring that income. This requires the calculation of the present value by discounting the stream of future net receipts at a rate of interest determined by the return which could be earned on alternative investments. The investment is profitable only if the present value is greater than present costs. Alternatively, one could calculate an interest rate, equivalent to a return to maturity on a fixed interest bond, which would equate the value of the net future receipts to

present costs. This would produce what is known as an internal rate of return for the investment which could be compared with the return on any other asset. This is what Keynes defined as the "efficiency" of capital, the marginal efficiency being determined by the internal rate of return on the last investment which was chosen because its return was greater or equal to the return on an investment in a risk-equivalent financial asset. Neither the present value calculation, nor the internal rate of return calculation, are in any way linked to the physical rates of return from the investment projects, however they might be defined.

Keynes's fundamental point of departure from the traditional quantity theory approach was in his treatment of the return that might be achieved by holding money. In the quantity theory, money is only held because it serves as a means of exchange, it has no inherent value and without the necessity of using it to make transactions, money would not be held at all since it offers no return and has no inherent utility. Keynes instead argued that money could serve as an alternative to investment in other types of financial assets. Although money would be inferior to those other assets because it did not earn a monetary return -- this Keynes called income risk of holding money, it had an advantage over them. A decision to purchase an interest-bearing asset, such as a consol, exposes the holder to the risk of a change in its prices if there are changes in market interest rates. Keynes called this capital risk. Money, by definition, has no capital risk. Indeed, holding money rather than an interest bearing financial asset which has the risk of a losing capital value may avoid loss and thus represent a positive contribution to an investor's net wealth. The decision to hold money will then depend on the expectation of future market interest rates which will determine the prospective profit or loss on financial assets, or on what Keynes called the "liquidity preference" of the public. The return on the holding of money as an investment will then

be given by its liquidity premium, or roughly the balance between income and capital risks.

Decisions to determine whether to use money to hire labour and capital to produce saleable output thus depends on the return from such activity exceeding that available on any other investment activity, real or financial, and in particular the return on holding money. If the liquidity premium attached to the holding of money is sufficiently high, it will not pay entrepreneurs to provide employment and produce additional output, they will maximise their returns to their wealth by holding money.

The analysis of the decisions that determine the "efforts of producers" formed the first element of what Keynes called the theory of effective demand. The second element came from the decisions which motivated the "expenditures of consumers" which Keynes explained by means of the "propensity to consume". This represented the proportion of households' incomes spent. Thus "*effective demand, D, ... depends on the sum (D) of two quantities, namely ... the relationship between the community's income and what it can be expected to spend on consumption, designated by D_1 ... and D_2 , the amount which it is expected to devote to new investment*" (pp. 28-9). "It follows that in a given situation of technique, resources and factor cost per unit of employment, the amount of employment, both in each individual firm and industry and in the aggregate, depends on the amount of the proceeds the entrepreneurs expect to receive from the corresponding output. For entrepreneurs will endeavour to fix the amount of employment at the level which they expect to maximise the excess of the proceeds over the factor cost.

Let Z be the aggregate supply price of the output from employing N men, the relationship between Z and N being written $Z = \phi(N)$, which can be called the *Aggregate Supply Function*. Similarly, let D be the proceeds which entrepreneurs expect to receive from the employment of N men, the relationship between D and N being written $D = f(N)$, which can

be called the *Aggregate Supply Function*. ... the volume of employment is given by the point of intersection between the aggregate demand function and the aggregate supply function; for it is at this point that the entrepreneurs' expectation of profits will be maximised. The value of D at the point of the aggregate demand function, where it is intersected by the aggregate supply function, will be called *the effective demand*. ... this is the substance of the General Theory of Employment." (pp. 24-5). Effective demand is thus a reflection of the importance of the expectation of the future on the present. It combines influence of monetary (liquidity preference of the public and the banks) and real factors translated into expected future monetary sums (marginal efficiency of capital and propensity to consume).

The level of actual output and employment is then determined by the "point of effective demand", or the equilibrium position where short-term expectations concerning sales levels and profits on output from current capacity are confirmed and do not raise doubts concerning long-term expectations of future capacity needs. Thus, even when short-term expectations of future conditions are confirmed, there is no reason for the equilibrium position determined by the point of effective demand to correspond to full employment of all available resources, it could occur at any level of utilisation of resources. These positions were equilibria in the sense that there were no forces to change their determinants, such as the liquidity preferences of the public, their propensity to consume or the marginal efficiency of capital. Since these factors depend primarily on the expectations of future asset and goods and labour prices, there is nothing in the real conditions of production or current market conditions that need necessarily bring about any change which would lead to a reduction in the amount of unused resources. In particular, there is no reason for excess supplies to produce an automatic increase in effective demand. This was the reason for Keynes's insistence on the importance of the

impact of the future on present decisions.

On the basis of this approach Keynes argued that the depression was caused by a collapse of investment due to a fall in the estimated returns to investment as expressed in the marginal efficiency of capital. This was aggravated by an increase in liquidity preference caused first by the losses on stock investments and then by the reduction in lending capability of the banks as bank failures caused individuals to withdraw cash to hold which prevented the rate of interest from falling sufficiently to make investment attractive. Finally, the situation was aggravated by the fall in consumption expenditures due to a fall in the propensity to consume caused by increased uncertainty over future incomes produced by the ever rising level of unemployment. The problem was to break the equilibrium of expectations and increase effective demand. Keynes argued that since there was nothing automatic to bring this about, and firms would not invest in the expectation of further losses. Since price adjustments would only make things worse, the best way to shift the equilibrium would be for government to engage in public investment which would generate profits for producers and convince them that they could earn a better return by committing funds to hiring labour and using capital to produce output than by holding money or financial assets. The point was not to direct the use of economic resources, Keynes thought the competitive price mechanism did this sufficiently well, but rather to shift expectations of future conditions.

It was the same effective demand approach that was used as the basis for the war planning process, attempting to regulate the two components of effective demand so as to match the resources available. In carrying out this exercise, much of the British national accounting statistics were developed to be able to track the main components of aggregate expenditure: private consumption, gross fixed investment, net exports and government spending. In contrast to the experience of the

convenience, allowed goods market equilibrium to be written as $S = I(e, Y)$. Given the supply of money, $M = M$, and the demand for money determined by the traditional quantity theory demand for transactions balances, $L = L_1(Y)$, and Keynes's liquidity preference, which Hicks represented as showing money investment demand to be inversely related to the return on money given by the interest rate, $L = L_2(i)$, gives the demand for money as $L = L_1 + L_2 = L(i, Y)$ and money market equilibrium as $M = L(i, Y)$.

There are thus three independent equations (1, 2, and 4) to determine three variables, e , i , and Y . Since the value of the marginal efficiency of capital is determined by the rate of interest, Hicks substitutes i for e in equations 1) and 2). This leaves two equilibrium relations (1=2 and 3=4) to determine i and Y simultaneously. Expressed graphically, these became the IS and LM locuses, whose intersection determined the level of i and Y .

Aside from the fact that this representation completely overlooks the theory of effective demand and the impact of the future on the present, this rendering reduced Keynes's contribution to the idea that there would be a horizontal stretch of the LM curve, implying that the interest rate is unchanged when output increases. Hicks finished by suggesting his own, 'more general' theory which soon came to represent textbook 'Keynesian' economics.

Although Keynes objected to this rendition, Hicks's presentation had other drawbacks which were not present in Keynes's original approach. Following Keynes's provisional assumption, Hicks assumed rigid wages. This eliminated the necessity of analyzing the labor market. In a 1944 article criticising Hicks's version of Keynes's theory, Franco Modigliani argued that it was the assumption of rigid wages, not money and uncertainty, that explained Keynesian unemployment. Thus, although Hicks had identified money and uncertainty as the basis of Keynes's new approach, his IS-LM rendering of the

policy to increase demand in the latter case, and to reduce expenditure in the former.

As Sidney Weintraub soon pointed out, it was difficult to envisage how inflation and deflation could be contemplated in this diagram, as prices played no direct role. Further, the policy implications of increasing government intervention, which had not been novel in the inter-war period, had a rather different impact in the post-war cold war rhetoric of anti-communism. Efforts were made to distance Keynesian theory from Soviet style state intervention by arguing that Keynesian theory relied on traditional classical microeconomic theory based on supply and demand in competitive markets. This was given full expression in the "neoclassical synthesis" of Paul Samuelson's popular Economics textbook which combined perfectly competitive markets with government expenditure policies to promote full employment. Obviously, the only way these two positions could be compatible was on the assumptions of significant imperfections in market competition and in the flexibility of the adjustment of prices and wages to imbalances.

This simple income-expenditure version of Keynesian theory encountered further difficulties when stagflation appeared in the US economy in the late 1950s. In terms of the 45° line diagram, the rising level of unemployment suggested that there was excess output, while the rising price level suggested an inflationary gap which required just the opposite conditions. The absence of any express analysis of prices thus rendered the model useless as a policy tool. The full IS-LM diagram did not offer any help, for as noted the analysis of prices was hidden by the assumption of the consumption good as numeraire.

There were thus two questions raised. The first was how prices should be explicitly introduced in the 45° line-IS-LM Keynesian model. The neoclassical synthesis implied that the microtheory that should be

introduced was the traditional classical theory. This raised a second problem of the internal consistency of Keynesian demand management and Classical micro theory for the latter implied that the system would naturally return to full employment in the absence of impediments, while the former suggested that the simple removal of such factors would be insufficient to create full employment and output.

The first problem was met by grafting the Phillips curve and a pricing equation onto IS-LM to produce an explanation of prices. The second led to the controversy over the "microfoundations of macroeconomics" and produced a full return to Classical theory in the form of the New Classical Macroeconomics.

The Phillips curve was based on a study by A.W. Phillips in 1958. It showed an inverse relationship between the rate of change in nominal wage rates and the level of employment. Further, his statistical regressions, covering a period of 1861-1957, implied that wage rates were stable only at what were then considered relatively high levels of unemployment, above 5%.

This result could be explained if there were structural imbalances between the qualifications of the labour force and the skill requirements of job openings so that excess demand at high rates of unemployment was due to structural or frictional problems linked to labour supply. If demand for labour were defined as including unfilled vacancies (v) and supply as those employed plus those seeking work (u), market clearing in the labour market might require a relatively high level of frictional unemployment. Full equilibrium would still be characterised by equality between supply and demand for labour, but now with $u=v$.

An alternative explanation by Phelps assumed that employed workers had less than perfect information about the impact of supply shocks on their equilibrium real wage. If employers reacted to a negative supply shock by reducing wages to their new equilibrium level,

workers would refuse the reductions and quit their jobs to take employment elsewhere at existing wages. This would create a resistance to wage adjustments, as well as an increase in the number of unemployed workers searching for jobs at wage rates which no longer existed. This 'search' unemployment would exist until workers' expectations had adjusted to the new, lower, equilibrium wage. Imperfect information, and in particular money illusion on the part of labour, thus explained the negative relation between the unemployment rate and the rate of increase of wages expressed in the Phillips curve.

Phillips's analysis was extended to the relation between the rate of change in prices (inflation) and unemployment by Samuelson and Solow, who introduced changes in labour productivity and a mark-up relation between rates of changes in wages and market prices. The statistical confirmation of a negative relation produced the idea of a "trade-off" between the unemployment rate and the rate of inflation.

Although the Phillips curve was meant to remedy the absent discussion of prices in Keynesian theory, its main contribution was to replace Keynes's emphasis on effective demand with competitive conditions in the labour market. Along these lines, Milton Friedman quickly challenged the assumption of imperfect information as a permanent explanation for the delayed adjustment of wages to supply shocks. At best this delay would be temporary as workers would soon realise that equilibrium real wages had changed and adjust their supply behaviour accordingly. Indeed, if workers learned from experience the impact might disappear altogether: money illusion could not be permanent.

Friedman argued that any position to the left of the intersection of the Phillips curve would then represent disequilibrium since worker's expectations of real wages were being disappointed. As soon as this was recognised workers would attempt to restore equilibrium, either by bargaining for higher nominal wages to restore real wages or

adjusting their labour supply. This implied that in the long run employment and output would not vary from the point of intersection of the Phillips curve on the unemployment axis. This position was baptised the "natural rate of unemployment"; since it was compatible with stable wages, the non-accelerating wage rate of unemployment (NAWRU). When rates of wage increase were linked to changes in prices by adjusting for productivity and profit margins, this produced a 'non-accelerating inflation rate of unemployment (NAIRU).

Implicitly what Friedman had done was to restore the instantaneous adjustment of wages to labour market disequilibrium, but in the long run. It did not take long for classical theorists such as Lucas and Rapping to argue that the work decision should be modelled as an intertemporal optimisation problem. If workers learn to expect that an increase in employment brought about by expansionary fiscal policy to be linked to declining real wages and anticipate this result through what came to be called "rational expectations" then they will refuse to increase labour supply above the natural level which then sets the maximum level of output for the system. Wage and price adjustment would then be instantaneous and the problem of explaining the slope of the Phillips curve was resolved by making it vertical in both the short and the long run. As a corollary it produced the policy inefficacy hypothesis which stated that it was impossible for any government policy to increase the level of output or employment above the 'natural' level given by the vertical, long-run Phillips curve.

This reasoning effective brought an end to the "Keynesian approach" for it returned the analysis of employment to competitive conditions in the labour market and suggested that there was no way in which a change in aggregate demand could influence the level of unemployment (unless it was random and unanticipated, but thus also useless for policy purposes). The same argument also applies to the use of monetary policy which can only be effective if it is completely

unanticipated.

Attention was thus shifted from the negative relation between unemployment and wages to the intercept of the Phillips curve on the abscissa determining the natural rate of unemployment. As the 1970s progressed it soon became obvious that the rate of unemployment at which the rate of change in wages and prices stabilised, the NAWRU and the NAIRU, were not stable: the natural rate was not a natural constant.

One of Phillip's findings which had not initially been subject to discussion was that similar rates of unemployment were compatible with different rates of wage increase, depending on whether unemployment had been rising or falling. This behaviour was explained by "hysteresis" (Cf. Blanchard and Summers). If unemployment rates had been growing rapidly the natural rate would tend to be higher and vice versa; the behaviour of the natural rate would then be "path dependent", determined by the recent behaviour of the system. This took the Phillips relation away from its original grounding in supply and demand equilibrium, and reintroduced the possibility of forces external to the labour market as exerting influence on unemployment. But this explanation has done little to support active employment policy associated with traditional "Keynesian" economics, since it implies that measures to reduce a high level of natural unemployment can only be associated with inflation in the short run as demand pushes against supply constraints. It thus resurrects an inflation-unemployment trade off at a time when the elimination of inflation has replaced unemployment as the primary goal of policy.

Other theories explained the steeply negative slope to the Phillips curve by elaborating on factors other than imperfect information which might retard the wage-price adjustment process. Lindbeck and Snower (1986) suggested that unlike other markets, in the labour market wages were only determined by employed workers who

dominate wage bargaining, while the unemployed are excluded. This means that there will be little influence from the unemployed workers who are in excess supply on the speed of adjustment of wages to the new market clearing equilibrium. Already employed "insiders" look after their own interests, while unemployed "outsiders" have no influence on wage determination.

Another approach argued that workers and employers are engaged in implicit and/or optimal contracting. Bailey suggested that since firms are more able to withstand fluctuation in their incomes than workers they will be less risk averse than workers. It may then be profitable for firms to offer newly engaged workers a double contract, a contract specifying remuneration for labour services and another providing an assurance that wages will vary over time by less than demand for the firm's output or profitability. Workers are thus offered constrained wage rates which be below equilibrium in periods of expansion in exchange for an implicit guarantee that wages will not be reduced to equilibrium in periods of slack demand. Such practices may increase profits for firms and increase utility for workers. However, they do not explain why the actual offers of employment are below the amount required for full employment. It is the wage smoothing which is profitable, but there is no reason why this should occur an aggregate level of employment below full employment. This line of reasoning was also developed by Okun in the form of the implicit handshake. Azariadis (1975) extended this approach to show that if there is temporal variation in employment, it will be the result of layoffs, rather than workers quitting to seek better wages, although Bailey shows that if costs of shifting between firms or attracting new workers is high, firms will also insure workers against layoffs through labour hoarding.

Another line of argument abandoned the explanation of unemployment based on imperfections impeding the functioning of the labour market and instead sought rational explanations for the

negatively sloped "aggregate demand curve", so that lower prices are associated with higher levels of output, given the supply of money and the velocity of circulation. A change in M shifts the function, producing the familiar quantity theory relation of higher or lower price levels.

The Phillips relation $(w_t/w_{t-1}) - 1 = -b(u-u^*)$ can be transformed into a relation between wages and output with the addition a production technology (usually a simple production function) linking output to labour inputs $Y = aN$. Defining $u = (N^*-N)/N$ the Phillips curve becomes $w_t = w_{t-1}(1 - b[(Y^*-Y)/Y])$. Adding a linkage between wages and prices such as $P = z(w)$ where z is a constant equal to one a cost mark-up over unit costs, $w = W/\pi$. Thus $P_t = w_{t-1}(1 - b[(Y^*-Y)/Y])$ and since $P_{t-1} = z(w_{t-1})$ this can be written defining b/Y as $\#$, $P_t = P_{t-1} (1 - \# (Y^*-Y))$. Thus when $Y > Y^*$, $P_t > P_{t-1}$. The shape of the aggregate supply curve linking price and output thus depends on the technology, the shape of the Phillips curve and the behaviour of the mark up over costs. Under constant returns and a constant mark-up with stable wages, the aggregate supply curve would be horizontal, which was defined, ex post facto as the implicit assumption underlying Keynesian theory, for prices would then be stable as output changes with a shifting aggregate demand curve. On the other hand, if the Phillips curve has the "normal" negative slope, then the aggregate supply curve will have positive slope, rising output is associated with rising prices. A negative supply shock can then be represented by a change in the a coefficient, and has the effect of shifting the curve upwards, and prices as well.

The aggregate demand and the aggregate supply curve then produce an analysis of prices, as well as an analysis of the influence of supply shocks on prices and output. Their intersection gives the equilibrium price level and output level, given the coefficients of the production function, the Phillips curve, the price function and the income velocity and quantity of money.

The only problem with this representation is that it depends on the Phillips curve, and is thus open to the criticisms made by Friedman that in long-run equilibrium the curve can only be vertical, which implies that the supply curve will also be vertical the level of output produced by the labour market produces the natural rate of unemployment. This means that manipulation of aggregate demand can have no impact on output, but only on prices for output levels below the natural level. If Phillips conception is accepted this means that unemployment rates in excess of 5% should be considered natural and there should be no attempt to reduce them, for to do so would only produce inflation.

Finally, this representation has no relation to the aggregate supply and demand curves that Keynes employed to formulate his theory of effective demand, and indeed incorporates aspects of traditional analysis which he expressly rejected. For this reason, its policy conclusions are also different, for demand can play not role in determining national income, but only the price level at which "natural" income is sold. The only possible policy is supply side policy to shift the vertical aggregate supply curve, usually recommendations for increased wage and price flexibility, increased competition in input and output markets. These are the same recommendations which were voiced before the "Keynesian" revolution.

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As noted above, the revolutionary aspects of Keynes's theory required economists to reject their traditional approach to the operation of individual competitive market prices in producing equilibrium, in particular as this theory applied to the labour market. This incompatibility was also present in the neoclassical synthesis and eventually led to the discussion of the appropriate microfoundations for macroeconomic theory. Other economists, such as Patinkin, attempted to make the two theories compatible by rejecting Keynes's claim to have

established underfull employment equilibrium, suggesting that it represented a position of disequilibrium in which both employers and workers might not be on either the demand or the supply of labour curve, but in the area to the left of the point of intersection, below the demand curve and above the supply curve. Such an interpretation, however, it directly contradicted by Keynes's representation of the labour market, which accepted that labour might not be able to choose its position on its supply curve, but that the wage would be on the labour demand curve.

Robert Clower chose a different line and attempted to make Keynes's theory consistent with traditional micro theory by means of what he called the "dual-decision hypothesis". He noted that process by which workers optimised their consumption decisions was income constrained. Workers may have an unsatisfied demand for more champagne, but it may not be "effective" if workers cannot sell labour to pay for it. Thus there may be an excess demand which does not call forth additional supply. Clower concentrated on the price-quantity adjustment process which is implied in the process market coordination. This led to the formulation of quantity constrained equilibria, which were further developed by Barro and Grossman as an alternative to the fully flexible Walrasian adjustment processes. This theory gave rise to what came to be called the "French" school (Benassy, Dreze) which investigated the results of a Walrasian adjustment process in which quantities could not adjust or were slow to adjust.

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Thus the modern 'Keynesian' model, elaborated in the post war period, relied on rigid wages, prices set by a mark-up over wage and other costs in non-competitive markets, and a fixed money supply to explain unemployment as the result of inappropriate combinations of wages and prices or interest rates. Keynes' concerns to represent the impact of the present on the future, and its importance for modeling

the decision to consume and investment in the concept of effective demand had completely disappeared. When interest in expectations returned to economics, it was on the presumption that economic theory could only deal with positions of equilibrium. In the context of the aggregate supply function based on the Phillips curve, the only position of equilibrium was where expectations of future price changes were being realised, i.e. with the vertical curve. Thus, even the introduction of expectations into the market clearing assumptions of the New Macroeconomists in the "Keynesian" model implied that any equilibrium short of full employment was due to an 'ad hoc' assumption or of competitive "market failure".

In response to such positions a group of economists, who called themselves 'New Keynesian', defended the assumptions of rigid wages, prices and interest rates which characterised the "Keynesian" model and attempted to explain them as the natural result of profit maximizing behaviour by rational agents. Even in this "New Keynesian" approach, no trace remains of the importance originally attached to money and expectations in Keynes's theory of effective demand.

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A small group of economists, known as 'post Keynesians' attempted to preserve Keynes's oft-expressed belief that his theory was unique because it was a theory of a 'monetary production' economy. Their work is divided into those who developed the role of money and expectations, and those who concentrated on production.

One of the first points raised after publication of the *General Theory* concerned the impact of investment expenditures on future potential productive capacity. While investment expenditures would generate additional current demand and employment, they might produce excess supply in the future, so that Keynes's theory might be solving a problem in the short-term, but be making it worse in the long run. Roy Harrod, and then Evsey Domar, first worked on this question. They were

followed by Joan Robinson, Nicholas Kaldor, Richard Kahn and Luigi Pasinetti in the 1950s and 1960s to produce the first long period post Keynesian models of growth and distribution. Pasinetti extended his approach to include Leontief's inter-industry analysis and Sraffa's *Production of Commodities By Means of Commodities*' theory of prices of production, making input-output models, rather than production functions, the core of the post Keynesian supply-price-production nexus.

Even before the publication of the *General Theory* Roy Harrod had been working on what he called a "dynamic" theory in the sense that it dealt with rates of change rather than levels. Specifying the increase in capital stock by net investment which was necessary to raise national income by an additional unit as $I/C = \Delta Y$ or $C = I/\Delta Y$, as the "capital coefficient" and defining the rate of expansion of national income as $G = \Delta Y/Y$ Harrod notes that $GC = (\Delta Y/Y)(I/\Delta Y) = I/Y$. Since the Keynesian equilibrium $I=S$ is also $I/Y = S/Y = s$, Harrod derives his dynamic growth "relation" as $GC=s$ or $G = s/C$. In order for this growth rate to be stable, demand must be growing at the same rate that new investment is increasing productive capacity. This Harrod called the "warranted" rate of growth. It requires that households be able to carry out the consumption which they desire, as given by a desired propensity to consume, or what is the same thing, a desired propensity to save, s_w and for entrepreneurs to realise the expected increase in sales and profits which led them to the investment decisions which produced I . The capital coefficient which allows entrepreneurs to realise their expectations Harrod calls the "required" coefficient, C^r , so that the equivalent of Keynes's point of effective demand is defined as the "warranted" rate of growth, $G_w = s_w / C^r$. There could be any number of these rates, but only one of them would be a full employment rate of growth which would be given by the rate of growth of the labour

force, $n = \Delta N/N$ and the rate of growth of output per head, $q = \Delta(Q/N)/(Q/N)$.

Extension of this approach to the Analysis of growth and distribution employed Kalecki's alternative approach to effective demand in which the ratio of prices to costs as given by imperfect competition determines the distribution of income between wages and profits, and thus effective demand, with the addition of the 'classical' savings assumptions that workers spend all their wages and capitalists spend all their profits on new investment goods. Kalecki started from national income relations which define national incomes as wages, W , plus profits, P , and national output as consumption, C , plus investment, I , goods expenditures. Thus, $Y = W + P = C + I$. If workers are assumed to spend all their income so consumption out of wages $C_w = 1$, and capitalists only invest their incomes so consumption out of profits $C_p = 0$, then $P = I$ and $P/K = I/K$, or the rate of capital accumulation I/K is equal to the rate of profit. If $C_p > 0$, then $P = I + C_p$ so $P > I$ and $P/K > I/K$, the rate of profit is greater than the rate of capital accumulation.

Josef Steindl extended this approach to develop a theory of economic stagnation by noting that in the presence of technical progress large monopoly firms would earn profits in excess of their needs to invest to expand capacity, leading to an investment shortfall as all profits were not invested in new plant and equipment. In this approach $P/K > I/K$, not because of the consumption out of profits, but because of increasing productivity reducing investment expenditures required to produce additional output, or in Harrod's terminology, a fall in C_i , causing a rise in the warranted rate.

Nicholas Kaldor also built on this approach, extending it to take into account the fact that wage earners save. Defining s_w and s_p as the proportions saved out of wages and profits respectively, the Kalecki relation then becomes $I = S = s_w W + s_p P = s_w Y + (s_p - s_w)P$. Dividing by Y

Kaldor produces $P/Y = [1/(s_p - s_w)] [I/Y - (s_w/(s_p - s_w))]$ which reduces to $P/Y = [1/(s_p)] I/Y$ on the classical savings assumption that workers do not save.

Joan Robinson (1956) used a similar approach. She also emphasised the importance of way in which the relation between capital and technical progress are introduced into these investigations. Echoing Keynes's earlier concerns for the difficulties involved in establishing a relation between physical output from investment and the entrepreneur's returns. She extends this to the difficulties involved in relating the rate of return on investment and the capital intensity of the investment.

Pasinetti (1966) provided a generalisation to both of these authors' works. He pointed out that Kaldor's generalisation of Kalecki was not in fact general, for if workers did save they should be expected to receive a return on those savings. Workers would thus receive both wages and profits income, while capitalists would no longer receive all profit incomes. Pasinetti assumed that workers received in profits the same proportion of total profits as the proportion of their savings to total savings. Defining s_c as the propensity to save by capitalists out of their share P_c of total profits $P = P_c + P_w$, the relation can be written $I = s_w W + s_w P_w + s_c P_c$. With the return to the investments of workers and capitalists given by $P/K = P_c/K_c + P_w/K_w$ the share of profits in national income is given by $P/Y = (1/s_c) I/Y$ and the rate of profits by $P/K = (1/s_c) I/K$, which implies that the distribution of income and the rate of profit and capital accumulation are independent of the savings propensity of workers. In the case of classical savings the relations become $P/Y = I/Y$ and the rate of profits by $P/K = I/K$. This reinforces the central role played by the decisions of entrepreneurs to invest in both the level of employment and output as well as its rate of growth. Central to all of these elaborations is the ability of producers to determine

the prices at which output will be sold in the market.

The relation between distribution, market power and technical progress is also at the centre of Paolo Sylos Labini's work in the 1960s which starts from Sraffa's early critique of Marshallian price theory. In the United States, Sidney Weintraub was also working on similar aspects, developing Keynes's aggregate supply analysis from an entirely different basis from the aggregate supply curve which was grafted onto the IS-LM model in post-war Keynesian theory, building on Keynes's presumption that prices were primarily determined by production costs, in particular wages, via a mark up of price over unit costs, and aggregate demand, determined primarily by households' consumption expenditures, also influenced by wages.

Analysis of the industrial structure of the modern economy is the basis of Alfred Eichner's 'mega-corp', a 'bell-weather' industrial firm, which is not a short-term profit maximizer, but rather tries to assure its long-run survival by consolidating and expanding market share through the introduction of new technology via investment. Mega-corps set prices as a mark-up over costs to generate a cash flow or 'corporate levy' to finance the new investment required to allow the company to grow at a rate equal to the expansion of its own market. Eichner's approach blends the Sraffa-Sylos Labini-Weintraub concern with pricing and models of technical progress, growth and distribution developed by Pasinetti.

Post Keynesian economics thus developed a varied analysis of the supply, production and price formation process, precisely those factors which were criticised for their absence in Hicks's IS-LM version when the supply side shocks and inflation disrupted the industrialized economies in the 70s.

Post Keynesian economists also provided elaboration and extension of Keynes's original emphasis on the importance of money and expectations in his theory of effective demand. Paul Davidson has

pointed out the importance of the use of money as an alternative store of value. Money, without a monetary rate of return, would be used for this purpose only if expectations of future conditions, in particular the prices of alternative stores of value, were more uncertain than the price of money. Since money serves as the unit of account its price does not vary over time, so holding it to satisfy what Keynes called 'liquidity preference' can prevent losses from buying other durable assets whose prices are variable in terms of money.

Davidson has formalized this concept of uncertainty as variations that would be present in a 'non-ergodic' system, which may be defined as one in which the future values of variables cannot be predicted from knowledge, no matter how complete or perfect, of past conditions. Since increasing market competition or price and wage flexibility does little if anything to diminish the impact of uncertainty on economic behaviour in non-ergodic conditions, it is unlikely that such measures will increase the probability of the economy naturally reaching either stability or full employment. This is in direct contrast to the position of most traditional Keynesian economists and New Macroeconomists assuming rational expectations who limit the scope of economic analysis exclusively to ergodic conditions where the factors necessary to explain the crucial importance of monetary factors are absent by definition. <Lucas quote>. Thus, within the New Macroeconomics, as in traditional Classical theory, one of the most difficult facts of economic life to explain is why people choose to hold an asset which has a zero rate of return when other substitute assets with non-zero returns are available, or why something which has no measurable utility will be held.

Money's role in creating inherent instability, and thus ergodic uncertainty, is by Hyman Minsky in his 'Financial Fragility Hypothesis'. In difference from monetarists who assume that the supply of money is exogenously determined, Minsky starts from the creation of

money which occurs when banks 'accept' debt issued by firms in exchange for deposit liabilities. In tranquil conditions, as borrowers meet their interest and principal payments out of current revenues without difficulty, banks become more optimistic about firms' future prospects and thus about their ability to service increased borrowing. Thus, as confidence increases and banks increase the amounts they are willing to lend, both the balance sheets of banks and firms become more highly leveraged; interest payments thus account for a higher proportion of their gross cash flows. Minsky defined this as an increase in "financial fragility". Any random variation in receipts, costs or interest rates thus has a higher probability of exceeding a firm's margin of safety leading to an inability to meet commitments. This may produce a liquidity crisis or even insolvency. Banks will respond by adjusting their liquidity premium on lending, charging higher interest rates and reducing lending limits, in order to strengthen balance sheets to meet the higher expected rate of future defaults. If firms or banks are forced to sell assets to liquidate positions this may cause a sharp increase in supplies when financing is falling, producing a collapse of asset prices, or a 'debt deflation'. For Minsky, a monetary economy will inherently produce fragility and thus be unstable and cyclical. He notes that the fact that a Great Depression has not recurred is explained by the rising proportion of government spending in GNP which sets an ever increasing floor level under aggregate demand. Stephen Rousseas, starting from the concept of velocity, provides a similar explanation in terms of a variable velocity of circulation model, and Fausto Vicarelli has noted the analysis of economic instability is a constant throughout Keynes's published work.

Although capital and distribution theory did not deal with monetary factors directly, it did show the concept of a 'real rate of interest' determined by the marginal physical productivity of capital which lies at the heart of modern post-Wicksellian monetary theory to

be without theoretical foundation. Keynes had already reached this conclusion when he suggested that his theory reversed the traditional concept of equilibrium in which money rates are driven to equality with the real rate; instead it is the money rate that 'rules the roost'.

Since money rates of interest are ratios of present and future prices, if liquidity preference determines interest rates it also determines intertemporal prices. Kenneth Boulding was among the first to suggest that liquidity preference was the basis of a theory of asset prices. Keynes suggests this type of approach in Chapter 17 of the *General Theory*, building on his previously enunciated interest rate parity theorem and Sraffa's concept of commodity rates of interest. His approach to prices thus links up with Sraffa's. Since changes in interest rates must reflect changes in asset prices relative to changes in expected returns to investing in capital goods, any increase in investment and related multiplier expansion in output due to lower interest rates must also represent a process of price adjustment. Kregel thus concludes that alongside any income multiplier adjustment process there must be a simultaneous price adjustment process in the post Keynesian analysis of the process of economic expansion.

Hicks's IS-LM model assumed a given money supply to generate the upward sloping LM curve, and the exogeneity of money is one of the tenets of modern monetarism. This position was first criticized by Nicholas Kaldor and Basil Moore argued that money was endogenous and could best be represented by a horizontal supply curve, rather than the usual vertical line of LM analysis. This means that the central bank sets the interest rate, which appears to contradict the determination of the interest rate by liquidity preference. Others such as Alain Parguez and Augusto Graziani have instead argued that it is the financing of all economic activity (and not only investment expenditures) via credit creation of the banking system which is the crucial aspect of monetary economy. Randall Wray has shown how this

analysis of finance based on the circular flow of credit may be integrated with the endogenous money approach and the theory of liquidity preference. Current post Keynesian theory recognizes the integrated nature of production and financing activities in determining supply and price relations within the theory of effective demand. Post Keynesian theory has thus expanded Keynes's original concerns to explain the possibility of sustained unemployment to deal with a wide range of economic problems. Since the behaviour of money and production, the main elements of Keynes's approach, cannot be analysed independently of specific social institutions and their process of change, much recent work has concentrated on topics which traditionally have been of concern to institutional and evolutionary economics.

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