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DEPARTMENT OF ECONOMICS

Working Paper

Keynesian Theory and the AD-AS Framework: A Reconsideration

by

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Keynesian Theory and the AD-AS Framework: A Reconsideration

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Abstract

Contrary to what has been argued by a number of critics, the AD-AS framework is both internally consistent and in conformity with Keynes's own analysis. Moreover, the eclectic approach to behavioral foundations allows models in this tradition to take into account aggregation problems as well as evidence from behavioral economics. Unencumbered by the straightjacket of optimizing microfoundations, the approach can provide a useful starting point for the analysis of dynamic macroeconomic interactions. In developing this analysis, the AD-AS approach can draw on insights from the Post Keynesian, neo-Marxian and structuralist traditions, as well as from the burgeoning literature on behavioral economics.

Key words: AD-AS, Keynes, New Keynesian theory, microeconomic foundations

JEL classification: E12, O11, B22, B41, B50.

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1. Introduction

Several turn-of-the-century assessments of the state of macroeconomics regard the discipline as healthy. There may have been fierce debates and controversies, but these debates mainly served to highlight deficiencies of existing models and to stimulate the creation of new improved hybrid models. The history of macroeconomics, according to Blanchard (2000, p. 1375) is "one of a surprisingly steady accumulation of knowledge", and "progress in macroeconomics may well be the success story of twentieth century economics". Woodford's (1999) assessment gives slightly more weight to the disagreements and revolutions in the second half of the twentieth century. But Woodford also sees convergence, and he concludes that "modern macroeconomic models are intertemporal general equilibrium models derived from the same foundations of optimizing behavior on the part of households and firms as are employed in other branches of economics" (p. 31).

We disagree with these assessments. In our view, a large part of what has happened in macroeconomics since the late 1960s has been a wasteful detour. A generation of macroeconomists has grown up learning tools that may be sophisticated, but the usefulness of these tools is questionable. Moreover, a great deal of damage may be, and has been, done when the tools are applied to real-world situations.

In this paper we shall argue that, for all their limitations, the simple models of the old Keynesian school using the Aggregate Demand-Aggregate Supply (AD-AS) framework provide a better starting point for serious analysis than more recent models in the New Keynesian (NK) or Real Business Cycle (RBC) traditions which have come to dominate modern macroeconomics. The obsession with optimization and microeconomic

foundations has meant that a promising Keynesian research program has been largely abandoned. Our preferred version of this program builds on the old Keynesian models, but extends and modifies them to accommodate insights from the post Keynesian, neo-Marxian, and structuralist traditions.

The main emphasis in this paper is on the usefulness and shortcomings of the basic AD-AS framework, and on how the framework may be developed and improved. Section 2 outlines a standard version of the AD-AS model and shows that it can be given a logically consistent Marshallian interpretation. It also shows that the model does not, as claimed by some critics, suffer from internal logical contradictions. Section 3 discusses some alleged shortcomings of the model. Section 4 considers the NK alternative, focusing on two main issues: microeconomic foundations and the treatment of stability. Section 5 introduces post Keynesian and other arguments for the relevance of aggregate demand, not just in the short run but also as an influence on real outcomes in the medium and the long run. Section 6, finally, ends with a few concluding remarks.

2. The AD-AS framework

Following Keynes, the AD-AS approach visualizes the economy as a whole, that is, the theory is 'general' rather than 'partial'.[1] Keynes's (1936/1973) derivation of a fix-wage general equilibrium in chapters 1-18 of *The General Theory of Employment, Interest and Money* (*GT*) was an enormous intellectual achievement, and the one stressed by both Blanchard and Woodford in their accounts of the Keynesian revolution. The AD-AS framework gives a reasonable representation of the analytical skeleton behind this fix-

wage general equilibrium. The strength of the AD-AS apparatus is precisely the explicit attempt to integrate the analysis of goods, labor and financial markets.

The AD-AS framework divides the economy into two parts – the 'demand side' and the 'supply side' – and examines their interaction using accounting identities, equilibrium conditions and behavioral and institutional equations. The 'demand side' typically examines factors relating to the demand for goods and the demand and supply of assets. The 'supply side' typically examines factors relating to output and pricing decisions of producers, and factor markets. The framework ensures that neither demand nor supply side factors are overlooked in the analysis and that macroeconomic outcomes depend on the interaction between the different markets. The particular partitioning into 'aggregate demand' and 'aggregate supply' along with the choice of terminology may provide the pedagogic advantage of making macroeconomic analysis possible in terms of the same tools as the simplest microeconomic model of the market. But this advantage comes at a high price. The aggregate demand and supply curves embody complex interactions and are clearly not the same as the microeconomic curves which take a partial view of the economy. The analogy therefore is spurious, and forgetting this has led to a great deal of confusion in the literature, as briefly discussed later.

The basic AD-AS model is well-known, of course, but to ease the exposition it is helpful to state a simple version of it explicitly. There are two equilibrium conditions

$$Y = C + I + G \tag{1}$$

$$M/P = L, \tag{2}$$

where, in standard notation, Y is real output, C, I and G, denote real consumption, investment and government expenditure, M the supply of money, P the price level, and L the real demand for money, and six behavioral or institutional equations

$$C = C(Y), \tag{3}$$

$$I = I(r), \tag{4}$$

$$L = L\,(Y, r), \tag{5}$$

$$Y = F(N), \tag{6}$$

$$W/P^e = F'(N) \tag{7}$$

$$W = W_0 \tag{8}$$

where $0<C'<1$, $I'<0$, $L_1>0$, $L_2 < 0$, $F'>0$ and $F''<N$, and where r is the rate of interest, N the level of employment, W the money wage, and P^e is the price expected by firms. Equations (3) through (6) are standard consumption, investment, money demand and production functions. Since C, I and L are used to denote desired amounts in equations (3) through (5), equations (1) and (2) are equilibrium conditions (rather than accounting identities) showing that output is equal to the demand for it and that the money supply in real terms is equal to the demand for it. Behind these equilibrium conditions lie dynamic adjustment processes with excess demand for goods leading to an increase in P and excess demand for money leading to an increase in r.[2] Equation (6) is the profit maximizing condition of firms that are assumed to be price takers in perfectly competitive markets; since there is a production lag and firms make production plans prior to knowing what price they will receive for their goods, the price that is relevant for their production decision is the expected price. The levels of M, G and W are given

exogenously. To stress that this is the case for the money wage, equation (7) states that the money wage is given at the exogenous level W_0.

Our interpretation of the model is Marshallian and we examine the behavior of the economy in two different 'runs'. The expected price and the level of output are given in the 'market' (or 'ultra-short') run. In the 'short' run expected price changes in response to its deviations from the actual price, and this change is accompanied by changes in the level of production; in a short-run equilibrium expectations are being met and the expected and actual price coincide.

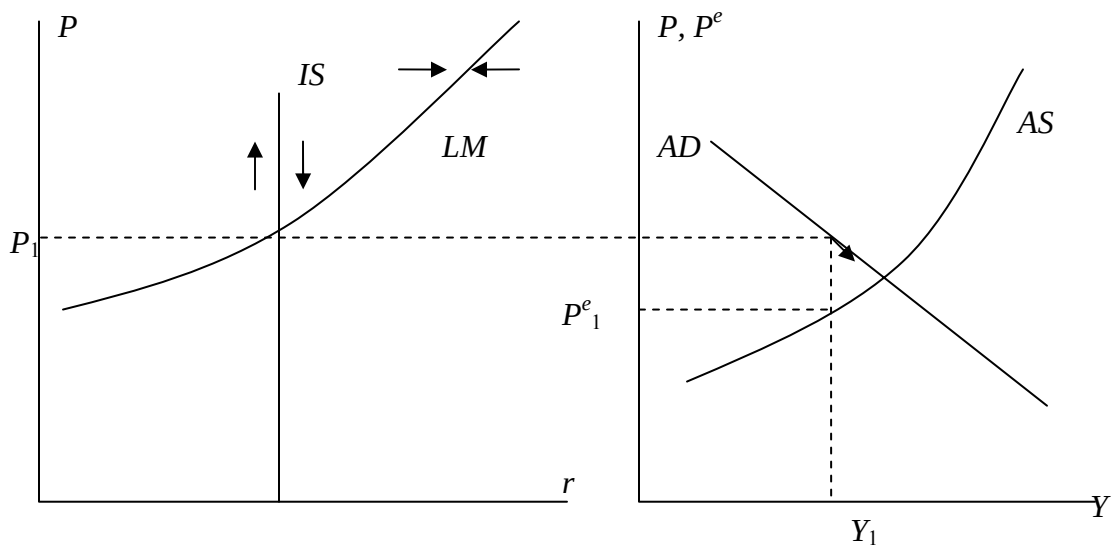

Figure 1

In the market run, given P^e, and given W from equation (8), N is determined by equation (7), and Y by equation (6). For this level of Y, substitution of equations (3) and (4) into equation (1) yields a value of r which satisfies that equation, irrespective of the price level. The IS curve in Figure 1, which shows equilibrium in the goods market in (P,r)-space , is vertical at this level of r.[3] The vertical arrows show the direction of price

adjustments when the economy is out of goods market equilibrium. Also for the given level of Y, substitution of equation (5) into equation (2) yields a positive LM relation between P and r, which represents money (and assets) market equilibrium. The horizontal arrows show the direction of interest adjustments when the economy is out of money-market equilibrium. The intersection of the IS and LM curves gives the market-run equilibrium values of P and r. The equilibrium value of r is determined by the position of the vertical IS curve, and the LM curve determines the value of P. With off-equilibrium dynamics given by the equations in note 2, it is readily seen that the market-run equilibrium is stable for a given Y.

In the short run P^e is allowed to change in response to unfulfilled expectations. When P^e changes to a new level, firms adjust their employment and output levels. This adjustment is captured by the AS curve, which shows the profit-maximizing level of output produced by the firms for a given P^e. When Y changes, the IS and LM curves shift in (r,P)-space and determine a new market-run equilibrium of r and P. The level of P which clears goods and money markets for each level of Y is shown along the AD curve. A higher level of Y increases the level of saving, so that goods market equilibrium requires an increase in investment, a fall in r and hence a leftward shift of the IS curve. A higher level of Y increases the real demand for money, so that money market equilibrium requires a fall in P (or an increase in r), so that the LM curve shifts to the right in (r,P)-space. Consequently, a higher Y implies a lower P for market-run equilibrium, explaining the negative slope of the AD curve.

The short-run dynamics shown in Figure 1 can be described as follows. Starting from an initial level of expected price, P^e_1, output is determined at Y_1 (as shown by the

AS curve) and price at P_1 (as shown by the AD curve). Since $P_1 > P^e_1$, if firms revise their price expectations adaptively, P^e rises, making Y expand along the AS curve and the market-run equilibrium move along the AD curve (representing shifts in the IS and LM curve) as shown by the arrow. This adjustment will continue till the economy arrives at the short-run equilibrium at the intersection of the AD and AS curves, where $P = P^e$.[4]

Three comments about this model are in order. First, the Marshallian interpretation of the model finds a great deal of exegetical support in Keynes's own work and in the writings of many Keynesians. Clower (1989), for instance, notes the Marshallian aspects of Keynes's *GT*, although not as precisely as done in our model (see Dutt, 1992).

Second, the Marshallian interpretation is important for the internal consistency of the economic argument. It has been argued by Barro (1994), Fields and Hart (1990), Colander (1995) and Bhaduri, Laski and Riese (1999) that the AD-AS model embodies two mutually-contradictory approaches to pricing and production by firms. According to this criticism, the AD curve is based on IS and LM curves, but the analysis assumes that firms fix the price (having the ability to do so) and that equilibrium levels of r and Y are determined from equations (1) and (2), using (3) through (5). The story told is that firms fix their price and adjust their output in response to changes in demand conditions. The AS curve, on the other hand, assumes price taking behavior on the part of firms operating in purely competitive markets with demand constraints, producing to maximize profits given the money wage and the production function. While some textbook versions of the AD-AS model do suffer from this inconsistency, our Marshallian model is free of it. The equations of the model are similar to those of the standard textbook version,[5] but in our

interpretation the AD and AS curves both embody profit maximization and price-taking behavior: the AD curve in our interpretation shows equilibrium price for a given level of output and not, as the standard AD curve, the equilibrium value of Y for different levels of P. [6]

Third, the model can easily be recast using Keynes's own 'AD-AS diagram' with employment and the value of output (price times quantity) on the axes (he did not actually draw this diagram in *GT*, but described it in words in chapter 3).[7] Keynes's Aggregate Supply function is given by $W_0F(N)/F'(N)$ and is derived from equations (6), (7) and (8): its curve shows the expected value of output at each level of employment consistent with profit maximizing behavior. The Aggregate Demand function is derived from equations (1) through (6), and its curve shows the actual equilibrium proceeds (PY) for any given level of N. The level of N determines Y from equation (6), and given this Y, P is determined as shown in the IS-LM diagram of Figure 1, which determines the equilibrium level of PY. The value of aggregate demand at the intersection between the supply and demand curves defines "the effective demand" (*GT*, p. 25).

By construction expectations are being met at the point of effective demand. In chapter 5 of *GT,* however, Keynes discusses the formation and revision of short-period expectations, showing how firms produce a certain level of output with a certain level of employment, given short period expectations, and then adjust these expectations if they are not fulfilled. Though he does not explicitly analyze this process, we can do so by using the expected proceeds curve, given by $P^eY = P^eF(N)$, for a given P^e from equation (6): it shows what firms expect the value of output to be for a given price expectation. The intersection of this curve with the curve for the Aggregate Supply function

determines the market-run equilibrium level of employment since it satisfies equation (7). For the market-run equilibrium employment level, one can read off actual proceeds from the Aggregate Demand function. If actual proceeds are different from expected proceeds, P^e will change, shifting the expected proceeds curve, till the economy arrives at short-run equilibrium at the intersection of all three curves.[8] For most of the *GT*, however, Keynes confines attention to short-run equilibrium in which actual and expected price are equal, thereby concealing the Marshallian adjustment process because it was not central to his demonstration of the possibility of unemployment short-run equilibrium.[9]

3. Shortcomings

An AD-AS model of the type just described has many well-known weaknesses and limitations, of which three are relevant for our purposes.

The criticisms that have received the most attention concern the alleged lack of microeconomic foundations of the model. NKs (along with new classical economists and RBC theorists), who have been vocal in this criticism, wish to supplant the model with models based on explicit optimization. We shall take up the issue of optimizing microfoundations in section 4 where we discuss the NK approach. But the behavioral approach of the AD-AS model has also been criticized from another angle. Many post Keynesian economists, but also some impeccably mainstream old Keynesians, have suggested that the model is too mechanical and does not take into account uncertainty and expectations in a serious manner.[10] It is beyond the scope of the present paper to address this important issue in any detail but in our view, 'mechanical' mathematical formalization can be extremely useful. This formalization needs to be supplemented by

verbal descriptions and empirical analysis, and less formal discussions of possible outcomes may also come into play if the relations determining the evolution of the system are not capable of being formalized in a precise manner. Even this informal discussion, however, will often benefit from using more formal analyses as points of reference and by suggesting where and how the results of the models may need to be modified.

A second set of criticisms claims that the AD-AS model omits many important features of reality and that some of its implications are not consistent with empirical observation. Assumptions of imperfect competition, for instance, should replace perfect competition, and the money supply should not be treated as an exogenous variable in an economy with modern monetary institutions.[11] The consumption function should also take into account income distributional effects on consumption, increases in aggregate demand should provide a direct stimulus to investment, and the distinction between nominal and real rates of interest may be critical (not least for the reactions of aggregate demand to changes in money wages and the stability of full employment). These (and other) modifications may complicate the model and affect some of its properties, but in principle their introduction is quite straightforward and the resulting model can still be depicted with AD and AS curves (see, for instance, Dutt and Skott, 1996). The modifications, moreover, help to address some of the empirical criticisms of the AD-AS model. The simple model, for instance, predicts a counter-cyclical movement of the real wage. This implication, which finds little support in the data (as noted early on by Dunlop, 1938, Tarshis, 1939), no longer holds in versions of the model that include imperfect competition (perhaps with markup pricing à la Kalecki, 1971) and some

combination of non-diminishing returns to labor and/or a counter-cyclical pattern in the markup.

A third set of problems with the AD-AS model concerns the unsatisfactory treatment of dynamics. There is a lack of integration between the analysis of the short-run and more long-term issues, and even when it comes to the treatment of the short run, the analysis often relies on unstated or questionable assumptions concerning the process leading to a short-run Keynesian equilibrium. Our own presentation above is quite explicit in its assumptions (notes 2 and 4) but, perhaps unrealistically, it presumes that the adjustment to market-run equilibrium is 'very fast' relative to the adjustments of price expectations. The adjustment to market-run equilibrium could therefore be based on given price expectations, and in the analysis of adjustments to short-run equilibrium it could be assumed that there is continuous market equilibrium during the adjustment process.[12]

The shortcomings of simple AD-AS models with respect to dynamics may be a legacy of Keynes's own focus on short-run equilibria in *GT*. The assumption of fulfilled expectations facilitated the presentation of the fix-wage general equilibrium.[13] Unfortunately, it makes it hard to discuss the stability issues, and from today's perspective – having before us a well-developed theory of general equilibrium – the truly revolutionary and provocative message of the *GT* concerns the destabilizing effects of money wage flexibility, rather than the existence of a fix-wage equilibrium with unemployment.

The AD-AS model does not address the stability issue – it takes the money wage as given - but can serve as a starting point. The model can be easily extended in a way

which makes it have the implications presented in the typical textbook: (i) that unemployment can exist in the model because the money wage is exogenously fixed; (ii) that if one allows the money wage to fall in response to the existence of unemployment, the AS curve, given by $P = F'(F^{-1}(Y))/W$ is shifted downwards; and that (iii) this leads to an expansion of output and employment along the negatively-sloped AD curve and moves the economy to the 'natural rate of unemployment' (corresponding to the absence of Keynesian involuntary unemployment). The mechanism behind this adjustment is the 'Keynes effect' by which a reduction in wage and price increases the real supply of money, lowers the interest rate, and increases investment and aggregate demand. This effect can be supplemented by the real balance effect by which the rise in real balances directly stimulates the aggregate demand for goods.

This standard analysis is at odds with Keynes's own argument in *GT* where, in chapter 19, he insisted that involuntary unemployment would not be eliminated by increased wage flexibility. Falling money wages will influence the economy in a number of ways but, on balance, are unlikely to stimulate output.[14] Keynes's analysis of the effects of changes in money wages may have been sketchy, but the logic behind potential instability is impeccable. The real balance effect was overlooked by Keynes, but has been found to be empirically insignificant, and the expansionary effects of a decline in money wages due to the Keynes effect may be more than offset by the adverse influences of debt deflation, distributional shifts, and expectations of continuing reductions of wages and prices. 'Old Keynesians' have been aware of these stability problems (see Tobin, 1975), and post Keynesians have stressed additional problems arising from the role of

uncertainty, the financial situation of firms and the effects of an endogenous money supply.

These complicating factors can be addressed by an informal discussion of the diverse effects of money wage changes, using the AD-AS model as the starting point. This is basically what Keynes did in chapter 19 of *GT*. The analysis and the destabilizing effects can be illustrated using the AD-AS diagram (see Dutt and Amadeo, 1990). For instance, debt deflation problems can make the AD curve upward-sloping and, in addition, money wage reductions can shift the AD curve to the left (because of a higher propensity to consume out of wage income than non-wage income), both of which prevent the economy from converging to the 'natural' level of output. The analysis can be made more precise by incorporating specific effects into more general Keynesian models in order to formally examine the stability question, as done by Chiarella and Flaschel (2000), among others. Their analysis demonstrates that the Keynesian models can generate very complex dynamics and that local instability is a likely outcome for plausible specifications.

4. The New Keynesian detour

The New Keynesian approach can be characterized as one which attempts to derive Keynesian conclusions with respect to the existence of unemployment equilibrium and/or the effectiveness of aggregate demand policy, while using a standard neoclassical methodology.

Unemployment equilibrium can be explained in terms of the optimizing behavior of agents in models that depart from Walrasian perfect competition by introducing

perceived demand curves for imperfectly competitive firms, asymmetric information, efficiency wages, credit rationing, and the like.[15] Some of these models are very insightful, but they largely fail to address the issue of involuntary unemployment in Keynes's sense. Keynes explicitly defined 'voluntary unemployment' to include all frictional and structural unemployment, that is, to include unemployment caused by minimum wage legislation and excessive union wage demands, for instance. By extension, Keynes's notion of voluntary unemployment also includes structural unemployment generated by the various departures from perfect competition that have been invoked by NK. Structural unemployment of this kind may be theoretical interesting and empirically significant, but it is not the kind of unemployment addressed by Keynes. His involuntary unemployment is defined in terms of inadequate aggregate demand and the failure of the market mechanism to ensure the adjustment of aggregate demand to the level of aggregate supply associated with a structurally determined (minimum) rate of unemployment. It is the deviation from a structural unemployment rate that makes demand policy desirable.

In NK models the effectiveness of aggregate demand policy is confined to the short run and derives from nominal wage and price rigidities. Some of the early NK models were of the spanner-in-the-works variety which merely introduced nominal wage and price rigidities into new classical or RBC models with rational expectations. But the NK methodology requires that such rigidities be based on optimizing behavior: "rather than postulating that prices and wages respond mechanically to some measure of market disequilibrium, they are set optimally, that is, so as to best serve the interests of the parties assumed to set them, according to the information available at the time"

(Woodford 2003, p.7). Thus, prices and wages are set in a forward-looking manner, expectations are assumed to be rational, and preferences are regarded as structural and invariant to changes in policy.

Our comments on the NK approach focus on two issues: the obsession with microeconomic foundations based on explicit optimization, and the treatment of stability issues. The two issues are related since the obsession with optimization stands in the way of serious stability analysis.

4.1 Optimization

Optimization, in our view, can sometimes be very useful as a simple way of describing goal-oriented behavior (indeed, both our simple AD-AS model and Keynes's own analysis included the assumption of profit maximizing firms). But insisting on optimization can also result in problems. The problems with the optimization approach are largely well-known and a brief summary of some of the main points will suffice.

The cognitive limitations and bounded rationality of all real-world decision makers have been stressed by many authors, most notably perhaps by Simon, and a more recent literature has documented the existence of systematic departures from optimizing behavior (see Kahneman, 2000, and Camerer et al., 2004). From this perspective the NK demand for optimizing microeconomic foundations is remarkable primarily because of the highly restrictive form that it takes.[16]

Aggregation represents another problem for the optimizing approach. To obtain definite results, any theory of the economy as a whole has to engage in aggregation. Thus, there can be no attempt at full disaggregation in the agent space, as in Arrow-Debreu models of general equilibrium, and it is well-known that even if all individual

agents were fully rational and maximized well-behaved utility functions subject to standard constraints, the aggregate variables do not behave as if determined by an optimizing representative agent (see, for instance, Kirman, 1992). Aggregation problems therefore imply that the use of an optimizing representative agent in NK models has little to recommend itself.

The existence of social norms and conventions provides a further reason to eschew the mechanical application of optimization methods based on exogenously given and constant preferences. The role of relative wages and norms of fairness in Keynes's *GT* analysis of wage formation presents an example of this perspective. The existence of norms and conventions may be a source of 'conditional stability' in Keynesian models of uncertainty (Crotty, 1994) but norms and conventions also change over time, both endogenously and as a result of exogenous shocks. We shall return to these issues in section 5 below.

A more subtle danger of the optimization approach is that it may predispose the analysis to slide from individual 'rationality' to systemic 'rationality'. Some economists may view optimization is simply an organizing principle (see note 16), but countless examples suggest that an optimization approach may generate (sometimes unconsciously) a slippery slope in which individual optimization eventually leads to social optimality. Sargent (1993), for instance, is able to assume bounded rationality and yet produce, eventually, his unique, new classical equilibrium. As a second example, many of the problems caused by efficiency wage considerations can be 'solved' when credit markets function efficiently (again, with clever institutions). A history of how a focus on

individual optimization in neoclassical economics inexorably, albeit tortuously, has led to presumptions of social optimality awaits an author, if one does not exist already.

A serious problem, finally, arises from the bounded rationality of the theorist. Carrying the straightjacket of optimization – especially in its dynamic versions – reduces the ability of the theory to incorporate many important aspects of reality in a tractable manner, and therefore encourages the theorist to ignore them. One may insist on treating all agents in a model as fully optimizing, but there is a cost to meeting this demand. Simplifications then need to be made in other areas in order to keep the model tractable; the number of distinct agents, for instance, may have to be kept very small and the nature of the interaction between the agents very simple.

All useful models, of course, represent drastically stylized pictures of a complex reality. The art of model building consists in choosing appropriate simplifying assumptions, and in our view the insistence on fully optimizing behavior represents a suboptimal 'corner solution' to the modeling problem: the gains from explicit optimization are often minimal and the costs of the required simplifications in other areas high. Thus, over the last 30 years macroeconomists have struggled to solve problems of intertemporal optimization. These optimization problems grossly simplify real-world decision problems, and the astounding implicit presumption has been that agents in the real world solve (or act as if they had solved) these much more complex problems. The neglect of aggregation problem and the use of representative agents in models that purport to provide microeconomic foundations only serve to make the picture even more bizarre. In fact, the contemporary approach with its sophisticated and perfectly rational representative agents would seem to embody a good example of how not to use

mathematics: mathematical models arguably are useful primarily because they allow a clear analysis of complex interactions between agents, each of whom may follow relatively simple (but possibly changing) behavioral rules.

4.2 Stability and rational expectations

NK models may include non-clearing labor markets and allow for real effects of aggregate demand policy. But it is assumed that, in the absence of shocks, the economy converges to an equilibrium position, and cyclical fluctuations are generated by introducing stochastic shocks into models with a stable equilibrium solution. If only prices and wages were flexible, there would be no Keynesian problems of effective demand.

The stability concerns that were at the centre of Keynes's message have been largely forgotten.[17] Is there a NK answer to these stability concerns? Not really. Stability is simply assumed in NK models. The models typically involve saddlepoints and jump variables, and the presumption of stability is used to pin down the outcome in the short run. Agents have rational expectations, and the jump variables seek out the stable saddlepath. Thus, to the extent that there is an answer, it comes from the NK focus on microfoundations and rational expectations, and from the implicit rejection of the old Keynesian analysis because of its alleged deficiencies in these areas.

Rational expectations have been used before Muth and Lucas, although without using that name. Keynes's own *GT* approach of assuming that short-period expectations are fulfilled is an example of rational expectations in the sense of perfect foresight, and Harrod's (1939) warranted growth path also represents a rational expectations path. But the extension of rational expectations to all models - and not just steady growth paths or

Robinsonian mythical ages - lacks both theoretical and empirical foundations. We confine our attention to a few observations about theory.

The theoretical argument relies on the claim that the systematic deviations characterizing other specifications would lead to changes in expectation formation. This claim has some force and, indeed, changing expectations may be an important source of instability (as suggested by the role of 'animal spirits' in Keynesian analyses). But the claim this does not justify a focus on rational expectations. It has been notoriously difficult to get convergence to rational expectations even in simple models of rational learning, and the real-world learning process takes place within a complex overall environment and one that is subject to constant and profound technical and institutional change (Frydman and Phelps, 1983). These changes in the environment may lead to shifts in expectations; indeed, some institutional or structural change is often invoked to justify expectations that would otherwise seem unreasonable, viz. the appeal to a 'new economy' during the stock market boom of the 1990s. However, structural and institutional changes of this kind count against rational expectations since the learning processes underlying the claims in favor of rational expectations fare better in a stable environment.[18]

It should be noted, finally, that a dismissal of stability concerns cannot be justified by reference to Walrasian general equilibrium theory. In fact, the realization that stability had not and probably could not be established under reasonable assumptions may have been a critical factor behind the virtual abandonment in microeconomics of all research on Walrasian general equilibrium theory (Kirman, 1989, Katzner 2004).[19]

The use of individual optimization therefore does not imply that one can ignore stability issues, and in fact not all contributions that can be called NK have ignored these

issues. A notable exception is the work of Hahn and Solow (1995), who develop an overlapping-generations model and introduce real money balances using a variant of the Clower constraint to show that wage-price flexibility can result in macroeconomic instability. They also show that wage and price sluggishness as explained by standard NK techniques can be stabilizing but also prevent the economy from attaining full employment. However, unlike many of the other elegant theoretical contributions of these authors, the model becomes extremely unwieldy, primarily due to its optimizing assumptions (despite the artificial way money is introduced) and they have to resort to simulation techniques to examine the behavior of the economy.

5. Post Keynesian, structuralist and neo-Marxian alternatives

The AD-AS tradition – including the recent work on 'integrated Keynesian disequilibrium dynamics' by Chiarella and Flaschel and their associates – rightly stresses the need to consider dynamic interactions across markets, and it is justifiably critical of optimization methodology. But theories in the AD-AS tradition need to be developed not just in terms of more advanced mathematical analysis of the dynamic interactions but also in terms of a renewed attention to the behavioral assumptions and their implications for the specification of the various equations.

The behavioral foundations, of course, have not been neglected in the Keynesian literature, as is evident from even a cursory look at Keynes's own analysis or the efforts of many old Keynesians. Nonetheless, some of the presumptions of the AD-AS tradition seem questionable from a heterodox perspective. A post Keynesian approach questions the limited role of aggregate demand in determining medium- and long-run growth

patterns in AD-AS models; a neo-Marxian approach suggests a greater focus on income distribution and its interaction with the rate of accumulation and the movements in the 'reserve army of labor'; a structuralist approach (see Taylor, 1991, 2004) emphasizes the need to examine how the structural and institutional characteristics of economies determine their dynamics.

It is beyond the scope of this paper to discuss the behavioral alternatives in any detail. We shall confine ourselves to a couple of examples of what we have in mind. The examples concern assumptions that affect the role of aggregate demand in the medium and long run, and we shall focus on medium- and long-run steady states rather than the stability of these steady states.

5.1 The medium run: Fairness and the 'natural rate of unemployment'

The existence of a 'natural rate of unemployment' has been a mainstay of NK models, and the extensions of the AD-AS models by Chiarella and Flaschel (2000) share this feature; the natural rate of unemployment may not be asymptotically stable in their models, but cycles take place around a structurally determined long-run equilibrium (except for a brief sketch in their final chapter on the "road ahead"). The existence of a natural rate of unemployment implies that aggregate demand plays (almost) no role in the determination of the trend of output and the average long-run value of the unemployment rate. We find this aspect of the models questionable, both empirically and theoretically.

Money wages may be sticky partly because workers care about relative wages (as suggested by Keynes). This argument implies a rejection of a traditional view of preferences as defined over the agent's own consumption. Instead, a notion of fairness becomes central, and the behavioral literature has provided strong support for the role of

‘fairness’ in wage formation (see, for instance, Bewley, 1998, Fehr and Gächter, 2000, Akerlof and Yellen, 1990). The literature also shows that changes in nominal wages are relevant for the perceived fairness of the wage offer. The relevance of nominal changes implies a kind of ‘money illusion’. As a result, there is no natural rate of unemployment. Instead, a downward sloping Phillips curve emerges, and demand policies may affect real output and employment in the medium and long run (Shafir et al., 1997, Akerlof et al., 1996).

A more radical conclusion can be obtained if it is recognized that norms of fairness may change over time and that the prevailing wage norms are strongly influenced by the actual wage patterns in the past. Thus, according to Kahneman et al. (1986, p. 730-1) notions of fairness tend to adjust gradually to actual outcomes:[20]

> the reference transaction provides a basis for fairness judgments because it is normal, not because it is just. Psychological studies of adaptation suggest that any stable state of affairs tends to become accepted eventually, at least in the sense that alternatives to it no longer readily come to mind. Terms of exchange that are initially seen as unfair may in time acquire the status of reference transaction. Thus, the gap between the behavior that people consider fair and the behavior that they expect in the market-place tends to be rather small.

Skott (1999, 2005) shows that this conventional aspect of wage norms may lead to employment hysteresis, even in models that exclude money illusion of any kind.[21] If inflationary expectations are formed adaptively and adjustments in wage norms take a simple linear form, the models generate a downward-sloping Phillips curve. In general, however, aggregate demand policy will affect output in the medium run, but there will be no well-behaved Phillips relation, vertical or downward–sloping, between employment and the inflation rate.

These examples illustrate how lessons from behavioral economics may cast doubt on the natural rate hypothesis.[22] Theoretical doubts might not carry a lot of weight if the

empirical evidence was overwhelming, but this is not the case. Even strong supporters of the framework concede that the applicability of the theory may be limited. Thus, Gordon (1997, p. 28) concludes that

> Within the postwar experience of the United States, the modest fluctuations in the NAIRU seem plausible in magnitude and timing. When applied to Europe or to the United States in the Great Depression, however, fluctuations in the NAIRU seem too large to be plausible and seem mainly to mimic movements in the actual unemployment rate.

From a Popperian perspective, Gordon's reading of the evidence must imply that the theory should be rejected.

5.2 The long run: Growth, accumulation and technological change

Models of the long run, which introduce capital accumulation, technological change and labor supply growth, are generally of two varieties.

By far the more popular one is the one in which aggregate demand disappears from the scene and aggregate supply determines growth. In fact, neoclassical growth theory following Solow (1956), and new growth theory, following Romer (1986) and others, abstracts entirely from the AD side, assuming perpetual full employment and investment being determined identically by saving. The debate between neoclassical and new growth theory revolves around whether or not the marginal product of the produced factor of production, capital, falls to zero as the capital-labor ratio rises indefinitely and, therefore, whether long-run growth is affected by the saving rate and other economic variables. The neglect of AD is usually not explicitly explained in these models, but it is implicitly assumed that wage and price flexibility will remove unemployment in the medium run or, failing that, that government aggregate demand policy will do the job. Thus, the long-run growth path is independent of AD factors.

A less popular variety, with roots in the Keynesian theories of Harrod (1939), Robinson (1962) and others, focuses on AD as determining growth. In these models growth is determined by the interaction between aggregate demand and supply factors (including, for instance, firms' pricing decisions). Some work in this tradition has included the labor market explicitly and linked the long-run rate of growth of output to the growth of the labor supply in efficiency units (see, for instance, Kaldor 1957, Skott 1989, Dutt 1992a). Most models, however, do not impose the requirement that the unemployment rate be constant in the long run but simply assume that the labor supply does not constrain the rate of growth (see Marglin, 1984, Dutt, 1984, Taylor, 1991). These models have many interesting implications, including the possibility that a more equal distribution of income can increase the rate of growth and that technological change can have immiserizing effects, and the assumption of no labor constraints can be defended by pointing to the existence of large amounts of hidden unemployment in the primary and tertiary sectors in most countries, developed as well as less developed, until some time in the post World War II period. For the more recent period, however, the hidden-unemployment argument may not be persuasive, at least for advanced industrial countries. Most of the OECD economies arguably have become 'mature' in Kaldor's (1966) sense: they certainly have unemployment, both open and disguised, but it would be misleading to treat the labor supply to the modern sector as perfectly elastic and to disregard the labor constraints on the long-run rate of growth. Even under conditions of maturity, however, the rate of growth may be influenced by aggregate demand.

As argued in section 5.1, the rate of employment can not be taken as independent of the demand side, even in the medium run, and this dependence of employment on

aggregate demand opens up ways in which demand may also influence the rate of growth in the long run.

One channel runs through migration. Even if a country has exhausted its domestic reserves of hidden unemployment, the possibility of immigration provides an international reserve army and, immigration laws permitting, the growth rate of the country need not be limited by its labor supply. Immigration laws respond to economic conditions (as evidenced, for instance, by the change in attitudes of European countries between the 1960s and the more recent period), and the employment rate can therefore have a significant effect on the rate of growth of the labor force.[23]

Induced technical progress represents a second possible channel. Labor shortages provide an incentive for firms to seek out new labor saving techniques, and this technology channel suggests that the rate of growth of the labor supply in efficiency units may be positively related to the employment rate. Both the employment and technology channels imply that insofar as aggregate demand policy influences the rate of employment, it also affects the long-run rate of growth (Flaschel and Skott, 2005).[24]

A more radical approach is pursued by Dutt (2005) who considers a range of models in which the rate of labor productivity growth responds to labor market conditions, with tight labor markets speeding up labor-saving technological change. One of the models makes the employment rate affect both changes in the 'autonomous' investment parameter (to capture the effects of unemployment and wage reductions on aggregate demand through the Keynes effect) and the rate of labor productivity growth. Since the same rate of employment makes investment and labor productivity growth stationary, the result is a zero root model in which a change in the level of autonomous

demand (for instance, government expenditure) has a permanent effect on the long-run rate of growth. The economy converges to its long-run rate of growth, at which the economy grows with unemployment at its 'natural' rate, but the long-run rate of growth itself is affected by aggregate demand. AD and AS grow at the same rate, but the growth rate of the economy is not independent of factors determining AD.

6. Conclusion

We have argued in this paper that the older Keynesian tradition based on the aggregate demand-aggregate supply framework provides a more suitable and promising framework for building macroeconomics than the currently-dominant approach, including its New Keynesian variant. This is so for a number of reasons.

Contrary to what has been argued by a number of critics, first, the traditional aggregate demand-aggregate supply approach is internally consistent, at least in its Marshallian interpretation, as well as consistent with Keynes's own analysis.

Second, it has the strength of explicitly including the major markets and sectors of the economy and examining their interactions. In this sense it is a general, rather than a partial, theory. Walrasian general equilibrium theory may also be general in this sense, but is different in several ways, including the perspective on behavioral foundations.

Third, the aggregate demand-aggregate supply approach does not insist on optimizing microfoundations. The AD-AS model is not necessarily inconsistent with optimizing behavior, but the approach is eclectic. It starts with some basic and commonly-used accounting identities, adds rules of behavior of individuals or groups in specific institutional settings, and examines their consequences for the performance and

evolution of the system. The theorist must be prepared to explain and defend the choice of behavioral rules, but an appeal to optimization is neither necessary nor sufficient for a successful defense. This eclecticism, we have argued, is a strength, and the New Keynesian methodological position is flawed. New Keynesian macroeconomics has produced interesting insights, but the insistence on optimizing microfoundations means that these insights have come at the cost of neglecting a variety of important issues, including the analysis of stability.

Fourth, it is true that a great deal of analysis using the aggregate demand–aggregate supply framework is mechanical and fails to capture important aspects of reality, and its extensions to medium- and long-run issues typically ignore the role of aggregate demand. However, unencumbered by the straightjacket of optimizing microfoundations, the approach provides a useful starting point for the analysis of dynamic macroeconomic interactions. In developing this analysis, the approach can draw on insights from the Post Keynesian, neo-Marxian and structuralist traditions, as well as from the burgeoning literature on behavioral economics.

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NOTES

[1] According to the preface to the French edition of the GT, written three years after the English publication, Keynes (1936/1973, p. xxxii) explains:

> I have called my theory a general theory. I mean by this that I am chiefly concerned with the behavior of the economic system as a whole, - with aggregate incomes, aggregate profits, aggregate output, aggregate employment, aggregate investment, aggregate saving rather than with the incomes, profits, output, employment, investment and saving of particular industries, firms and individuals. And I argue that important mistakes have been made through extending to the system as a whole conclusions which have been arrived at in respect of a part of it taken in isolation.

[2] The dynamics can be explicitly formalized by the equations

$$dP/dt = \beta_G\,[C+I+G-Y]$$

$$dr/dt = \beta_A\,[L-(M/P)],$$

where t denotes time and $2_i > 0$ are speed of adjustment parameters for the goods and asset markets.

[3] If we introduce real balance effects which make C (and, possibly, I) depend positively on M/P, the IS curve would be negatively sloped rather than vertical. We abstract from this complication here, but refer to it later.

[4] The stability of short run equilibrium can be verified by representing the dynamics of expected price by the equation

$$dP^e/dt = \beta_E\,[P - P^e]$$

where $2_E > 0$ is the speed of expectations adjustment parameter.

[5] For a discussion of the history of the AD-AS model, including that of its emergence and spread in macroeconomic textbooks, see Dutt (2002).

[6] See Dutt and Skott (1996) for further discussion of the internal-consistency criticisms.

[7] He probably used this type of diagram, rather than that in (P, Y) space, because aggregate price level and real output were not in common use in his day, while value of output and total employment, involving fewer aggregation problems, were.

[8] Keynes's Aggregate Demand function does not actually use the simultaneous equations approach to solving P, focusing only on goods market equilibrium without taking into account asset markets explicitly. An alternative formulation of the model, which focuses only on the goods market, but allows consumption demand to respond to price changes due to either the real balance effect or distribution shifts, can easily be developed. See Dutt (1987) for a version in which changes in price affect the value of output through changes in income distribution between wages and profits.

[9] The *Treatise on Money* had concentrated on the Marshallian ultra-short run (or market run) equilibrium:

> My so-called `fundamental equations' were an instantaneous picture taken on the assumption of a given output. They attempted to show how, assuming the given output, forces could develop which involved a profit-disequilibrium, and thus required a change in the level of output. But the dynamic development, as distinct from the instantaneous picture, was left incomplete and extremely confused (Keynes, 1936/1973, p. xxii).

Skott (1989, 1989a) develops a model of cyclical growth using the Marshallian (or Keynes-of-the-Treatise) ultra-short run equilibrium as the basic building block; see also Skott (1983) for a discussion of this Marshallian approach and the relation between the *Treatise on Money* and the *GT*.

[10] For a review of post Keynesian contributions see Dutt and Amadeo. For more mainstream discussions, see Hicks (1980-81), Tobin (1975) and Meltzer (1988).

[11] See, for instance, Moore (1988). New Keynesians have also abandoned the exogenous-money assumption, but rather than stressing the nature of monetary institutions, they focus on the specific policy rule adopted by the Central Bank in the US and elsewhere (e.g. Romer, 2000, Woodford 2003)).

[12] In the context of our simple specification, however, it is easy to prove that local stability carries over to the case where P, P^e and r are all treated as state variables, with their dynamics shown by the equations in notes 2 and 4.

[13] In a set of lecture notes from 1937, Keynes argues as follows:

> When one is dealing with aggregates, aggregate effective demand at time A has no corresponding aggregate income at time B. All one can compare is the expected and actual income resulting to an entrepreneur from a particular decision. Actual investment may differ through unintended stock changes, price changes, alteration of decision. The difference, if any, is due to a mistake in the short-period expectation and the importance of the difference lies in the fact that this difference will be one of the relevant factors in determining subsequent effective demand.
>
> I began, as I have said, by regarding this difference as important. But eventually I felt it to be of secondary importance, emphasis on it obscuring the real argument. For the theory of effective demand is substantially the same if we assume that short-period expectations are always fulfilled. (Keynes 1973, p. 181)

[14] Hicks (1974) used the term Keynes's 'wage theorem' to denote the benchmark result that variations in money wages have no net effects on real output and employment in a closed economy'.

[15] Some contributions are adventurous enough to depart from optimization to invoke 'near' rationality! See Akerlof and Yellen (1987).

[16] It can be argued that problems related to information gathering and computational ability need not undermine the neoclassical optimizing hypothesis, because this hypothesis does not assume rationality in an empirical sense (whatever that means), but simply uses the organizing framework of analyzing behavior in terms of the optimization *some* objective function subject to *some* constraints (see Boland, 1981). This argument, however, suggests that there is no overriding justification for insisting on the use of the optimizing approach (for instance, based on some notion of the rationality of economic agents), and that a non-optimizing approach need not be inferior to the neoclassical one.

[17] The Japanese stagnation in the 1990s may have alerted the profession to some stability issues, and the `liquidity trap' has made a comeback (e.g. Krugman 1998). The liquidity trap arises because of an inability of monetary policy to reduce interest rates, that is, to change intertemporal prices. It seems to have escaped attention, however, that the liquidity trap and the problem of intertemporal prices are indicative of the general stability problem. Money wage reductions fail to solve the unemployment problem because "[a]ccording to Keynes' diagnosis, it is fundamentally the *intertemporal relative values* observed or implicit in the actual vector that are 'wrong'", and, "*although the most eye-catching symptom of maladjustment is the great excess supply in the labor markets, ... the burden of adjustment should not be thrown on this market*." (Leijonhufvud, 1968, p. 338 and 336; italics in original)

[18] The learning argument is particularly vulnerable with respect to some of the key variables of macroeconomic interest - saving for retirement, for instance, or educational choices (investment in human

capital) - where essentially each agent makes only a single decision. Parental background and experience may be a critical influence on these choices but for backward rather than forward looking reasons.

[19] Joan Robinson's criticism of tatonnement-based stability should have provided additional impetus for this shift, but her criticism was not widely understood (e.g. Robinson (1962, pp. 23-29), Skott (2005a)).

[20] The conventional aspect of fairness is implicit in many discussions of these issues. Keynes (1930a), for instance, expressed his sympathy with the view that "there is a large arbitrary element in the relative rates of remuneration, and the factors of production get what they do, not because in any strict sense they precisely earn it, but because past events have led to these rates being customary and usual" (quoted from Keynes 1981, p. 7). Marshall (1887) noted that fairness must be defined "with reference to the methods of industry, the habits of life and the character of the people" (p.212). Fairness, he argues, requires that a worker

> ought to be paid for his work at the usual rate for his trade and neighbourhood; so that he may live in that way to which he and his neighbours in his rank of life *have been accustomed*. (p. 213; italics added)

Similar views have been advocated by Hicks (1974) and Solow (1990).

[21] Here we use the term hysteresis in a broad sense to include zero-root models, and not just models with 'remanence' (see Cross, 1988).

[22] Other theoretical and arguments against the natural rate hypothesis are discussed in, for instance, Cross (1988, 1995).

[23] This channel may be reinforced by the effects of unemployment on changes in the labor force participation rate; women's participation rate and the average retirement age, for instance, may respond gradually to labor market conditions.

[24] Verdoorn's-law effects in which learning by doing generates a positive impact of the rate of growth of output on productivity growth imply an additional stimulus from faster immigration to productivity growth.