Keynesian Theory And The Aggregate-Supply/Aggregate-Demand Framework: A Defense

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The paper has benefited from the helpful comments on an earlier draft by Sally Dunne, two anonymous referees and the editor.

1. Card and Krueger [1992] also address this issue. Their data permits private school effects on the percent of students enrolled in private schools by state and pupil-teacher ratios for public and private schools. Their results indicate a positive but insignificant relationship between the percent private variable and the returns to education. They conclude that any sectoral effects on the returns to education are explained by pupil-teacher ratios, and term length.

2. We estimate the models with the selectivity correction. These results, available from the authors upon request, are consistent with those reported below.

3. The use of the natural log of wages in the standard in the estimation of hourly wages. Hence, the coefficient are interpreted as the percent change in wages given a unit change in the independent variable.

4. Gaudet and Griffin [1993] mention private education as one of several measures of child quality, but they do not include it in their empirical analysis. The results in Table 2 indicate that private education is a relevant factor in determining wages.

5. Gaudet and Griffin use this approach to test a productivity of schooling or child quality theory. They include several family background, student performance (high school GPA and standardized test results), and school characteristics in the earnings equations. Many of these factors have a significant effect on earnings in a pooled model, but most are not significant when the data is stratified by race. Their primary finding is that the returns to education coefficients decline when controlling for family background, student performance, and school characteristics, which is consistent with the child quality, or productivity of schooling hypothesis.

6. Hannushek [1996] reports that pupil-teacher ratios have inconsistent impacts of the performance of students on standardized tests.

7. For example, Card and Krueger [1992] find no private sector effect on the returns to education when controlling for pupil-teacher ratios and term length. The differences in findings may be due to the time periods of the studies. Card and Krueger use cohorts born between 1920 and 1928. These groups would have finished high school from approximately 1938 to 1959. This paper uses respondents who would have been in high school in the 1970s and 1980s. The relative quality of public and private schools could have changed substantially between these periods.

REFERENCES


KEYNESIAN THEORY AND THE AGGREGATE-SUPPLY/AGGREGATE-DEMAND FRAMEWORK:

A DEFENSE

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INTRODUCTION

In a paper published earlier in this journal Barro argues that the widely used aggregate-supply/aggregate-demand (AS/AD) framework is "unsatisfactory and should be abandoned as a teaching tool" [1994, 1]. This recommendation is based on the claim that the models usually represented by the AS/AD framework fall into two categories: those that are inconsistent or those that can be represented more conveniently in a different way. Barro is not alone in having misgivings about the AS/AD framework: others, including Fields and Hart [1990], Colander [1950] and Bhuduri, Laski and Rieke [1996], have also recently argued that the framework is internally inconsistent and fundamentally flawed, although they have not called for its abandonment as a pedagogical device.

As we understand it, the AS/AD framework is a general diagrammatic approach. The defining characteristics of the framework is the use of a price-output diagram to illustrate two reduced-form relations, the (misleadingly labelled) AS and AD curves. The AS curve represents a reduced form of equations describing the labor market and pricing behavior while the AD curve represents a reduced form of equations depicting the nature of asset markets and the demand for goods.

Since this definition of the AS/AD framework says nothing about the nature of labor, goods, and assets markets, it cannot be called a model of the economy. For present purposes, this observation has two implications. First, many different models can be depicted using the AS/AD framework. Second, while specific AS/AD models may have inconsistencies, such inconsistencies are not necessarily attributable to the framework itself.

In this paper we argue that Barro’s judgment regarding the AS/AD framework is incorrect, that his analysis is riddled with some basic and fundamental errors, and that the AS/AD framework, pace Barro, can represent a variety of macroeconomic models in a consistent way. As such, it may be useful in teaching basic macroeconomic theory, enabling students to appreciate the differences among alternative
macroeconomic approaches in terms of a common simple framework. We hope to
convince others not to join Barro in abandoning what can be a useful teaching device.

Our main disagreement with Barro does not concern pedagogical issues, however,
for Barro's paper is not primarily about how one should teach a given material.
Underlying the discussion of teaching tools loom substantive issues of economic theory.
In Barro's view there are currently only "two types of internally-consistent models
that allow for cyclical interactions between monetary and real variables" (1994, 4):
the fix-price models associated with the work of Barro and Grossman [1976] and oth-
ers, and the new classical models of market clearing.

This position is blatantly wrong. In fact, Barro (somewhat inconsistently) acknowledges the existence of other types of models elsewhere in his paper when he refers to "what used to be called the complete Keynesian model" (ibid., 1). Barro does not critic-
ize this model on grounds of internal inconsistency but suggests that the model "was rejected long ago for good reasons" (ibid., 1). These reasons, we are told are partly theoretical (essentially that it does not capture some of the main Keynesian ideas) and partly empirical (it is inconsistent with the observed cyclical pattern for the real wage) (ibid., 4). Barro's theoretical criticisms are in our opinion unjustified, and the empirical objection — which has a long history going back to Dunlop [1938] and Tashia [1939] and which applies to monetarist and new classical models as well — can be met by a straightforward reformulation of the theory to take account of imper-
fect competition and non-diminishing returns to labor.

The other aforementioned authors who have criticized the AS/AD framework have put forward their own suggestions about how the framework can be modified to free it of its internal inconsistencies and empirical shortcomings. Although we do not concern ourselves with the details of their arguments, we do comment on their work to the extent that it is directly related to the issues relevant for understanding the problems with Barro's criticisms and our own interpretation of the AS/AD framework and models. We should say at the outset that we disagree with many of the claims made by these authors and our interpretation of consistent AS/AD models are significantly different from theirs.

The rest of this paper proceeds as follows. The next section uses a common AS/AD framework to illustrate simple versions of four well-known macroeconomic mod-
els. Drawing on this analysis, the subsequent section shows the weaknesses in Barro's arguments and comments on some issues raised by the other authors.

THE ASAD FRAMEWORK AND SOME ILLUSTRATIVE MODELS

Since the "AS/AD models" are well known, our presentation can be extremely brief. We consider four models, the first three of which Barro discusses; reversing his order, we start with the traditional "complete Keynesian model." Table 1 compares some of central assumptions and implications of the models.

### Table 1: Comparison of Alternative AS-AD Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Ultra Short Run</th>
<th>Short Run</th>
<th>Long Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neoclassical-Synthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keynesian</td>
<td>Firm's price</td>
<td>Money wage given.</td>
<td>Money wage changes in response to unemployment. AS curve shifts.</td>
</tr>
<tr>
<td></td>
<td>expectations and</td>
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<tr>
<td></td>
<td>money wage given</td>
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<td></td>
<td>output predetermined.</td>
<td>Price varies to clear goods market.</td>
<td>In equilibrium, AS and AD curves intersect at full-employment level.</td>
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<tr>
<td></td>
<td>equilibrium economy on AD curve, with unemployment possible.</td>
<td>Workers' price expectations adjust to the actual price. In equilibrium, AS and AD curves intersect at full-employment level.</td>
<td></td>
</tr>
<tr>
<td>Monetarist Mark I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Firm's and workers' price expectations given. In equilibrium labor markets and goods market clear and economy on AD curve.</td>
<td>Workers' price expectations adjust to the actual price. In equilibrium, AS and AD curves intersect at full-employment level.</td>
<td></td>
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<tr>
<td>Rational expectations</td>
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<tr>
<td>New Classical</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Price, wage, and interest rate always flexible)</td>
<td>Not applicable.</td>
<td>Workers' and firm's expectations formed &quot;rationally.&quot; In equilibrium economy at intersection of AS and AD. Full employment. Economy at natural rate (apart from random shocks).</td>
</tr>
<tr>
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</tr>
<tr>
<td>Kaleckian/post-</td>
<td>Money wage given.</td>
<td>Firms adjust output (if excess capacity exists) when market-clearing price deviates from markup-up price.</td>
<td>Money wage changes do not remove unemployment. Unemployment can persist.</td>
</tr>
<tr>
<td>Keynesian</td>
<td>Output predetermined. Price varies to clear in goods market.</td>
<td>In equilibrium economy on AD curve.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Wage and interest rate given)</td>
<td>Unemployment possible.</td>
<td></td>
</tr>
</tbody>
</table>


A Neoclassical-Synthesis Keynesian Model

This model—a version of the neoclassical-synthesis Keynesian model developed by Hicks [1937], Modigliani [1944] and others and used in many standard textbooks—is described by the following equations:

\begin{align}
C &= C(T), \quad C > 0 \\
I &= I(r), \quad I < 0 \\
L &= L(Yr), \quad L_e > 0, L_c < 0 \\
Y &= F(N), \quad F' > 0, F'' < 0 \\
W/P &= F'(N') \\
N' &= N_e \\
N &= \min\{N', N_e\} \\
W &= W_e \text{ for } N < N_e \\
Y &= C + I \\
M/P &= L(Y, r)
\end{align}

where, following standard notation, \( C \) denotes real consumption, \( Y \) real output and income, \( I \) real investment, \( r \) the rate of interest (we do not distinguish between real and nominal levels for simplicity), \( L \) real money demand, \( N \) the level of labor employed, \( N_e \) labor demand, \( N' \) labor supply, \( W \) the money wage, \( P \) the price level, and \( M \) the nominal money supply. Equations (1) through (6) are, respectively, the consumption function, investment function, money demand function, production function, inverse labor demand function (where firms are price takers), and labor supply function. In this model we assume that the labor supply is exogenously given at the level \( N_e \); it would be straightforward to introduce a positive labor supply elasticity (as below, in the monetarist and new classical models). Equation (7) makes actual labor employed equal to the short side of the market, and equations (8) through (10) close the model. Equation (8) specifies a constant money wage rate, while equations (9) and (10) give the equilibrium conditions for the goods and asset markets, respectively.

The model can be represented using the AS/AD framework. For any given level of \( Y \), equations (1) through (3) and (5) and (10) yield values of \( P \) and \( r \). If we plot the values of \( P \) for different values of \( Y \) we obtain the downward-sloping \( AD \) curve in Figure 1.

This \( AD \) curve can be given the following Marshallian interpretation. The existence of production lags implies that the level of output is predetermined at any given moment; current output is determined by past production decisions. These past decisions have been made in the light of expectations of current demand, and under pure competition, demand conditions can be represented (at the level of the individual firm) by an expected price level. With output predetermined in this way, the realized price is now determined by actual demand. Equations (1) through (8) and (9) and (10) describe this Marshallian, ultra-short-run determination of demand price for any given output. Note that the economy, on this interpretation, will always be on the \( AD \) curve; it is assumed that the price level adjusts to clear the output market in the very short run (Marshall's 'day' or market period).

Turning to the \( AS \) curve, for \( N' \approx N_e \), equations (5) through (7) imply that

\begin{equation}
W/P = F'(N')
\end{equation}

Combined with equations (4) and (8), equation (11) yields an upward-sloping relation between \( P \) and \( Y \), shown as the \( AS \) curve in Figure 1. Equation (11) holds only in the short-run equilibrium, and the economy need not be on the \( AS \) curve in 'daily' equilibrium. Profit-maximizing firms always choose output and employment such that

\begin{equation}
W/P = P' \times (N)
\end{equation}

where \( P' \) denotes firms' price expectations when output and employment decisions for the current period were being made (that is, their demand expectations, since we
assume pure competition. Condition (11), on the other hand, requires that short-term expectations are being met, so that $P = P^s$. Out of short-run equilibrium, the economy will be on the $AD$ curve but not on the $AS$ curve. With stable adaptive expectations, the economy will move to short-run equilibrium at $E_1$ along a path such as the one shown by arrows in Figure 1.

The $AD$ and $AS$ curves have been drawn to intersect at $Y = Y_f = f(\bar{N})$, so that there is unemployed labor in short-run equilibrium. This short-run equilibrium may not persist. The upward-sloping $AS$ curve will move downwards if $W$ falls. Hence, if $W$ falls over time due to the existence of unemployed labor, the economy will move to full employment as the $AS$ curve moves down over time; this non-Keynesian implication of the model will be discussed further in a later section.

Demand policies affect the $AD$ curve. Starting from $E_0$, a rise in $M$ due to expansionary monetary policy will push the $AD$ curve to the right, as shown in Figure 2. The economy will move from $E_0$ to $E_1$ in the ultra-short run if the expansion was unanticipated and firms’ demand expectations (the value of $P^s$) are taken to be given initially; changing expectations subsequently take the economy to $E_2$, as the economy attains its new short-run equilibrium level. If we replace the assumption that $P^s$ is formed adaptively and assume Muth-rational expectations—that is, that economic agents form expectations of the future with full knowledge of the actual parameters of the model and past values of variables—the economy will always be at the intersection of $AS$ and $AD$ curves in daily equilibrium, and the economy will move instantly from $E_2$ to $E_0$ (abstracting from unanticipated shocks).

A Monetarist Mark I Model

This model, which follows Friedman [1968] and Phelps [1970], is obtained by changing equations (6) and (8) in the neoclassical synthesis model. Thus, it is assumed that:

\[ N^p = g(W/W^p), \quad g' > 0 \]

\[ N^p = N^e \]

where $P$ (to be distinguished from firms’ expectations $P^s$) is the price level expected by labor suppliers, and equation (8) embodies the assumption of labor market clearing.

Equations (1) through (3) and (9) and (10) describing the $AD$ curve are unchanged so the $AD$ curve in Figure 2 is the same as before. The new $AS$ curve is derived from equations (4) through (8). For any given value of $P$, a higher price level $P^s$ is associated with a higher level of output. This $AS$ curve describes positions that are consistent with labor market equilibrium and price-taking behavior of firms. If it is assumed that firms’ price expectations are fulfilled, the economy must always be on the $AS$ curve as well as on the $AD$ curve. Abandoning the assumption that $P = P^s$, deviations from the $AS$ curve become possible as in the synthesis model of the previous subsection.

Note that the $AS$ curve is drawn for a given value of workers’ price expectation, $P^s$, an increase in $P^s$ will push the curve upwards. Workers’ price expectation, $P^s$, plays a role that is closely analogous to the money wage rate in the synthesis model. The synthesis model describes the formation of a short-run equilibrium condition on a given money wage. The monetarist model replaces the assumption of given money wages by an assumption of given (workers’) price expectations and assumes labor market clearing. High price expectations make workers demand a high money wage rate, and high price expectations (in the monetarist model) or high wage rates (in the synthesis) therefore both lead to a reduction in employment and output.

In long-run equilibrium all expectations will be realized; that is, $P = P^s = P^e$ and the equilibrium level of $Y$ will be at the “natural rate.” Starting from this equilibrium at $E_0$ in Figure 3, an increase in $M$ due to expansionary monetary policy will push the $AD$ curve to the right, taking the economy to a short-run equilibrium at $E_1$, with $P^e$ unchanged (assuming, as in standard presentations of the monetarist model, that $P = P^s$). Since $P = P^s$, suppliers of labor will revise $P^u$ upwards, which will push the $AS$ curve upwards until it reaches $AS'$ and a new long-run equilibrium is established at $E_2$, with output at its natural rate.

A Rational Expectations New Classical Model

This model, which follows Lucas [1972], Sargent and Wallace [1976] and others, differs from the previous one only in the way $P^s$ is formed. Maintaining all of the assumptions of the previous model (and assuming perfect foresight on the part of
overcomes by a straightforward reformulation. The reformulated model, perhaps unfamiliar to mainstream economists, has post-Keynesian features and differs especially on Kalecki's (1971) work. Some components of the previous models are preserved, making the version of this model presented here different from standard post-Keynesian treatments. The model is not usually represented using the AS/AD framework perhaps because that framework is viewed as a neoclassical Trojan horse.

Compared with the Keynesian synthesis, represented by equations (1) through (10), we introduce changes in equations (1), (4), (5) and (10). Equation (1) is extended to allow different saving propensities out of wage and non-wage income. Assuming for simplicity that wage income is entirely consumed and a fixed fraction, \( s \), of non-wage income is saved, we replace that equation by:

\[
C = (W/P)N = (1 - s)Y - (W/P)N.
\]

Equation (4) is modified by assuming constant returns to labor (below full capacity utilization). This follows from assuming that the possibility of factor substitution is limited in the short term and that excess capacity exists (assumptions which post-Keynesian claim are consistent with stylized facts); indeed, the existence of over-head labor may even give rise to a positive relation between employment and average labor productivity. Thus, we replace equation (4) by

\[
Y = P(N), \quad F = c, F^* = 0 \quad \text{for } Y < Y^\infty
\]

where \( Y^\infty \) is full capacity output.

Assuming that firms do not hire more labor than they need for production, equation (4) implies

\[
N = c_Y Y.
\]

Firms are assumed to operate under imperfect competition and to plan to set their price as a fixed markup on variable costs. If, for simplicity, labor is the only variable input, we get

\[
P = (1 + \alpha)N, \quad W_e
\]

where \( \alpha \) is the markup over prime costs. If desired, this mark-up behavior can be derived from profit maximization with a constant-elasticity conjectured demand curve. More generally, the markup may be assumed to depend on such factors as the degree of industrial concentration, the elasticity of demand, and the bargaining power of workers [Kalecki, 1971; Sen and Dutt, 1990]. Equation (5) replaces (6).

Finally, we replace the assumption of an exogenously given supply of money with the assumption of an endogenously determined money supply at a given interest rate, \( r^\circ \). Equation (10) is replaced by the equation:

\[
I = s_{1}\bar{Y} - \left(1 + \delta_3 \right) z
\]
where $r$, is determined by factors such as monetary policy.

The $AS/AD$ representation of this model is shown in Figure 4. As in the earlier models, equations (1'), (2) through (3), (9) and (10) imply a downward-sloping $AD$ curve, but the reasons for this shape of the curve are different. With a given interest rate, a reduction in the price level cannot produce a "Keynes effect" according to which an excess supply of money reduces the interest rate and increases investment (and the model contains no real-balances effects). However, lower prices lead to an increase in the real wage (for a given nominal wage), and this shift in income distribution entails an expansion of demand since, by equation (1'), consumption depends positively on the share of wages in income. Algebraically, the equation for the $AD$ curve is given by

$$P = wY/(sY - Rr_y).$$

The $AS$ curve is simply the horizontal line defined by equation (5') when there is excess capacity; the curve becomes vertical at the full-capacity level of output. We focus on the interesting case in which the $AS$ and $AD$ curves intersect at a level at which there is excess capacity as well as unemployed labor.

If we take output to be given in the ultra-short-run, the $AD$ curve shows the (hypothetical) price level that will equate the demand for goods to this given level of output. We then assume that firms compare this market-clearing price with the markup-determined price curve (given by the $AS$) that they plan to set: if the market-clearing price exceeds (is less than) the markup-determined price, they increase (reduce) output. This adjustment will take the economy to a short-run equilibrium at the intersection of the $AD$ and $AS$ curves, with the price level determined at the marked-up level shown by the $AS$ curve, as long as excess capacity prevails. If firms adjust output instantaneously (when excess capacity exists), the economy will always be at the intersection of the $AS$ and $AD$ curves, and deviations between the market-determined and markup price will never be observed. This is the case actually considered by Kalecki [1971].

Starting from a position of short-run equilibrium with excess capacity, if the money wage were to fall due to the existence of unemployed labor and all other parameters were unchanged, the $AS$ curve would move downwards (as shown by equation (5')) but so would the $AD$ curve (as shown by equation (13)). In fact, the two curves would fall by the same vertical distance at the equilibrium level of $Y$, implying that the equilibrium levels of output and employment would be the same as before. This is easily verified from equations (5') and (13) which imply

$$Y = Rr_y(1+r)/s.$$  

Equation (14) shows that equilibrium level of output is independent of the level of the money wage. The price level simply falls proportionately with the money wage.

The inability of money wage changes to secure full employment in this model is not due to downward inflexibility of the real wage. If the fall in money wages implies a rise in the markup (since the price level does not fall equi-proportionately with the money wage) and thus a decline in the real wage, the $AD$ curve will shift down more than the $AS$ curve, implying a fall in output. As shown by equation (14), a rise in the markup reduces the equilibrium level of output: the redistribution of income from wage to non-wage income reduces consumption demand and leads to a contraction in output. Hence, in this model wage flexibility either has no real effect on employment (when the markup is constant) or may be counterproductive in the sense that falling money wages cause output and employment to fall if real and nominal wage rates move together. This conclusion, which is in line with Keynes's conclusions in chapter 19 of the General Theory, forms a striking contrast to the results for the neoclassical synthesis Keynesian model, in which wage flexibility leads to full employment.

PROBLEMS WITH BARRO'S CLAIMS

Having defined what we mean by the $AS/AD$ framework and having provided brief descriptions of what we believe are four consistent "AS/AD models" we are in a position to examine the flaws in Barro's arguments. We consider in turn Barro's dis-
which output equals the demand for output) at a given price level, and assume that level of output is not necessarily equal to the actual level of output as determined by the supply side of the model. This interpretation leads them all to argue that the AD curve is inconsistent with the AS curve in standard “Keynesian” models which do not assume that the price level is given. Colander [1996] points out that the AD curve (in the standard “Keynesian” model) does not hold the level of output constant, but assumes that actual output changes without inducing any changes in the price level (as in the 45° diagram of the fix-price income expenditure model or the fix-price textbook IS-LM model). He then claims that on the AS side of the model, a different story—with flexible prices and price-taking profit-maximizing producers—is introduced. Similarly, Bhaduri, Laski and Riese [1995] argue that in the AS/AD model firms are made to follow two inconsistent rules of behavior at a given price level: the AD curve makes them produce according to the level of aggregate demand, while the AS curve makes them produce to maximizing profit.

While Barro recommends the rejection of the AS/AD framework, the other three papers suggest ways out of the alleged inconsistency. Fields and Hart [1990] argue that when the price level is changed, one needs to examine the effects of this price change on output supply to find the new level of aggregate demand. But in examining the effect on output they use the Lucas surprise-supply function (according to which output deviates from its natural rate only—abstracting from persistence effects due to slow output adjustment—if there are expectation errors). The resultant model, of course, is not the neoclassical-synthesis Keynesian model with unemployment due to wage rigidity, but one which makes the economy always produce along the Lucas supply curve! Bhaduri, Laski and Riese [1995] suggest that one of two possible routes be followed. In one, they derive an AD curve in which they take aggregate demand at each price to be actually determined by output supply, and use the profit-maximization condition (with a given money wage) to find output supply. Thus the AD curve does not imply market clearing in the goods market, but gives the level of aggregate demand at each price level and the corresponding level of output at that price level which follows from profit maximisation by firms. They combine this with the standard AS curve of the synthesis model. In the other, they depart from profit maximization altogether, assuming that firms satisfy by using a markup to set price, and adjust their output according to the demand for goods. While there is no logical problem with the second route, and it is similar to that taken in our Kaleckian post-Keynesian model, the first route is unclear about its microeconomic foundations and firm behavior; the same is true of the other hybrid models presented by Bhaduri et al. Colander [1996] proposes the use of an AD curve that does not incorporate multiplier effects and takes into account only the direct effects of the price level on aggregate demand; his suggestion is thus similar to Bhaduri et al.’s first route. To introduce “complicated” dynamics into the model, Colander also introduces a coordination technology which uses capital and labor as an additional argument into his production function for output. He argues that this modification of the standard model can give rise to a fall in output due to self-fulfilling coordination shocks without changes in the real wage. Short of noting that this construction is—to say the
very least—extremely vague, we do not address this aspect of his proposed solution this paper, since it is not directly related to Barro's criticisms or our interpretation of the AS/AD framework.

The solutions, whatever their merits, are all unnecessary, since the criticism of the AS/AD framework is unwarranted. The criticisms are rooted in the mistaken interpretation of the AD curve: that it determines equilibrium output at a given price. Many textbooks do derive the AD curve using this method—going from the income-expenditure model with a given rate of interest, to a textbook IS/LM model with a given price, to the AS/AD model with a variable price—which suggests that output clears the market at a given price in the AD curve. Though the AD curve derived in this way is formally equivalent to one which determines the price level at a given level of output, the two constructions imply different adjustment dynamics. All of our AD curves show the ultra-short run equilibrium price at the given actual level of output. Except in short-run equilibrium this demand price, of course, does not coincide with the price shown by the AS curve corresponding to that level of output, because the AS curve shows the price level expected or planned by firms, which need not coincide with the actual market-clearing price found from the AD curve. Interpreted in this way, the AD curve implies market clearing at each level of actual output, and there is no inconsistency between the AD and AS curves.

We should clarify that we do not claim that product prices are always so flexible as to equilibrate the demand and supply of goods in the ultra-short run. However, it is one thing to claim that a model is empirically unrealistic, and quite a different thing to argue that it is internally inconsistent. Moreover, if price expectations change very quickly in the synthesis model, the degree of price flexibility implied by the model need not be very great. If one believed that prices are sticky and that firms change output levels very quickly in response to changes in demand, one would simply choose the Kaleckian/post-Keynesian AS/AD model, in which it would make no substantive difference to interpret the AD curve as solving for the equilibrium output for a given price or as solving for the equilibrium price for a given output, since the price level would in fact be fixed when the economy is below the level of full capacity. Second, Barro argues that the AS/AD model with given workers' price expectations in the short run is internally inconsistent because it combines price stickiness (in the derivation of the AD curve) with market clearing. Paradoxically, Barro is wrong in this argument since, as we have shown above, the AD curve for this model (which we have called the Monetarist Mark I model) does not assume price stickiness. Barro also argues that the model is not Keynesian. In this he is quite correct, but, unfortunately, for the wrong reason. He states that this model is not Keynesian because firms are "always able to sell whatever they wish at the going price level: they are not constrained by aggregate demand" (Barro, 1994, 3). In Keynes' (1936) analysis, however, firms are also able to sell whatever they wish at the going price level: thus this characteristic of the model hardly makes this model non-Keynesian. This is a point to which we will return. What makes the monetarist model non-Keynesian is that (1) the labor market always clears, even when the economy is not at its natural rate of output and (2) the model implies the existence of automatic tendencies for actual output to converge to the "natural rate" level.

Third, Barro endorses the rational-expectations new-classical model as consistent, but argues that it is not Keynesian. We agree with him regarding these claims. However, we would point out that the model is non-Keynesian for the same reason as the Monetarist Mark I model. The only difference between the rational-expectations new-classical model and the Monetarist Mark I model relates to the way expectations are formed. It is therefore unclear to us why Barro should think that the former model is consistent but the latter is not. While we agree with Barro's endorsement of the new classical model on grounds of internal consistency, we are not convinced of its empirical relevance, given the overwhelming evidence regarding the nature and duration of unemployment. This is not the place, however, to enter a discussion of this issue.

Fourth, regarding the neoclassical-synthesis Keynesian model, Barro does not argue it to be inconsistent, but claims that it is not Keynesian, and that it is inconsistent with empirical evidence. On the issue of Keynesian pedriegg, Barro argues (unlike Keynes) that unemployment is due to an excessively high real and nominal wage, and that firms are never constrained by aggregate demand because the goods market clears due to price changes. While it is certainly true that unemployment in this model is associated with a high real and money wage, it is not true that firms are unconstrained by aggregate demand in Keynes' sense. As Barro correctly notes, a rise in aggregate demand (following, say, an exogenous increase in investment due to higher long-period expectations) will push the AD curve to the right and increase employment.

Barro seems to think that output cannot be constrained by aggregate demand if the goods market clears due to price variations. In the neoclassical-synthesis Keynesian model firms always assume that they can sell any amount they want to at the price they expect. Their price expectations may not be accurate but they actually end up selling the amount they produce at a price which is exogenously given to each firm: the price level adjusts to clear the market during the 'day' and under assumptions of pure competition no firm is in a position to affect this market price. But output is still constrained by aggregate demand in the sense that if aggregate demand had been higher, the resultant rise in market price would have induced all firms to produce more goods and services and employ more labor. A reading of The General Theory should make it clear that Keynes was thinking of aggregate demand constraints in this sense rather than in terms of an excess supply of goods and the appearance of quantity rationing at the level of the individual firm. Although the clearing of the output market is fully consistent with Keynes' General Theory model, there is another, very important, inconsistancy. The synthesis model implies that money wage flexibility would cure the problem of unemployment. This implication of the model is inconsistent with Keynes' own analysis (Keynes, 1936, Ch. 19). Thus we agree with Barro that the model is not truly Keynesian, but we dispute his reasoning in support of this conclusion. One of the revolutionary aspects of Keynes' analysis was his 'wage theorem' (in Hicks' (1974) terminology). According
to this theorem, variations in money wages will have no net effects on real output and employment in a closed economy. Falling money wages will influence the economy in a number of different ways, but an increase in the volume of money wages will, in Keynes's view, have adverse effects on employment and output by reducing the level of aggregate demand. Thus, he concludes his examination of changes in money wage by noting that

if labor were to respond to conditions of gradually diminishing em-
ployment by offering its services at a gradually diminishing money-
that, this would not as a rule, have the effect of reducing real wages
and thus increase output and employment, AXD & FIS] and might
have the effects of increasing them, through its adverse influ-
ence on the volume of output. The chief result of this policy would be
to cause a great instability of prices, so violent perhaps as to make
business calculations futile in an economic society functioning after
the manner of that in which we live. To suppose that a flexible wage
policy is a right and proper adjunct of a system which on the whole is
use of laissez-faire, is the opposite of the truth. [Keynes, 1936, 269]

The post-Keynesian model presented above echoes this conclusion, but the result is
not restricted to monetary regimes in which the interest rate is kept constant through
monetary policy as in the Kaleckian/post-Keynesian model above. In models with a
variable interest rate, the Keynes effect of reduced interest rates and (empirically
insignificant) real balance effects on consumption may be more than offset by the
adverse influences of debt deflation, distributional shifts, and expectations of
continuing reductions of wages and prices.

On the empirical side Barro points out that the synthesis model predicts a pat-
tern of countercyclical real wages and labor productivity, a prediction which fits badly
with observed patterns of procyclical real wages and procyclical productivity. This
empirical problem was noted by Dunlop (1938) and Tsurishin (1939) soon after the
appearance of The General Theory. It occurs in the neoclassical-synthesis model due
to the assumptions of diminishing returns to labor and pure competition. However,
the Kaleckian/post-Keynesian model of the previous section, which jettisons both di-
munishing returns and pure competition, does not imply that a rightward shift in the
AD curve reduces the real wage. In this model, when Y increases, the real wage,
given from equation (2) to be \(1 + (1 + \varepsilon)\), will not change if \(1 + \varepsilon\) is fixed. Fur-
thermore, if one adds on to the model the assumption that \(\varepsilon\) declines when \(Y\) rises due
to a tightening in the labor market which increases the bargaining position of work-
ers [Kalecki, 1971], or because of the pricing policies of firms [Stiglitz, 1984, Rotemberg
and Saloner, 1980], then this particular \(\varepsilon\) appears to be a flexible wage
model to the assumptions of diminishing returns to labor and pure competition. However,
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CONCLUSION

This paper has argued that Barro's call for rejecting the AS/AD framework as a
teaching tool is unwarranted, and that the criticisms by others regarding the frame-
work are also misplaced. The AS/AD framework can be useful for the presentation and comparison of a variety of different macroeconomic models. We have briefly
discussed four such models and argued against Barro's tirade against the AS/AD
framework.

Barro's attacks on the AS/AD framework appear to be motivated by a hostility
towards models in which the economy can suffer persistent unemployment due to
demand constraints. He has not, however, produced convincing reasons to show that
such models should be abandoned. We have argued this in particular using a Kaleckian/
post-Keynesian model.

Although we have argued in favor of the AS/AD framework, we should end with
two cautionary remarks. First, the name AS/AD framework misleadingly conjures
up images of demand and supply curves with which the reduced-form AS and AD
curves have no relation.14 Perhaps a new name is in order such as GFA/LP (goods-
assets/labor-pricing). Second, the AS/AD framework presents models which are quite
complex. If they appear to confuse an economist of the caliber of Barro, they may
certainly confuse students in introductory economics courses. We thus agree with
Geithman's (1994) recommendation that the AS/AD framework not be used in such
courses before students learn about the functioning of goods, assets, and labor mar-
kets. However, once students reach the stage of intermediate courses and develop
an understanding of how these markets function, the AS/AD framework can be used to
analyze and evaluate different macroeconomic models and thereby help students de-
velop their own ability to think about the complexity of macroeconomics.

NOTES

We are grateful to Amit Chaudhuri, David Colander, Thomas Dalley, Jean-P Bo and the editor of
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unpublished work available to us. This paper was written while Peter Skott was Visiting Professor
in the Department of Economics at the University of Nice-Dauphine.

1. See the references in those papers for names of additional critics.
2. In his response to Barro's paper, Geithman, while admitting that Barro's judgment is overdrawn
and his recommendation cautious," argues that he is "too lenient toward the AS/AD apparatus"
(1984, 470). Geithman takes the view that the framework "offers textual nonsense and expository
convenience at the cost of impeding the development of student analytical skills." He also seems to
endorse Barro's claim that the "typical AS/AD textbook treatments are . . . logically flawed" [ibid.,
477].
3. We should note explicitly that we do not consider any of the ideas discussed in this paper as original.
Had the papers by Barro and the other authors mentioned not appeared, we would have thought that
these ideas were widely known, and not considered it necessary to put them to paper. The ideas have
been put forward by a number of authors in a variety of contexts, too numerous to exhaustively recount. The fact that we, at various points in this paper, refer to our earlier work, should not be interpreted to mean that we consider ourselves to be their eigentrace.

4. A fixed level of \( W \) is not required for this analysis. A positive relation between \( W \) and \( N \) would produce a similar model. We assume that \( W \) is fixed for expository simplicity. Keynes [1936, Ch. 21] discusses the reasons for the empirically-observed wage stickiness. See also Hicks [1937, Ch. 2], Wood [1979], Blinder [1980] and Skott [1982].

5. This structure follows Keynes [1936]. The Marshallian interpretation of Keynes is discussed in greater detail in Chick [1948], Skott [1980] and Dutt [1984].

6. We assume that the rate of change of expected prices is determined by the difference between the actual price and the expected price, and that the speed of adjustment in expected prices is not large enough to destabilize the economy.

7. This analysis assumes that the position of the short-run equilibrium remains unchanged. Shifts in the short-run equilibrium (due to induced changes in some of the parameters) imply that the sequence of short-run equilibria will be changing and moving target; the economy may never reach a position of short-run equilibrium. Skott [1983] and 1986 discusses this issue in greater detail.

8. Skott [1980] contains a dynamic analysis along these lines.

9. The same Mark I due to Hahn [1960] and Tobin [1960] is meant to distinguish this approach from Monetarist Mark II, which is called the Rational Expectations New Classical approach below.

10. A good exposition of some of these issues contained in this model will be found in Lavoie [1990], who also discusses the empirical relevance of several of the assumptions used here.

11. More [1968] calls this the horizontalist position as opposed to the verticalist position; see also Lavoie [1990, Ch. 4]. Although some post-Keynesian authors argue that this approach is generally applicable, more skeptical readers may take this assumption to imply that the central bank follows the policy rule of pegging the interest rate.

12. If the AD and AS curves intersect at the vertical portion of the AD curve, output will be set at the full-employment level and the price will be determined at the market-clearing level shown by the AD curve. The adjustment of output by the firms due to the fact that the market-clearing price is higher than the current price is no longer possible, since the economy is a closed economy.

13. See Skott and Dutt [1990] for a fuller discussion of this point. Cleaver [1994] agrees with this interpretation, but then concludes that Keynes's analysis did not really contain a formal treatment of aggregate demand failures. In this he seems to be accepting the definition of aggregate demand constraints.

14. Also states that this model some key features like the "Keynesian consumption function, the investment accelerator (or Keynesian investment function)," do not apply. Since the model does include the consumption and investment functions, it is not clear what it means. The accelerator was maintained by Keynes himself, but the clearing of the output market certainly does not exclude a strong accelerator-type influence of the degree of capital utilization (and hence of changes in aggregate demand) on investment.

15. Keynes's own aggregate demand and aggregate supply curves, in \( F \) and \( N \) space, face the same problem.

REFERENCES


