Time to Ditch AD-AS?

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Abstract

Complementing previous, often ignored criticism of the AD-AS model - to the effect that this widely-used construction is inherently inconsistent - this note argues that a (rare) defence of the model by Peter Kennedy fails to convince and that the model does indeed, as alleged, give rise to confusing and misleading expositions of the working of the macroeconomy.

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Keywords

intermediate macroeconomics, AD-AS model

1. Introduction

Over the last thirty years or so the AD-AS model has become an established piece of analytical kit in intermediate macroeconomics textbooks. Although a number of critics, including Rao (1991), Barro (1994), Colander (1995), Nevile and Rao (1996), and Grieve (1998) have alleged that the construction is logically incoherent and unsuited to use as an expositional aid, their objections have been ignored by the majority of textbook authors. An exception however is Peter Kennedy who proposed (1998) a spirited defence of AD-AS. This brief note, focusing on the original and most commonly-encountered version of AD-AS (which derives AS from the neo-classical model of the labor market), challenges that defence.

2. The Issue

The charge – brought against the model by the critics cited above – is of its being internally inconsistent, giving rise to misleading and confusing expositions of the working of the macroeconomy. More specifically: the essence of the claim of internal inconsistency is that the AD curve has embedded in it at each price level a horizontal aggregate supply curve (reflecting its basis in ISLM with Hicks's horizontal supply curve) so that it does not make sense to introduce another aggregate supply curve.

This critique recognizes that the AD and AS curves correspond to two different, and incompatible, theories of output and employment. Neither curve is actually what it purports to be: *both* are, to use Colander's term, "aggregate equilibrium curves" showing functional relationships between

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the price level and the equilibrium level of output within the economy, *not* relationships between prices and quantities demanded or supplied. AD is not a demand curve, nor is AS a supply curve.

What is now known in the macro textbooks is the AD curve shows how, *ceteris paribus*, different levels of price imply different equilibrium levels of *output*. That the curve links prices and output should be clear from its derivation from the ISLM model. No one would dispute that ISLM, and behind it the Keynesian cross diagram, show the overall level of output and (by implication) the level of employment as determined by aggregate demand. Given that the textbook AD curve is introduced to show in terms of ISLM the consequences of price level changes, it naturally follows that AD also be understood as indicating a postulated relationship between the price level, via demand (including multiplier effects), and the overall level of *output*.

Likewise, the AS curve shows a relationship between the price level and equilibrium output. The positively-sloped AS curve is (originally and still usually) derived from a pre-Keynesian theory of employment and output whereby the impact of spending changes depends on the supply-side response: if money wages are sticky, or workers misinterpret price changes, money wages will not keep pace with prices, real wages will alter, and employment will correspondingly increase or decrease. If prices fall, and money wages do not, conditions of labor supply are seen as having altered with labor, in effect, asking for better terms of employment. In other words the labor supply curve shifts upward and employment offered falls. Correspondingly, with a rise in price, the labor supply curve moves downwards, and employment increases. Use of this (classical) model of the labor market, with employment determined at the point of intersection of Nd and Ns curves, implies that demand *must* match whatever volume of output, corresponding to the current level of employment, is offered on the market. For employment and output to alter in consequence of a change in spending, it is a necessary condition that terms of labor supply alter.

There is no way in which these two theories of the determination of output and employment – one built on Keynesian foundations, the other of a pre-Keynesian, “classical” character – can be put together in a coherent model. Barro and Grilli’s succinct verdict (1994) on the AD-AS construction is worth quoting:

> The main problem with the ADAS framework is that the various pieces of the analysis are contradictory. The AD curve reflects the underlying ISLM model . . . the AS curve assumes that producers (and workers) can sell their desired quantities at the going price, P. That is why the quantity supplied rises when P increases relative to P^e (the expected price level). This set-up is inconsistent with the Keynesian idea – present in the ISLM model and therefore in the AD curve – that producers and workers are constrained by aggregate demand in their ability to sell goods and services.

Before we consider the Kennedy defence let me briefly note some implications of the textbook use of AD-AS.

3. An Unusable Device

There can be no prospect of successfully using the AD-AS model as constructed to assist with the exposition of macro theory as it draws simultaneously on two rival and incompatible analyses of the determination of the level of activity within the economy. On the one hand, represented by AD, is the understanding that aggregate demand for output, depending on factors of confidence and expectations, is the key determinant of the extent to which the available labor force is employed. From that perspective employment, corresponding to the derived demand for labor, is not – as in traditional theory – determined at the point of intersection of the marginal product of labor and labor supply curves: with deficient demand labor can be “off its supply curve.” On the

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other hand, the theory underlying AS explains employment as being directly within the control of the workforce: full employment is attainable by adoption of the appropriate "wages policy." What matters here are the terms on which labor is willing to work.

Moseley (2010) points out how the inclusion together of these conflicting theories of output means that the conventional AD-AS diagram makes no sense. At any price level other than that at which AD and AS intersect, the two curves predict the simultaneous existence of different equilibrium levels of income. Even if both curves indicate equilibrium at the same P, Y combination, the correspondence of predictions is mere coincidence: the underlying explanations of how the economy comes to be where it is are at odds with each other.

4. Extremely Dirty Pedagogy

Despite the inbuilt incoherence of the standard AD-AS model, textbook writers seem content with it. Two illegitimate "dodges" are employed whereby authors find it possible to make use of the model. One is to treat the AD and AS curves as macro equivalents of micro demand and supply curves, showing not the equilibrium level of Y, but quantities demanded and supplied as functions of the price level, for instance Gordon (2006: 210-212), Froyen (2006: 171-172), Mankiw (2000: 363). The result, naturally, is that the explanations of adjustment processes attached to the diagrams do not tally with the true nature of the curves as aggregate equilibrium curves. The other popular "dodge" (see again the above texts, respectively pp. 220-221, 165-177, and 538) which allows the appearance of telling a coherent story while using an incoherent model is simply to drop – while disguising the omission – the Keynesian element altogether from the story and expound a purely neoclassical account of how imperfect supply-side responses to spending changes cause temporary variations in employment and output, emphasizing that, in the fullness of time, the economy can be expected to return automatically to the "natural" level of activity. This conception allows no place for the Keynesian explanation of the demand for labor as derived demand. Virtually nothing is left of the Keynes theory of effective demand, treatment of demand being reduced to the classical proposition that the price level naturally adjusts to establish whatever real value of the given volume of nominal expenditure matches output as determined in the labor market.

What is derived from this typical textbook exposition is the muddled message that wage flexibility ensures full employment ("classical" theory), and that unemployment is the outcome of wage inflexibility (allegedly the "Keynesian" theory). But remember that long ago Professor Pigou (1933: 296) (the *genuine* classical theory) attributed – *in exactly that way* – fluctuations in employment to stickiness of money wages:

> real wage-rates not merely fail to fall when the real demand for labour is falling, but actually rise; and in like manner, when the real demand for labour is expanding, real wage-rates fall.

It is characteristic however of contemporary macro exposition via AD-AS to identify this wage–stickiness explanation of unemployment as the essence of the *Keynesian* theory. Not only is Keynes's own deficient demand explanation lost from view, the Pigouvian theory – the specific object of attack in the *General Theory* – is itself described as being the Keynesian account.

5. Kennedy's Defence of AD-AS

Kennedy's defence of the model is ingenious, but – in my opinion – unpersuasive. Kennedy takes the line that the difficulties the critics have with AD-AS are the result of (a) their

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misunderstanding the nature of the model, and (b) their using it in an inappropriate manner. He holds that the model itself is unproblematic.

Kennedy reads AD and AS as being what he calls "market" (not "aggregate") "equilibrium curves" which indicate P, Y combinations consistent with equilibrium in the markets in question: the goods and asset markets in the case of AD and the labor market in the case of AS. In thus interpreting AD and AS, Kennedy not only puts aside all the theoretical underpinnings by which the curves are derived – as *aggregate* equilibrium curves – and treats them as depicting potential equilibria only in the specific markets involved, he requires also that the curves be used to describe only equilibrium states, and not be employed to tell dynamic stories about adjustment processes. Disequilibrium analysis is excluded to avoid the possibility of touching on incompatible accounts of supply conditions; no such difficulties will, it is supposed, be encountered *if AD-AS is employed only for the purposes of comparative statics analysis*.

He explains (1996: 190):

> [T]he AD supply story should not remain part of the AD curve once the AD curve is properly interpreted as an equilibrium curve. Any such stories must become part of the dynamic storytelling that one weaves around the ADAS diagram. Colander's complaint lies with the dynamics that many textbook expositions have chosen to attach to the AD-AS model, not with the ADAS model itself.

Kennedy thus views the AD-AS model as made up of the two market equilibrium curves, *and nothing else*. In other words Kennedy's response to the "two supply curves" allegation is to represent what would normally be regarded as analysis in terms of AD-AS as separable into two operations: (i) formal comparative statics, which treats the market equilibrium curves AD and AS simply as indicators of potential equilibrium conditions in particular markets, curves carrying no further implications; and (ii) informal "storytelling" via which out-of-equilibrium behavior of the economy can be discussed. Kennedy's defence appears to identify AD-AS simply with the former "core" element, the equilibrium model. Having on this basis, he believes, successfully detached the AD curve from the Hicksian supply curve of the ISLM model, Kennedy claims that no inconsistency is created if AD is taken along with AS in the same model.

What can I say? I simply do not accept that the theory of output and prices told in terms of AD-AS can legitimately be viewed as divisible into two separable elements, one consisting of a formal "model" and the other of less formal "storytelling." The fact is that the two elements, *together,* constitute a theory, an explanation which provides understanding of the phenomena in question.

The implication drawn merely from inspection of the AD-AS diagram – that an equilibrium level of output exists at a certain level of prices – does not answer the question posed by an inquirer as to how the market works to achieve that equilibrium; for a complete answer to be provided, the "stories" about how agents respond to the emergence of an excess of demand or supply must be included. By itself, without some dynamic complement, the static AD-AS diagram is hardly more than a dead skeleton; not a theory, only a bald statement of the existence of a solution, with nothing to say in terms of the model itself as to whether that solution is attainable or relevant. That sounds very limiting. Are we to understand that issues of disequilibrium cannot be discussed using the core model? Is a situation in which the economy gets "stuck" in a disequilibrium state – as with involuntary unemployment – outside the compass of the formal model? For my part I believe that it is the "whole package," the two components – what Kennedy calls the formal model *and* the dynamics he relegates to the storytelling accompaniment – that together, *as a unified exposition*, should be regarded as making up the relevant, issue-resolving theory, and judged together as such.

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Kennedy's defence of AD-AS is conceived of in peculiarly narrow terms, not of the whole substance of what most people would regard as the AD-AS analysis of the simultaneous determination of output and the price level. Note that, having adopted that strategy, Kennedy does not directly challenge the allegation that what is normally understood as the AD-AS model is inherently inconsistent; rather, by employing his chosen strategy, he tries to hide from it.

6. Kennedy's Model

Kennedy himself presents an individualistic version of AD-AS, significantly different from the usual textbook treatment. Notably, AD represents price as a function of output (rather than *vice versa*), which means that Kennedy avoids the usual problem of having AD and AS predicting different sets of values of output for the same price levels. But does Kennedy manage to deliver a coherent model? Let me (briefly) summarize his account.

The AD curve represents equilibrium in the goods and asset markets. There is no supply side or supply curve embedded in the AD curve. All it says is that if output (supply) were such and such, equilibrium in these two markets simultaneously would require such and such a price. To go beyond equilibrium and have a complete theory, we need a supply side. Here (so far) all we have to work with is ISLM; this probably requires that we invoke a horizontal supply curve to tell disequilibrium stories. (But remember, the horizontal supply curve is viewed as an "adjunct" to ISLM, not an inherent part of the model.) But once the model is enriched by moving into the AD-AS framework, we have the labor market to work with, and so it would be foolish to continue to use the same horizontal supply curve in the new context. Now bring in the AS curve. AS is an equilibrium curve which says, given a price, what level of output will give rise to equilibrium in the labor market.

In this model, the actual level of output will be as set, given the AS curve, by firms selecting, according to the current price, the profit-maximizing level of output. Demand will be whatever it is. Note this model does not predict two different levels of Y for a given P. If not initially consistent, demand and supply will be brought together by price-level changes.

While this seems an improvement on the usual textbook model, all is still not well. Even if the AD curve is read in general terms, dissociated from any specific foundations, as a "market equilibrium curve," it represents an essentially Keynesian theory of the determination of output and employment by real planned aggregate demand. Given labor supply conditions, want of effective demand will give rise to involuntary unemployment. Consider on the other hand the AS curve. Here we have a picture of continuous market clearing, with employment and output altering because of the inadequate response of labor to the prevailing changes in prices. This conception can recognize frictional or voluntary unemployment but cannot comprehend the Keynesian problem of demand-deficient involuntary unemployment.

The two components of the model present contradictory explanations of relationships between aggregate demand and employment. One indicates that aggregate demand for output, determined independently of supply conditions by certain factors, may cause the demand for labor to vary independently of the supply of labor; the other implies that demand for output – and hence demand for labor – is essentially a "tame" variable which accommodates itself to conditions of labor supply.

There is no room in Kennedy's AD-AS model for a non-clearing labor market and a conception of involuntary unemployment. That does not square with the implication deriving from AD via ISLM that real aggregate demand is an independent parameter of the system. But with the neoclassical labor market dominating the expository scene, the way is open to explain the essence of Keynes's theory as being the assumption of inflexible wages, which – as I have said – just happens to be how Professor Pigou viewed the matter.

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7. Conclusion

I conclude (1) that the AD-AS model, even the Kennedy version, is internally inconsistent, and (2) that misguided use of AD-AS by textbook authors can indeed result in "misleading and confusing expositions of the working of the macroeconomy."

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