RE-EVALUATING THE AS-AD MODEL AS A DEVICE FOR TEACHING INTERMEDIATE MACROECONOMICS *

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ABSTRACT
In the previous issue of this journal, we provided a survey of AS-AD models used in intermediate macroeconomic textbooks. That exercise was seen as preliminary to a careful consideration of criticisms made of the AS-AD model that suggest it should cease to be used as a device for teaching intermediate macroeconomics. In this paper, we undertake this investigation and examine a range of problems that have been identified with the AS-AD model. We argue that that while a number of these criticisms are valid, they may be overcome in ways that leave the model largely intact as a device for teaching the neoclassical explanation of price-output determination. One of these ways involves a new interpretation the model. We do, however, point out two more fundamental criticisms of the AS-AD model that have not featured in the literature, and argue that acceptance of these criticisms would require replacement of the neoclassical paradigm itself. Until a decision to do this is taken by the profession, we argue that a revised AS-AD model has a continuing role to play in teaching intermediate macroeconomics.

Keywords: Aggregate demand, aggregate supply, teaching.

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1. INTRODUCTION
In the previous issue of this journal, we conducted a survey of AS-AD models used in intermediate macroeconomic textbooks. That paper considered the structure of these models, examined their adjustment

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mechanisms, and compared their key features. We argued that teaching more than one version of the *AS-AD* model had the potential to better reflect to students the state of the economics discipline and to foster stronger critical skills, as students were presented with the challenge of comparing the different models. We noted however, that the *AS-AD* model had come under strong criticism for its treatment of aggregate demand, the presence of multiple and inconsistent theories of aggregate supply, the lack of corroboration by empirical observation, and for *impeding* rather than enhancing the development of students’ critical skills (see Barro, 1994, p.1; Fields & Hart, 1990; Geithman, 1994; and Colander, 1995). With the development of new frameworks such as those advanced by Taylor (2000) and Romer (2000) to replace the *AS-AD* model, a re-evaluation of its role in undergraduate education is thus timely.

The purpose of this paper, therefore, is to consider various critiques of the *AS-AD* model in order to determine whether the model continues to be a useful teaching device. We will undertake this exercise against the background of the survey carried out in our previous paper to which a number of references will be made.

The paper is structured as follows. In Section 2 we consider the objectives of intermediate macroeconomics courses since these objectives are likely to play an important role in deciding what should or should not be included in course curricula. Sections 3 to 6 then consider some of the key criticisms of the *AS-AD* model. In particular, Section 4 considers the issue of inconsistent theories of aggregate supply within the model, and a new interpretation of the model is offered to resolve this issue. Section 7 discusses two more fundamental criticisms not identified in this literature. Section 8 reflects on discussion in the previous sections and offers an overall re-evaluation of the *AS-AD* framework for undergraduate teaching, while Section 9 concludes.

### 2. PEDAGOGICAL OBJECTIVES OF INTERMEDIATE MACROECONOMICS COURSES

Siegfried *et al.* (1991, p.203) identify three objectives that intermediate macroeconomics courses can have in the wider context of undergraduate economics education: first, intermediate economics courses can show “how rigorous thinking can illuminate economic phenomena”; second, they can provide students with the tools needed for more advanced study of economics; and third, they can signal to
students what is entailed in this more advanced study. More broadly, Siegfried et al. (1991, pp.199-201) argue that economics education involves the development of problem-solving and creative skills to enable students to “think like economists” (cf. Becker 2000, p.109). The former entails an ability to use deductive reasoning and parsimonious models, and to apply a core set of fundamental principles which elaborate the processes of human economic decision-making and encapsulate key concepts such as tradeoffs, opportunity cost, constrained maximisation and efficiency. The latter involve identifying important economic issues and framing problems in ways that do not immediately occur to others.

While Siegfried et al. thus appear to conceive of economics education as training in the standard neoclassical framework, they do offer an important qualification to this conception. They argue that the development of “independent and critical thought” is also an important objective of a well-structured undergraduate education in economics and that teaching a particular paradigm as “the truth” in a “doctrinaire” fashion or as a form of “dogmatism” may actually work against this objective (Siegfried et al., 1991, p.212). Moseley, Gunn & Georges (1991, pp.235-236) place particular emphasis on this point, arguing that teaching multiple theories and examining the controversies which emerge from multiple perspectives explicitly develops critical and independent thinking in students. When students gain experience in seeing issues from more than one point of view, when they are required to identify the points at which alternative perspectives differ from one another, and when they learn how to evaluate such perspectives from the stance of empirical corroboration, explanatory scope and logical coherence, their critical abilities as economists are greatly enhanced. Froyen (1996, p.113) appears to share this perspective, as does Mankiw (2003, p.xxiv).

These observations immediately suggest ways in which teaching the range of AS-AD models considered in Docherty & Tse (2009) may be helpful for producing well-trained economics graduates. The level of rigour and complexity involved in the models considered have the potential to help undergraduates at the intermediate level to learn how macroeconomic arguments may be structured. These models also do this in a way that highlights the possibility of deductions about the impact of changes in economic conditions and the way in which these changes could come about. Teaching a range of AS-AD models also
shows students how macroeconomic phenomena can be understood from more than one point of view and could operate in various ways. Thus lower output arising from a negative demand shock can be seen in one of two ways: either it results from rigid money wages that lead to higher real wages in the face of reduced prices, and hence a lower optimal level of labour in production (see Docherty & Tse, 2009, pp.60-62); or it results from a response by firms in cutting output to reduce excess supply after a negative demand shock which then increases unemployment and causes a reduction in money and real wages as a result of the reduced output (see Docherty & Tse, 2009, pp.71-72). The existence of more than one plausible way in which the economy could operate in the face of a demand shock thus provides the opportunity for students to think more deeply about how these models suggest the economy will respond to such a shock and which is most plausible in terms of logical consistency, scope of argument and comparison with empirical data as suggested by Moseley et al. (1991). Teaching the AS-AD framework, and teaching more than one version of it, thus expands the number of tools students have available to conduct macroeconomic analysis and enhances the depth and critical stance they are able to adopt in the application of those tools.

As argued earlier, however, a number of economists have argued that the AS-AD framework is not very useful for achieving these objectives. The main criticisms focus on its treatment of aggregate demand, the presence of dual, inconsistent theories of aggregate supply within the model, its lack of corroboration with empirical observation, and its negative impact on the development of undergraduate analytical skills. The following sections consider each of these criticisms in turn.

3. PROBLEMS WITH AGGREGATE DEMAND

Hansen, McCormick & Rives (1985, p.289ff.) suggest four sets of problems with the treatment of aggregate demand (AD) in the AS-AD model. The first is that exponents of the AS-AD model are not careful enough to distinguish between the construction of single-product demand curves and the AD curve which involves a completely different set of forces. The second is that textbook treatments frequently imply that the downward sloping AD curve requires the average price level and total expenditure (in nominal terms) to be inversely related while it is, in fact, entirely possible for downward sloping AD curves to be associated with positively related average
prices and total expenditure. The third is that textbooks are not usually clear enough on the factors being held constant in the treatment of aggregate demand especially compared to standard treatments of demand at the microeconomic level. The fourth focuses on the various channels by which changes in the average price level affect the level of aggregate demand in the standard textbook treatment.

Hansen et al. break this fourth point into a number of problems with the channels by which the average price level can affect aggregate demand. The most important relates to the wealth effect by which variations in the real value of wealth caused by changes in the price level induce changes in consumption spending. Hansen et al. point out that if prices rise and wealth holders are made worse off so that their consumption spending declines, counterparties to the debt contracts associated with this wealth will be better off, and their spending will increase (cf. Colander, 1995, p.177). Thus the net effect of the price change via the wealth channel will depend on the relative spending propensities of wealth holders versus debtor counterparties with the possibility that offsetting effects make the importance of this channel quite small. Hansen et al. further argue that empirical estimates of the wealth effect reinforce this conclusion.

Another issue identified by Hansen et al. with the transmission of price changes to aggregate demand relates to the impact that entrepreneurial expectations can have on the standard Keynes effect (cf. Docherty & Tse, 2009, p.55). Even though a fall in prices can stimulate aggregate demand by increasing the real money supply and reducing interest rates, depressed entrepreneurial expectations can significantly reduce the size of this effect according to Hansen et al.1

The final critical point made by Hansen et al. with respect to the transmission of price effects to aggregate demand relates to a "bracket creep" argument. Price increases can inflate nominal incomes, pushing them into higher tax brackets, reducing disposable incomes, and causing consumption spending to fall. Hansen et al. argue that the size of this effect depends on what the government does with increased tax revenues, and that increased government spending may completely offset this effect.

It is worth pointing out that Hansen et al. largely accept the core features of the Keynes effect and the international price level channel

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1 Hansen et al. (1985, p.290) cite chapters 11 and 12 of Keynes’ General Theory in support of this argument.
by which price rises change the real exchange rate and net exports (see Docherty & Tse, 2009, p.55). They are, however, very critical of the approach based on the equation of exchange (see Docherty & Tse, 2009, p.56) arguing that it is essentially a tautology depending on the “extreme assumptions” of a fixed velocity of circulation and a constant money supply in the face of changes to the price level, providing no explanation of how changes are transmitted from the price level to aggregate demand.

In evaluating the impact of these criticisms, it must be said that while Hansen et al. make a number of points that should be borne in mind when teaching the model, their critique does nothing to undermine the model’s essential integrity. It is true that the aggregate demand curve is qualitatively different from single-good microeconomic demand curves and this point could be emphasised more strongly in the textbooks. It is also true that it is possible for downward sloping $AD$ curves to be consistent with a positive relationship between the average price level and total nominal expenditures,\(^2\) but the key relationship of interest in this analysis is usually that between changes in the average price level and real expenditures, and a negative relationship between these variables is implied by a downward sloping $AD$ curve. Their point about the wealth effect is well taken but this leaves three other channels by which the downward sloping $AD$ curve operates. Their most penetrating point relates to the role of expectations in determining investment spending but given the precarious nature of expectations formation, the effect they outline can mostly be relied upon in a situation of significant economic crisis which may well not characterise run-of-the-mill economic fluctuations. It thus fails to undermine the standard aggregate demand curve although we return to this point later in the paper.

\(^2\) Nominal expenditures are given by $PY$, where $Y$ is real spending and $P$ is the average price level. A positive relationship between the average price level and nominal spending implies that $d(PY)/dP > 0$. This may be written as $(YdP + PdY)/dP > 0$ or $Y/P > -(dY/dP)$. A negatively sloped $AD$ curve implies that $dY/dP < 0$. Imposing this on the previous expression implies that $Y/P > dY/dP \geq 0$. Thus a negatively sloped $AD$ curve and a positive relation between the average price level and total nominal expenditures is possible provided $Y/P > dY/dP$ or $(P/Y) \cdot (dY/dP) < 1$. This last condition says that the elasticity of real output with respect to the average price level must be less than unity which is the condition Hansen et al. (1985, p.289) specify for their relation.
The upshot of Hansen et al.’s analysis is that it generates a number of qualifications that are worth making about the \textit{AS-AD} model but it does not alter the fundamental validity of the model as a teaching tool for intermediate macroeconomics.

4. INCONSISTENT TREATMENT OF AGGREGATE SUPPLY

A potentially more serious issue for the \textit{AS-AD} model is raised by Fields & Hart (1990), Rao (1991) and Colander (1995). These authors point out that the standard derivation of the \textit{AS-AD} model involves \textit{two} theories of aggregate supply: the first, a Keynesian theory underlying the multiplier analysis associated with the construction of the \textit{AD} curve; the second, a labour market-based account built into the various versions of the \textit{AS} curve considered in Docherty & Tse (2009, pp.56-75). In the first of these theories, supply accommodates demand and causes diminishing feedback effects on demand summarised by the multiplier. The assumption is that this accommodation does not depend on the price level although the \textit{AD} curve defines various equilibrium levels of income given these effects for different values of the average price level. In the second, supply is the result of interaction between profit maximising decisions by firms that determine the optimal amount of labour to be employed in production, and utility maximising decisions by workers that determine how much labour is made available for the production process. Since the price level affects both of these sets of decisions, it has an effect on the resulting level of supply. The model thus incorporates two different sets of assumptions about the determination of aggregate supply, and these sets of assumptions are inconsistent with each other.

Rao (1991, p.271) characterises this inconsistency in terms of Hicks’ distinction between fix-price and flex-price markets. The \textit{AD} curve is usually constructed from the \textit{IS/LM} model in which the goods market is treated as a fix-price market where adjustments occur by variations in quantity (output). But in constructing the \textit{AS} curve, the output market is treated as a flex-price market and adjustments in the average price level are supposed to bring the market for output into equilibrium. The \textit{AS-AD} model thus treats the output market as being simultaneously a fix-price and flex-price market and this is problematic.

Fields & Hart (1990, pp.679ff) have proposed a solution to this problem according to which aggregate supply, \(Y^s\), would be used in the formulation of aggregate demand as follows:
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\[ AD = \bar{C} + c(1 - t)Y^s + [\bar{I} - bi] + \bar{G} \]  \hspace{1cm} (1)

\[ Y^s = AD \]  \hspace{1cm} (2)

Where \( Y^s \) is the level of income given by the aggregate supply relation in the AS-AD model, \( AD \) is aggregate demand, \( \bar{C} \) is autonomous consumption spending, \( c \) is the marginal propensity to consume, \( t \) is the tax rate, \( \bar{I} \) is autonomous investment spending, \( i \) is the interest rate, and \( \bar{G} \) is autonomous government spending. The result of this approach would be to introduce interdependence into the analysis that would operate between the aggregate demand and aggregate supply curves. Any change in income, apart from those directly associated with variations in the price level, would thus shift the aggregate demand curve itself. This they argue would revolutionise the framework but enable it to be retained.

An alternative approach is suggested by Colander (1995, pp.181-182) which involves distinguishing the AS-AD framework from standard Keynesian analysis rather than attempting to reconcile it. This could be achieved by removing income as an argument from the consumption function and replacing it with the interest rate. This would continue to leave income, however, as an argument in the demand for money expression underlying the LM curve, which would suggest continued interdependence between aggregate demand and aggregate supply. Colander also suggests that revisions be made to the production function to include “co-ordination technology” that allows the institutional framework and policy apparatus to modify this relationship between aggregate demand and supply.

We suggest the possibility of a modification to this approach. Since income in the money demand equation reflects transactions demand, the appropriate argument is not actual income at all but planned expenditure. Hence instead of Fields & Hart’s \( Y^s \) variable, we suggest that it is more appropriate to use \( AD \) itself in the money demand equation. Combining Colander’s suggested modifications to the \( AD \) function with this suggestion for the money demand function would transform the expression for goods market and money market equilibrium from the standard specification (see Docherty & Tse, 2009, p.54) into the following:

\[ AD = [\bar{C} - ji] + [\bar{I} - bi] + \bar{G} = \bar{A} - (j + b) \cdot i \]  \hspace{1cm} (3)
where the new parameter $j$ represents the interest-sensitivity of consumption spending and $\bar{A}$ represents all autonomous forms of spending. These expressions completely omit $Y$ as a variable from the $AD$ part of the $AS$-$AD$ model, hence dealing with the “dual theories of supply” problem in a way that also avoids the complexities of demand-supply interdependence. Rearranging (4) to express the interest rate, and substituting this into (3), gives a revised expression for the $AD$ curve as follows (cf. Docherty & Tse, 2009, p. 55):

$$AD = \frac{(h\bar{A})}{(h + k[j + b])} + \frac{(j + b)}{(h + k[j + b])} \cdot \frac{M}{P} \quad (5)$$

It must be remembered, however, that there are no longer any Keynesian dimensions to an $AD$-$AS$ framework that employs this expression for the $AD$ curve although the model can now be interpreted as discussed in Docherty & Tse (2009).

There may also be a solution to the problem that simply reinterprets the existing structure of the $AS$-$AD$ framework and attempts to build in a relationship with the $IS$-$LM$ model. The overall problem of having two theories of supply is linked to an issue we raised in our earlier paper that care must be taken to understand what is being represented on the horizontal axis of the $AD$ curve (see Docherty & Tse, 2009, p.55). We described this variable as the level of output at which the goods market is in equilibrium, fully reflecting induced supply responses to changes in aggregate demand. As Rao indicates, this determination essentially happens in an $IS$-$LM$ world so that while the horizontal axis indicates the level of aggregate demand at a short run equilibrium, this level of demand assumes that firms have responded to the initial increase in demand by supplying output, leading to further changes in demand until the equilibrium is reached. The variable on the horizontal axis is, therefore, best understood as the level of output at which equilibrium is reached in this world rather than simply as the level of aggregate demand somehow independent of supply decisions. As Rao argues, this analysis assumes an output market of the fix-price variety.

When we move, however, from the $IS$-$LM$ world into the $AS$-$AD$ world, we may allow for qualitatively different types of supply decisions.
to be made within different time frames. Consider Figure 1. If we assume that the current price level is $P_1$, then at this price, let firms provide short run accommodation of supply to demand so that demand and output are at a short run equilibrium at $Y_1$ on the $AD$ curve. That is, actual supply is given at this level. But it is also true that firms do not find this level of output profitable and would prefer to produce at the lower level of $Y_2$. The question is then, how to manage this disequilibrium within the model. One possibility is that firms contemplate a continuation of supply at $Y_1$. But once we move out of the “short-run” (defined as the period relevant to decisions within the $IS/LM$ framework with fixed prices), such continuation would require a price level of $P_2$ from the perspective of firms rather than $P_1$. Firms would thus begin to raise their prices towards $P_2$ although they may well do this in a series of discrete and tentative changes rather than with a single adjustment. They might thus set the slightly higher price of $P_3$ as a first step in adjusting price after a suitable period of time, and a new short run equilibrium would be established at this price level with aggregate demand revised in the light of the adjusted price level. In Figure 1, the level of output associated with this new short run equilibrium would be $Y_3$. Firms would, however, still not regard this level of output as profitable, preferring to produce $Y_4$ and would, therefore, consider further price adjustments after the passage of sufficient time. Provided there were no changes in the underlying parameters of the model, this process
Figure 2: Wider Implications of Short Run Equilibrium in the AS-AD Model

would eventually establish a “medium run” equilibrium at point $E$.\(^3\) Here the short run accommodation of supply to demand specified by the $AD$ curve would be consistent with the profit maximising supply decisions of neoclassical firms.

This distinction between actual output, read from the aggregate demand curve, and desired output, read from the aggregate supply curve, raises a question about what is happening in the labour market in such a situation. We may consider this issue in terms of the four quadrant structure used in Docherty & Tse (2009). Figure 2 outlines this structure and shows the situation described earlier from Figure 1.

\(^3\) Here the “medium run” refers to a period within which money wages remain fixed although prices may vary.
in Panel (d). We assume that the price level is initially $P_1$. At this price level, output is $Y_1$, read from the aggregate demand curve, but firms prefer to supply $Y_2$ as before.

We will use the term “short run” to mean the time frame that applies within the IS/LM model with fixed prices, and, as previously, we will use the term “medium run” to refer to the period in the AS-AD model within which prices may be changed but with fixed money wages. In Docherty & Tse (2009), we referred to this as the “short run” but this now needs to be redefined given our more explicit attention to the relationship between the AS-AD model and the IS/LM model.

Given that both the price level and the money wage are fixed in the short run, the real wage is also fixed within this time frame. At a price level of $P_1$, and with a money wage of $W_1$, the real wage is given in panel (c) of Figure 2 at $w_1$. In the short run, we also assume that firms meet demand so that output is at $Y_1$ when the price level is $P_1$. Given the production function in panel (b), output of $Y_1$ requires a labour force of $N_1$, and this constitutes both labour demand and employment in the short run. In the labour market, shown in panel (a), this combination of employment at $N_1$ and a real wage of $w_1$, defines point $A$ which is off both the labour supply curve and the labour demand curve. Short run equilibrium is thus very messy in the labour market given fixed prices and money wages but from a neoclassical perspective this is hardly surprising since the adjustment of two important market prices are not available to change the real wage and thus clear the market.

However, with the passage of sufficient time, firms are able to raise the price level, as suggested above, and this allows the economy to move to a new short run equilibrium. If the price level is reset to $P^E$, aggregate supply and aggregate demand would be equal in panel (d) with output at $Y^E$ and this would correspond to point $B$ in panel (a). The economy is now at what we have defined as a “medium run” equilibrium which corresponds to being on the labour demand curve. Were firms to adjust prices to $P^E$ more slowly, the new short run equilibrium would not initially coincide with the medium run equality of aggregate supply and aggregate demand, and the economy would be somewhere on the adjustment path in panel (a) between points $A$ and $B$ indicated by the arrow. Once the labour market is at point $B$, however, all of the AS-AD analysis considered in Docherty & Tse
(2009) comes into play. According to that analysis, the economy would only reach labour market equilibrium at point $C$ once the real wage had adjusted via changes in the money wage, and this implies that the aggregate supply and aggregate demand curves in panel (d) intersect at potential output, $Y^*$. This is what we have defined as “long run” equilibrium within the framework.

The most troubling aspect of this interpretation of the $AS-AD$ apparatus is the messy nature of the short run situation in the labour market. But accepting the neoclassical conception of the world, this situation makes some sense. Blinder (1991) reports interview evidence from a range of firms in the north eastern United States suggesting that they refrain from varying prices after a supply or demand shock (i.e. after some event that causes disequilibrium in their markets and thus in the aggregate situation) for average periods of around one quarter. Instead, they engage in a range of ad hoc responses that include being more accommodating to their customers on supply (Blinder, 1991, p.95). If wage contracts are of the order of years, and firms adjust prices at intervals not more frequent than one quarter, accommodating demand between adjustments, the outcome in terms of the neoclassical labour market is going to be something very similar to that shown in panel (a) of Figure 2.

Such an interpretation of adjustment dynamics requires a slight modification to that set out in Docherty & Tse (2009). There we interpreted the $AS$ curve as indicating the actual level of output supplied by firms at a particular price level rather than simply their desired level of output at that price. The variable on the horizontal axis of the $AD$ curve was the level of output at which $AD$ was consistent with induced supply if this supply was assumed to be forthcoming. This level of output thus took on a provisional nature since actual supply might well be different from this level but we assumed that it was known and provided a reasonable basis for the planning of expenditures. We then assumed that firms responded to the difference between their actual supply decisions and the level of output at which aggregate demand was consistent with accommodating supply decisions by attempting to match demand. This required adjustments to prices of exactly the same type as outlined above until equilibrium between aggregate supply and aggregate demand was achieved. Altering the interpretation of the horizontal axis for aggregate supply to desired aggregate supply, and
allowing actual supply to be given by the horizontal value of aggregate demand allows the same dynamics to operate as those described in Docherty & Tse (2009) but, we suggest, with greater veracity, and in a way that reconciles the two theories of aggregate supply.

The charge that the AS-AD model contains two approaches to aggregate supply is thus correct. The critics are also correct in arguing that this fact is downplayed and treated poorly in standard intermediate textbooks. But a number of solutions to this problem are available that would not require the model to cease being used as a device for teaching intermediate macro. We will have more to say later about which of these solutions we regard as preferable but, before addressing this point, we consider the remaining problems raised with the AS-AD model.

5. EMPIRICAL VALIDITY OF AS-AD DYNAMICS

A third general criticism of the AS-AD model is that its adjustment dynamics are not corroborated by empirical observation. Colander (1995, pp.176-178) argues that the dynamics associated with a negative demand shock in the case of perfectly flexible wages and prices are problematic for two key reasons. The first is that they require falling prices which have not been observed in the United States since the 1930s and the second is that adjustment to a new, long run equilibrium occurs entirely through the impact of reduced prices on the money supply and wealth, and that these effects are too weak to account for the full extent of the required adjustment. Colander’s first reason is echoed by Barro (1994, p.4) and Mankiw (2003, p.351) who focus specifically on the sticky wage version of the AS-AD model. Barro and Mankiw both dismiss this particular version of the model because its prediction of counter-cyclical real wages is inconsistent with empirical evidence that real wages behave pro-cyclically.

This empirical argument for rejecting the AS-AD model as a vehicle for teaching is, however, dubious for a number of reasons. Firstly, while deflation may indeed have been a rare occurrence in the U.S. since the 1930s, its mild recurrence in Japan during the 1990s indicates that it remains a real possibility for developed economic systems when faced with severe demand shocks (Kuttner & Posen, 2001, p.101-102).
Secondly, one must bear in mind at this point, the objectives of intermediate macroeconomics courses outlined by Siegfried et al. (1991) considered in Section 2 above. These objectives were to show “how rigorous thinking can illuminate economic phenomena”, to provide students with the tools needed for more advanced study of economics, and to signal to students what will be entailed in this more advanced study. It is consistent with these objectives that students should be developing their understanding of macroeconomic frameworks in the intermediate course rather than necessarily perfecting them. The AS-AD model is clearly a static framework that abstracts from the fact that real economies grow in real time. Siegfried et al. (1991, p.200) stress the necessity of abstraction in allowing economic theorising to focus on particular problems in particular contexts, and the need for students to learn to understand and manage this abstraction. Abstraction from growth in the AS-AD model, allows the instructor to focus on the underlying forces of price and output determination. Thus when the framework predicts that the price level will fall in the face of negative demand shocks, this implies, in the context of the model’s abstraction from growth, that the price level will fall relative to its level had the demand shock not occurred. In an actual, growing economy, this may not translate into a fall in the absolute price level but into a slowing of the rate at which observed prices are rising. The instructor needs to make this abstraction clear and to help students develop the ability to see what the model can and cannot say about particular aspects of reality given its level of abstraction.

A third problem with the empirical argument for rejecting the AS-AD model is that it misrepresents both the model and important aspects of the empirical evidence. Barro (1994, p.4) and Mankiw (2003, p.351), for example, both argue that the prediction of the fixed money wage version of the model that real wages should move counter-cyclically is inconsistent with empirical evidence that real wages in fact move pro-cyclically. But it is neither true that the fixed money wage version of the model predicts that real wages will always move counter-cyclically nor that the empirical evidence indicates that real wages always move pro-cyclically. Consideration of the implied adjustment dynamics of the fixed money wage model in Docherty & Tse (2009, pp.60-63) indicated that real wages should indeed move counter-cyclically when the economy is hit by a negative demand
shock but that they should move pro-cyclically when hit by a negative supply shock. This is precisely what the empirical evidence suggests according to Sumner & Silver (1989, p.707). They argue that while a number of studies have found evidence of pro-cyclical real wage behaviour (see, for example, Bils, 1985), other studies have found the opposite effect (see, for example, Neftci, 1978 and Sargent, 1978; cf. Russell & Tease, 1991), and some studies have found real wages and employment to be broadly independent (see, for example, Geary & Kennan, 1982).

In addition, Docherty & Tse (2009, p.76) point out that some variants of the AS-AD model predict consistent pro-cyclical behaviour of real wages so that it is likely that some version of the model matches the particular aspects of empirical evidence one wishes to emphasise. Either way, rejection of the model is not warranted by the empirical evidence on real wages.

A final point on this issue is also that the fixed money wage version of the AS-AD model follows in a straightforward manner from the logic of the neoclassical paradigm. Outlining the model and subjecting it to empirical scrutiny is a worthwhile learning exercise for students, whatever the outcome. Here, it is worth distinguishing between the approach of Mankiw (2003), who includes the fixed money wage version in his exposition of the AS-AD framework and then evaluates it against the evidence as suggested, and that of Barro (1994), who appears to be more concerned with teaching what Siegfried et al (1991) earlier called “the truth” and wishes to banish the model from the classroom on this account.

Colander’s (1995) argument that effects from reduced prices on the money supply and wealth are too weak to account for adjustment to a new, long run equilibrium are important, but here we distinguish again between criticisms of the fundamental logic of neoclassical macroeconomic frameworks and problems of whether pedagogical frameworks properly reflect the underlying theory. We suggest that the issue of the size of interest rate effects properly belongs to the former rather than simply to the latter. As with one or two other matters that have been raised throughout the paper, we will return to this issue in the penultimate section.

Our overall evaluation of the “empirical validity” criticism, therefore, is that it fails to undermine the AS-AD model as a teaching device. It does, however, highlight an important matter for the
development of students’ critical skills that theories should be subjected to empirical scrutiny, and this we fully endorse. We consider the issue of critical skill formation further in the following section.

6. IMPEDIMENTS TO CRITICAL SKILL FORMATION

Geithman (1994, pp.475, 477) offers a further criticism of the AS-AD model that it impedes rather than enhances student’s critical skill formation. He argues that “the AS-AD framework seems ideally designed to prevent learning by concealing the logic behind all of the macro processes . . . [it] offers textual neatness and expository convenience at the cost of impeding the development of student analytical abilities”. His chief justification for this conclusion is the level of abstraction and complexity of the model and the demands it, therefore, places on students to understand how it functions (Geithman, 1994, p.476).

Our perspective is very different. Giving students a framework within which to understand the workings of an extremely complex reality empowers them to undertake independent analysis rather than impedes them. That framework must be complex enough to capture the key forces influencing the variables of interest but must of necessity abstract from much of the complexity that characterises reality. Given the extent to which it reflects the key features of the dominant economic paradigm, we think that the AS-AD framework, handled properly, can perform this function. This is not to say that students should not question the framework. We have argued the opposite. This is not to say that students should not compare the framework with empirical observation. We have also challenged this idea. And finally, this is not to say that intermediate macroeconomics students should not be exposed to other frameworks that make alternative assumptions about how real economic systems operate. We suggest below that they should have such exposure. But subject to the concessions we have made regarding the criticisms considered above, we believe that the AS-AD framework, used with care and intelligence, has considerable value in teaching students to think systematically and critically about the macroeconomy.

7. TWO ADDITIONAL CRITICISMS

There are two criticisms of the AS-AD model not considered in the literature cited above. The first arises from the capital debates of the
1960s which raises theoretical questions about the possibility of constructing a downward sloping investment demand function (see Harcourt, 1972). Empirical support for the outcome of these debates from studies such as Fazzari, Hubbard & Petersen (1988) and, more recently, Chirinko, Fazzari & Meyer (1999) suggests that the effect of variations in the cost of capital on investment spending are extremely weak. This is consistent with Colander’s (1995, p.177) argument regarding the weakness of interest rate effects in generating changes in output from movements in the average price level.

This potentially more serious criticism of the *AS-AD* model would undermine any impact of variations in the price level on aggregate demand through changes in interest rates and would make the *AD* curve vertical in price-output space. It also raises questions about the aggregate production function used in the *AS-AD* model as well as the labour market analysis used in the derivation of the fixed money wage *AS* curve that would leave the shape of this curve highly uncertain. One of the causes of such a weakness in the standard channels by which price level changes are transmitted to output may be that identified earlier in the paper by Hansen, McCormick & Rives (1985, p.289) which focused on the importance of entrepreneurial expectations, although our judgment is that this is particularly relevant to severe downturns and economic crises.

A second additional criticism is that the money supply is better conceived as *endogenous* rather than exogenous as it is in the *AS-AD* framework (see Kaldor, 1986; and Moore, 1988). Variations in the price level do not necessarily alter the rate of interest when the money supply is endogenous, leading again to a vertical *AD* curve. While alternative neoclassical teaching frameworks such as those suggested by Taylor (2000) and Romer (2000) do contain endogenous money in the short run, the Taylor rules employed in those models effectively require central banks to adjust the volume of money in response to excessive inflation and this makes money exogenous in the long run. Money that is genuinely endogenous generates price level indeterminacy in neoclassical systems and disrupts the mechanism by which these systems gravitate to “long run”, full employment equilibrium (see McCallum, 1986; and Docherty, 2009).

These additional criticisms again raise the distinction between problems with the logic of neoclassical theory itself and problems with how that theory is taught. Since these criticisms fall into the
former category, we suggest that they are not reasons for rejecting the AS-AD model as a teaching device unless and until the neoclassical framework is also discarded because of its logical difficulties. This issue is discussed further in the next section.

8. A RE-EVALUATION OF THE AS-AD MODEL
As suggested at the beginning of the paper, the criticisms considered above have led some economists to argue that the AS-AD model should be removed from the syllabi of intermediate macroeconomics courses and replaced with other approaches. A range of minor criticisms has been considered that raise points we think should be kept in mind when teaching the AS-AD model (such as being clear about the difference between single-product demand curves and aggregate demand curves) but these points hardly lead to the conclusion that the AS-AD model should be retired. The most challenging of the criticisms we have considered are the “dual theories of supply” criticism and the charge that the model’s adjustment dynamics are not corroborated by empirical evidence. Careful examination of these issues, however, indicates that they need not lead to the conclusion that the AS-AD model’s time has come to an end within a primarily neoclassical education.

The dual theories of supply problem may be resolved in a number of ways. Fields & Hart’s (1990) solution is to use the value of output from the aggregate supply function in equations for aggregate demand, thus bringing both theories of supply together in a way that introduces interdependence between aggregate supply and aggregate demand into the model. Colander’s (1995) alternative is to remove Keynesian multiplier theory from the aggregate demand equation although interdependence would persist via the demand for money equation. We have suggested a modified version of this approach that breaks this interdependence and allows the standard treatment of the model to be used although now without Keynesian implications. Alternatively, we have suggested above that closer attention could be paid to the nature of time within the AS-AD model, to the proper allocation of two qualitatively different types of supply decisions to their appropriate time frames, and to articulation of adjustment dynamics which more carefully define the variables on the horizontal axis of both the AS and AD curves. This approach maintains the two theories of aggregate supply but manages them in a consistent way within the model, and allows the standard operation of the model to be
used with modifications to how the adjustment dynamics are interpreted. To our knowledge, this represents a new way of interpreting the *AS-AD* model.

*Any* of these approaches, however, deal with the “dual theories of supply” problem without having to completely jettison the *AS-AD* framework. Which approach is chosen largely depends on one’s attitude towards Keynesian theory and to debate within the economics profession. We agree with Froyen’s (1996) view that comparison of the neoclassical and Keynesian approaches to macroeconomics provides a useful organising theme for intermediate macroeconomics courses, especially in the light of the Global Financial Crisis. Separation of a purely neoclassical *AS-AD* model taught alongside a Keynesian version of the model (which would have to be developed), with both tested against empirical observation would represent an excellent enhancement of intermediate macro courses in our view. Given the dominance of the neoclassical paradigm, however, such a separation may lead to the Keynesian view slipping from sight in undergraduate training and in this respect maintaining a Keynesian element to the main teaching framework would be an advantage from our perspective. Either approach, however, has a constructive role for the *AS-AD* model.

On the question of empirical consistency, the *particular* issues of empirical corroboration raised in the literature appear not to hold up on close examination. This is where different versions of the *AS-AD* model become important. As argued above, neither the claim that the *AS-AD* model predicts counter-cyclical real wages nor that real wages are in fact pro-cyclical are unambiguously true. The real wage in the sticky-wage version of the *AS-AD* model is indeed counter-cyclical for demand shocks but pro-cyclical for supply shocks. In other versions of the model it is pro-cyclical for both types of shock. The empirical evidence is also more problematic than the literature suggests. The best interpretation of this evidence appears to be that real wages are counter-cyclical for supply shocks but pro-cyclical for demand shocks and this fits the predictions of the sticky-wage *AS-AD* model quite well. It is, therefore, hard to reject the *AS-AD* model as a teaching device on the particular empirical grounds specified in the literature.

We have argued that two criticisms could be made that would justify retirement of the *AS-AD* framework. These are the inability on theoretical grounds to construct a downward sloping demand for
investment schedule and the existence of endogenous money. But these criticisms go to the heart of neoclassical economics itself, not simply to problems with a pedagogical framework used to teach this school of economics. One of our central premises is that while neoclassical economics continues to be the dominant mode of thinking used by economists, it is acceptable to teach this paradigm to undergraduates using frameworks that properly reflect its key features. In our view, the AS-AD framework continues to have a role to play in this respect.

9. CONCLUSION
This paper has considered various critiques of the AS-AD model in order to determine whether the model continues to be a useful device for teaching intermediate macroeconomics. It has been argued that while a number of the criticisms made of the AS-AD model are valid and need to be addressed, this can be done without jettisoning the model altogether. We strongly advocate asking challenging questions of the AS-AD framework in the classroom and encouraging students to do the same. But we suggest that part of this process involves teaching a range of AS-AD models and asking students to note the different assumptions of these models and to be aware of model limitations. Another part of the process involves comparing various versions of the model with empirical data. What the process does not involve, at least at this stage in the development of the economics discipline, is teaching a particular framework as “the truth”, since the discipline is not yet agreed on what constitutes “the truth”. In this respect, we endorse the preliminary conclusion we reached in Docherty & Tse (2009). If the objectives of undergraduate economics programs are anything like those outlined by Siegfried et al. (1991) and include the development of students’ abilities to think rigorously and critically, we believe that a strong case can be made for the intelligent and careful use of the AS-AD framework in pursuing these pedagogical objectives, at least for the time being.

REFERENCES


