WHEN AGGREGATE DEMAND IS NOT AGGREGATE DEMAND:
A PEDAGOGICAL NOTE ON THE AGGREGATE
DEMAND AND SUPPLY MODEL

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I. INTRODUCTION

The aggregate demand and supply model (AD/AS) was quickly incorporated into almost all principles and intermediate level textbooks during the 1980s. This is because it has a significant pedagogical advantage in that students are quickly able to do simple macroeconomic analysis and find macroeconomic equilibria for the price level and real national income. One very important reason for this ease of handling is that AD/AS curves are made analogous to the microeconomic supply and demand curves previously taught. As instructors, we teach that the micro and macro curves are quite different. After all, behind each point on the AD curve is an equilibrium in the circular flow model and behind the AS curve are positions of labor market equilibrium or, in some cases, a variant of the Phillips curve. With these appropriate caveats, the AD/AS analysis does seem to offer a substantial pedagogical improvement in macroeconomics. However, this advantage is gained at the expense of considerable confusion and misunderstanding which begins in introductory macro courses and persists even among professional economists.

This paper is neither a critique nor a defense of any macroeconomic theory. The purpose of this paper is to show that the microeconomic analogy fails when the macroeconomy is in disequilibrium. Our quarrel is not with the underlying model. Rather, we object to certain pedagogical short-comings of the model as it is typically presented to students. The microeconomic analogy is a poor analogy because (1) it generates a semantic confusion (which leads to a conceptual confusion) between aggregate demand and aggregate expenditure; (2) it disregards and violates an important macroeconomic concept: the income-output identity; (3) it leads students into a misunderstanding of real world macroeconomic adjustment and (4) it makes our macro models appear inconsistent even when they are just different facets of the same model. Our contention is that the AD/AS analysis, rather than being an improvement in pedagogy, actually serves as an indication of just how bad our pedagogy is.

While we are suggesting that there are certain pedagogical problems rooted in semantics, others have suggested that these problems are inherent in the model and its theoretical underpinning (e.g. Weintraub, 1980; Colander, 1991). This paper will not enter into a debate concerning macroeconomic theory. However, the same semantic confusion which we believe gets in the way of student learning may have also gotten in the way of economists understanding each other. However, the extent to which the confusion and debate is more than merely semantic is beyond the scope of the present work.

This paper will proceed by recounting a typical AD/AS disequilibrium explanation followed by a discussion of the problems in this explanation. While many of these criticisms have been previously mentioned in the literature (e.g. Rao, 1991; Hall and Treadgold, 1982; Hausen, McCormick, Rives, 1985;
II. THE TYPICAL TREATMENT OF DISEQUILIBRIUM.

At the micro level, supply and demand curves are independent functions respectively relating quantities demanded and supplied at various prices. When a market is not in equilibrium, demanders and suppliers each make decisions "on" their respective curves, but when these decisions are inconsistent, price changes and new decisions are made until the market reaches equilibrium. Suppliers and demanders always remain "on" their respective curves. Horizontal distances between the curves always represent excess demand or supply.

The AD/AS model, as usually taught, extends this reasoning to the macro level by analogy. If this were a good analogy, we would expect that AD would represent desired or planned aggregate quantity purchased at various given price levels, and that AS would represent aggregate output at various price levels.\(^1\) If the economy is not in equilibrium the demand-side decisions registered along the AD curve are inconsistent with the supply side decisions along the AS curve. The result of demanders and suppliers staying "on" their respective curves leaves unintended inventory accumulation as the difference between AE and output. The horizontal distance between the curves is, once again, excess demand or supply. In disequilibrium the price level changes along with spending and production decisions until the economy reaches short-run equilibrium.

Baumol and Blinder, early pioneers in the use of the AD/AS model at the principles level, explain the model in this way. Having drawn typical AD/AS curves, they then postulate a price level above equilibrium and imply that the horizontal difference between the AD and AS curves is an increase in unintended inventories. At this price level,

...aggregate quantity supplied would exceed aggregate quantity demanded. There would be a glut on the market as firms found themselves unable to sell all their output. As inventories piled up, firms would compete more vigorously for the available customers, thereby forcing prices down. [1991, p. 181]

The tale is then told in reverse for the case of a price level below equilibrium.

Many texts do not explain short-run disequilibrium adjustments at all, leaving the student to assume that the model works much like we have described. Others ignore disequilibrium adjustment entirely and simply assert that short-run equilibrium occurs at the AD/AS intersection. This appears to be the standard practice in the leading intermediate texts. Dornbusch and Fischer, for example, tell an inventory adjustment story in their chapter on IS/LM [1987, pp. 139-140], but are silent on the question of AD/AS equilibrium [pp. 219-224].

III. PROBLEMS WITH THE MICROECONOMIC ANALOGY

This analogy with micro supply and demand curves makes macro analysis much more accessible to beginning students and is a very good reason for using the AD/AS model. However, there are some very serious problems with the typical explanations of disequilibrium rooted in the analogy used. In this section we will deal with four of these problems: aggregate demand is not aggregate expenditures, i.e. it does not represent total spending given a price level, the income-output identity is ignored, real world macroeconomic adjustments are misunderstood, and macro models appear inconsistent. Contrary to the critics, we will argue that these problems are not inherent in the model itself, but, rather, they arise from the belief (implicit or explicit) that AD/AS is analogous to micro supply and demand.

**Aggregate Demand is Not Aggregate Expenditure.** The AD/AS analogy to micro demand and supply curves seems reasonable because many of us do not make a distinction between planned aggregate effective demand, or aggregate expenditures, and aggregate demand. The "Y's" associated
with each have quite different meanings if we have disequilibrium and are the same if and only if the macro economy is in equilibrium.

Figure 1 will help us make this distinction. The upper graph is a typical AD/AS graph with equilibrium at $P^*$ and $Y^*$. Now suppose we are at a disequilibrium with the price level being $P_1$. How can we have two output levels $Y_1$ and $Y_2$? The answer implied by the previous section is that $Y_1$ is the spending at price level $P_1$ and $Y_2$ is output produced at $P_1$. The difference between the $Y$'s would be unsold output piling up as unintended inventories.

This answer is wrong. To see this we need the help of the 45° line model shown in the lower graph of Figure 1. For simplicity, let's assume the usual closed economy with taxes autonomous and investment a function of only the real interest rate. Of course, the 45° line model is entirely consistent with the AD/AS model. They are, after all, just different facets of the same macroeconomic theory.

If output is $Y_2$ then income is $Y_2$. At income level $Y_2$, the aggregate expenditure line (where $AE = C + I + G$) shows total spending of $E_2$. Using the 45° line we can project this level of aggregate expenditure level up to the AD/AS graph. Here we can see clearly that aggregate expenditure is not on the AD curve at the given price level of $P_1$.

If AD does not represent aggregate expenditure, given the price level, what does it represent? From its derivation in the IS/LM model we know that points on the AD curve are merely income-output levels where the goods and money markets are both in equilibrium at various price levels. The AD curve is, thus, more analogous to the IS curve than it is to a micro demand curve [Hall and Threadgold, 1982; Rabin and Birch, 1982]. With the IS curve, students and teachers do not believe aggregate expenditure at each real interest rate is necessarily on the IS curve. Only equilibrium expenditure is on the curve. If the goods market is in equilibrium, this implies that the $AE$ line crosses the 45° line at that same income level. This is shown in the lower graph. Thus, points on the AD curve must indicate where the 45° line model is in equilibrium at that price level. If we are not in equilibrium in the lower graph, we cannot be on the AD curve.

The reason aggregate expenditure is greater than AD at $P_1$ is simple to understand if we remember the income-output identity. If output is $Y_2$, then income (which is equal to output) is greater than $Y_1$. Therefore, planned aggregate expenditure must be greater than $Y_1$ due to induced consumption expenditures. As can be seen in the lower graph, there is excess supply in the goods market equal to $I_1$, but the excess is not $Y_2 - Y_1$. The excess output raises income, and spending increases by $[MPC (Y_2 - Y_1)]$ above the equilibrium level $Y_1$ (where $AE$ crosses the 45° line).

Line EE shows the levels of planned aggregate expenditure (AE) for each price level given the AD and AS curves. It is given by the following:

$$AE = AD + MPC (AS - AD)$$

Note that it is only equal to AD in equilibrium where AD equals AS. Otherwise there is either excess demand or supply in the goods market.

The failure to distinguish AD from aggregate expenditures arises for understandable reasons. First, the AE line in the 45° model is often referred to as aggregate demand and labeled AD. This was especially common before the advent of AD/AS. In fact, some texts still label graphs in this way. Second, economists are well aware that AD is derived from IS/LM and hence ultimately derived from the 45° model. Since the models are consistent, one logically flows from the other, many economists tend to think (erroneously) that AD as used in one is the same AD as in the other. However, just because they are the same in equilibrium does not mean they are the same in disequilibrium. When in disequilibrium, "aggregate demand is not aggregate demand," so to speak. We have evolved a sloppy terminology with which we have fooled ourselves into making bad analogies and consequently misleading our students with erroneous explanations.
Figure 1.
**Income-Output Identity.** The second problem we see with the bad analogy is that the income-output identity is disregarded. The AD/AS model may be an easy way for students to find macro equilibrium. However, our typical description of disequilibrium disregards one of the most important and basic concepts in macroeconomics: the income-output identity. Our students cannot begin to comprehend even the most simple macroeconomic theories without first understanding this identity. In addition, the relation between a trade deficit and a budget deficit is completely opaque to those unaware of the identity for an open economy.

The analogy to micro demand and supply is poor because Walrasian (or Marshallian) demand and supply curves are independent functions while in the macro model, the demand and supply sides are quite interdependent. This interdependence arises out of the income-output identity. We cannot legitimately teach that income must equal output as one of the national income identities and then several lectures later maintain that expenditures on the demand side, which are a function of income, are independent of output on the supply side which is equal to income!

The fact that we can tell our disequilibrium stories and not have even our brightest students catch this inconsistency with the income-output identity is revealing. First, it reveals that our students are not very facile in detecting the fallacy of composition (Hansen et al., 1985, p. 289). Second, it reveals our inability to teach even the most basic macroeconomic concepts. The AD/AS approach rather than being a vehicle to improve pedagogy, turns out to be an indicator of our bad pedagogy.

The disequilibrium analysis also indicates a lack of respect for the discipline of economics. We pride ourselves in the rigor of our method. We would not allow such sloppy thinking in our microeconomics courses, but in macro we justify sloppy thinking because it's easier for the students.

**Adjustment Process.** A third problem is that real world macroeconomic adjustment is misunderstood. A good analogy enhances understanding. However, the AD/AS analogy to micro supply and demand is a bad analogy, because it generates erroneous ideas concerning real world macroeconomic adjustments. To clarify, consider the following scenario.

Suppose that the economy depicted in Figure 1 was originally in equilibrium at P₁ and Y₂. Then for some reason AD declined to the level shown. How would the economy adjust from the old equilibrium at P₁ and Y₂ to the new equilibrium at P* and Y*? The explanation, based on the micro analogy, as stated in section II above, would have aggregate quantity demanded or expenditures fall to Y₁. The price level would fall as firms responded by producing less. Spending would increase as the price level went down. The implication is that spending initially falls, but then as income and output fall, spending rises. Is the result of our analysis to have students believe that as incomes fall during a recession, households and businesses spend more? Let's hope they do not read a newspaper, watch the news, or find out anything about the real world during a real recession.³

Now consider an alternative scenario based on using line EE which shows the aggregate expenditures at each price level. When the AD curve shifts back, the level of aggregate expenditure falls to E₂, assuming the price level is momentarily fixed. There is an unintended increase in inventories of I₂. This induces firms to reduce output, and, therefore, incomes decline. This further reduces spending. As output, spending, and the price level decline together, the economy moves along the EE curve to the new equilibrium at P* and Y*.⁴

It should be obvious that the movement along line EE represents a macroeconomic adjustment path consistent not only with our macroeconomic models but also with empirical reality. The disequilibrium story implied by the micro analogy should be obviously absurd.

**Inconsistent Models.** The fourth, and last, problem is that macro models appear inconsistent. The 45° line model and AD/AS model are really just different facets of the same macroeconomic model. They are, of course, completely consistent with one another. However, due to our confusion between aggregate demand and aggregate expenditure, as well as our obfuscation of the income-output identity,
we give our students the impression that they are two completely different models. AD/AS’s micro analogy causes students, and even some faculty, to view the two facets of the same model as being inconsistent with one another. After all, the disequilibrium explanations usually told with each bear little or no relationship with one another.

However, the use of the EE curve above shows that this need not be the case. If an explanation holds in one graph, the same explanation holds in the other. We do not have to change our stories from graph to graph. We can be as consistent as the underlying macro model as long as we avoid AD/AS’s micro analogy.

IV. CONCLUSION

The AD/AS model has allowed students to more readily do macroeconomic equilibrium analysis. It is ironic, however, that this is accomplished because our students misunderstand, ignore, or are unaware of even the most basic and important macroeconomic concepts. The analogy to microeconomic supply and demand leads students, and often their instructors, to (1) confuse AD with the level of planned aggregate expenditures; (2) obscure or ignore the income-output identity; (3) misunderstand real world macroeconomic adjustment; and (4) make our macro models appear inconsistent. The fact that our students are blissfully unaware of these problems indicates that, instead of being an improvement in pedagogy, AD/AS, as usually taught, exposes the weaknesses of our pedagogy.

We have shown that the usual description of disequilibrium adjustment is based on a semantic confusion which generates a conceptual confusion. Consequently, the micro analogy has misled students and instructors. False analogies which lead to misunderstanding cannot be good pedagogy.
ENDNOTES

1. Hereafter planned aggregate quantity purchased is referred to as "aggregate expenditures," or AE. We use "aggregate demand," AD, only to refer to the AD function in the AD/AS model.

2. Most principles texts define aggregate demand as total effective demand or as this paper defines aggregate expenditure (e.g., Stiglitz, 1993, p. 694; McConnell and Brue, 1993, p.152; Case and Fair, 1992, p. 794; Ragan and Thomas, 1993, p. 262; Samuelson and Nordhaus, 1992, p. 408). Even a major intermediate text defines aggregate expenditure in this way (Mankiw, 1992, p.217). We found only one major principles text (Lipsey, Courant, Purvis and Steiner, 1993, p. 559) that made the appropriate distinction.

3. Many principles texts have very little detail about AD/AS disequilibrium or the movement to equilibrium. However, some major texts explicitly lead their readers to believe the economy adjusts as if the micro analogy holds (e.g., Baumol and Blinder, 1992, p. 181; Samuelson and Nordhaus, 1992, p. 408; Ragan and Thomas, 1992, p. 264; McConnell and Brue, 1993, p. 169; Stiglitz, 1993, pp. 694-5).

4. At a particular price level, the horizontal distance between the EE line and the AS curve is the level of unintended inventory investment. This can be geometrically derived from the 45-degree model as the vertical distance between the AE curve (given the particular price level) and the 45-degree line at the level of income given by the AS curve. Line EE does not necessarily have a positive slope, but the important distinction between aggregate expenditures and aggregate demand is in no way dependent upon this. Basically line EE will be positively sloped unless the MPC is relatively small and/or the AS curve is quite steep relative to the AD curve. If the slopes of the AD and AS curves are $\tau$ and $\sigma$ respectively, then the slope of line EE will be positive if:

$$\frac{1}{1/\tau} < \text{MPC} \left( \frac{1}{\sigma} + \frac{1}{\tau} \right).$$
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REFERENCES


