Acceptable and Unacceptable Dirty Pedagogy:

The Case of AS/AD

David Colander and Peter Sephton

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Teachers of economics must simplify enormously to reduce the complex ideas that make up economics into models that are sufficiently simple to be conveyed to undergraduate students. This simplification is done in the knowledge that it violates some of the more complicated ideas of how the economy works, but it is justified in the name of simplicity.

Despite the importance of the simplifications, little direct analysis has gone into optimal simplification, and a wide variety of simplifications are all justified in the name of "dirty pedagogy." The argument of this paper is that not all simplifications are justifiable; specifically, a simplification is unjustified if an alternative simplification exists that conveys the ideas that a teacher wants to convey, but does so in a way that is less misleading, and more consistent with high-level thinking, than the alternative.

This paper will discuss one simplification that is prevalent throughout macro texts: the AS/AD model.[1] The central thesis of the paper is that the AS/AD model, as generally presented, is unacceptable dirty pedagogy. Specifically, the paper will argue that there exists an alternative model that accomplishes all that teachers of economics wish, or should wish, to convey with the AS/AD model, but that avoids many of the pitfalls of AS/AD analysis.

What the AS/AD Model Is Supposed to Accomplish

Professors need a relatively simple model to demonstrate to students the effect of macro policy on the economy. They need to be able to show graphically the effects of shifts in government spending, taxes, and the money supply on important macroeconomic variables such as real output, interest rates, and the price level. The AE/AP model on the introductory level, and the IS/LM model at the intermediate level, fit the bill until the price level and inflation had to be incorporated into the core macro models. The evolution of the core macro model to the AS/AD model occurred because the AS/AD model incorporated the IS/LM model as well as the price level. It fit the bill—it was easy to teach, easy to understand, easy to draw, and it conveyed the effects of monetary and fiscal policy that most economists saw as reasonable.

Problems with AS/AD Analysis

The movement to AS/AD did not occur without objection. AS/AD analysis has been attacked by many economists, including many in this volume. Among the complaints about AS/AD analysis are:

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[1] There are many variations of this AS/AD model. The one I am referring to has the AD curve derived from the fixed-price IS/LM model and the AS curve derived from the labor market, with the long-run AS curve—assuming wage-level flexibility—perfectly inelastic.

1 The AS/AD terminology misleads students into thinking the curves are essentially partial equilibrium curves, which they definitely are not.

2 The AD curve is not an AD curve. It is a conjectural aggregate equilibrium curve at all points on which: AS = AD.

3 The terminologically justifiable AD curve is not a curve derived from the IS/LM model; it is a curve that incorporates only the effects of changes in the price level on quantity of aggregate demand, and it is likely interconnected, in some fashion, with the aggregate quantity supplied.

4 The foundations of the AS curve presented in principles books blends those for a formal AS curve (an aggregate equilibrium curve conveying the condition that labor supply equals labor demand) with those for a curve reflecting price level institutional rigidities.

5 The dynamics that are implicit in the AS/AD analysis presented in textbooks assume that wage- and price-level flexibility will bring about full employment through effects operating through the hypothesized effects of price level changes on the quantity of aggregate demand. These dynamics are not those that most economists believe characterize the dynamics in our economy. Specifically, price-level decreases have generally not brought about full employment and real wages have not moved in the predicted manner.

6 AS/AD's equilibrium specification makes the model impossible to use for comparative statics since there is no presumption that the curves will remain constant as one moves along the other curve. Yet it is continually used in that fashion, with books implying that if the new equilibrium exists, the dynamics of the economy will get it there.

7 The typical textbook derivation of the model is from two disparate models. The goods market equilibrium curve is derived from a model assuming quantity adjustment, given a fixed price level. The labor market equilibrium curve is derived from a model assuming flexible prices. This can lead to, and in introductory textbooks generally does lead to, logical inconsistencies in the discussion of disequilibrium dynamics.

Despite these problems, which are well known, and which are accepted generally, AS/AD analysis continues to be used, and justified under the assumption of "dirty pedagogy." In this volume Peter Kennedy takes this position. His disagreements with those of us who are critics of the model concern items 5, 6, and 7 on the above list. Kennedy argues that if the standard AS/AD model is treated as a pure equilibrium model, and discussions of dynamics allow the economy to be off the curves, these problems can be avoided. (He agrees, however, that in practice, they generally are not avoided in the textbooks.) Specifically, he argues that "when people append dynamics to IS/LM to produce stories of how the economy moves to a new equilibrium, they supplement IS/LM and implicitly supplement the corresponding AD with a supply story (and not a very good one). But when one moves to the

AS/AD model, one scraps that supply story, replacing it with one told around the AS/AD curves. The old supply story is thrown away because it is not genuinely a part of AD—there is no inconsistency."[2]

Rao, Nevile, and Colander claim that if the derivation of the AD curve comes from a Keynesian fixed price IS/LM model, as it generally does, from a pedagogical standpoint there are implicit dynamics built into the explanation of the curves, and the inconsistency in alternative supply specifications cannot be avoided. They claim that once a story has been told to students, the instructor cannot throw away that story and substitute another story. In the pedagogical use of the model, the stories told in deriving the curves become part of student's understanding of the curve. Students have heard and learned the first story; it cannot be scrapped.

As is evident from the above discussion, Kennedy's dirty pedagogy justification does not work for us. If we had our druthers we would deep six the entire AS/AD model as it is currently taught, and replace it with a carefully specified alternative model. In this alternative model the AD curve would not be derived from a Keynesian model at all, and one would not assume an underlying perfectly competitive economy. In this model there would be no supply curve but, instead, a price-output curve reflecting the aggregate of the strategic pricing decisions of firms. This alternative model would focus on dynamics.

That model might make sense, but it is not what we are arguing for as the core principles macro model in this paper. We are textbook authors, and as textbook authors we are well aware of the pressures for a simple macro model, and of the enormous inertia that will keep some version of the AS/AD model central to the pedagogical exposition of macro for the foreseeable future. As our publishers, and our reviewers, have told us: An introductory book will not be successful without it.

Initially, Colander tried to define alternative AS and AD curves and to discuss the interrelationship between them (Colander (1994, 1996)), and did reasonably well in the market. In his revised AS/AD model, the AS curve was a hybrid curve--representing the quantity response of suppliers in seller-price setting markets to falls in the price level, holding expectations of real demand constant. That curve could shift due to expectations of demand. Colander's AD curve was a deductively derived curve that included only the initial effects of a fall in the price level on aggregate demand (for example, the Keynes and Pigou effects); it did not include the multiplier effects, since the curve was not derived from the Keynesian model. The difference is that the standard AD curve, derived from the IS/LM equilibrium, includes multiplier effects in it since those multiplier effects are embodied in the IS curve. A fall in the price level causes the quantity of aggregate demand to increase. In that standard IS/LM model, that increase causes supply, and hence income, to increase by an equal amount. That initial increase in income is multiplied by some amount dependent on the size of the multiplier and the shape of the LM curve. In Colander's revised AS/AD model the AD curve included only the initial effects of a change in the price level. Thus Colander's AD curve was always less elastic than the standard AD curve.

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[2] From private correspondence between Peter Kennedy and Colander.

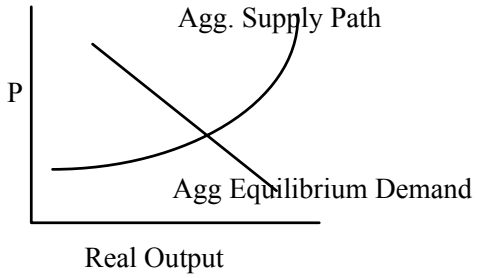
The advantages of this aggregate demand curve and hybrid aggregate supply curve were that they allowed dynamics to be discussed separately from equilibrium, with the possible interdependency between the aggregate supply decisions and aggregate demand decisions directly incorporated into the presentation.

Colander's alternative AS/AD model was logical and, we believe, insightful. But the formal foundations are complicated, and most economists were unwilling to accept a model that had a curve that looked like an AS curve shifting with expectations.[3] Because of this many reviewers kept telling him that his alternative macro model, while not wrong, was more complicated, or, at least, too different from the standard model, than the standard professor was willing to accept. If he wanted to move to be a market leader (which he did) he had to create an easier macro model that was more consistent with the standard model. Hence, the evolution of the model; in the third edition of Colander, and in the first Canadian edition, co-authored with Peter Sephton, the co-author of this paper, we have developed the *macro policy model*—a model that looks and feels like the AS/AD model of the standard texts, but that avoids many of the problems inherent in that model. It is this macro model that we believe makes the AS/AD model a model with unacceptably dirty pedagogy.

The Macro Policy Model

The basic macro policy model is shown in Exhibit 1.

Exhibit 1



It consists of two curves: (1) the Aggregate Supply path—a curve that looks like the "aggregate supply curve" in the AS/AD model; and (2) the Aggregate Equilibrium Demand Curve (AED) —a curve that is essentially a relabeled AD curve. Thus, the geometry of the macro policy model is identical to the geometry of the AS/AD model found in the principles books but there are three differences: (1) the names of both curves; (2) the implicit microfoundations of the curves and (3) a more limited claimed applicability for the model. Let's consider those differences.

The Renaming of the AED Curve

[3] Those foundations require the introduction of a shift factor, coordination, in the production function which allows output supplied to change independent of any change in the real wage, but simply in response to a change in aggregate demand. The paper by Allen and Stone in this volume discusses that model.

The first change that the macro policy model makes is that it relabels the AD curve the AED curve. The purpose of this change is to remove the current misleading terminology. Renaming the AD curve makes clear to students that it is a curve reflecting goods market equilibrium, and is not an aggregate demand curve. *Such a change, as argued by Colander (1996), is absolutely required by truth in labeling*. Given that supporters of AS/AD analysis all agree that what is currently called an AD curve is really a price/output space equilibrium curve, and that the AED curve is a curve at which the goods market is in equilibrium (AS=AD), we can see no legitimate complaint with changing the name, unless the purpose is to deceive students.

The only complaint can be that we did not go far enough in relabeling the curve: Why call it an AE**D** curve at all? Why not just call it a goods/money market equilibrium curve? Our answer is that it is derived from a Keynesian model in which demand plays a central role. This renaming of the AED curve resolves complaints (1) and (2) above, but it does nothing to complaints (3)-(7).

Using an Aggregate Supply Path Rather than a Supply Curve

To help meet complaints (3)-(7) we replace the aggregate supply curve with what we call an Aggregate Supply path. The Aggregate Supply path has roughly the same shape as the typical aggregate supply curve presented in the introductory textbooks, but has quite different microfoundations. Specifically, it is an empirically based curve that reflects the observed price-setting strategy of real world firms; it makes no pretense of being an AS curve reflecting marginal costs since it is based on an assumption that the goods market is not perfectly competitive. Whether the shift in output and prices reflect static or dynamic considerations is not an issue with this empirically based curve, and one can easily relate it to stories involving inventories, customer markets, and strategic pricing issues that characterize our real world economy. It is a curve that students can relate to, even if they cannot "derive it." It is a curve that can be influenced by the policy regime chosen, since firms' pricing strategy will reflect that regime.

The aggregate supply path allows for, but does not require, the Colander AD curve and the aggregate quantity supplied to be interconnected (solving complaint (4)); its ambiguity allows easier integration of a variety of dynamics into the stories one tells about adjustment (solving complaint (5)); and its definition lets it be used in discussions of dynamic shifts of the AED curve. Finally, it allows one to incorporate different assumptions about price-level flexibility, resolving complaints (6) and (7)).

Stating how the supply path differs from the aggregate supply curve in principles texts is difficult because of the ambiguity that surrounds the principles presentation of the aggregate supply curve. (In intermediate books, the supply curve is clear--it is a labor market equilibrium curve.) In most principles books there is implicit in the discussion a sense that the AS curve is the same curve as is formally developed in intermediate books--a labor market equilibrium curve, with the upward slope existing because of a fixed nominal wage assumption. But few principles texts ever explicitly come out and say that, nor do they explain why that labor market equilibrium curve would be perfectly elastic at low levels of output, as the AS curve is generally drawn in principles books.

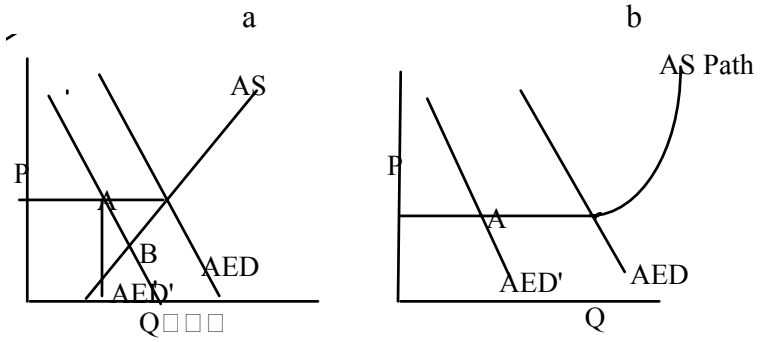
The perfectly elastic portion of the curve could be explained by assuming the production function has constant marginal returns at low levels of output, but that assumption is hard to justify intuitively, and is not used in most principles books. Instead, to explain the perfectly elastic portion of the AS curve, the standard principles book generally switches explanations, and discusses issues involving institutionally sticky prices. Our problem with this approach is one of incompatibility of the two explanations; they come from different models that analytically are far apart. Sticky prices, based on seller price setting behavior is inconsistent with a model in which a supply curve provides a meaningful reference point. A model in which an unchanging supply curve is a meaningful reference point is a model which assumes sellers are price takers.

One way to resolve the problem would be for principles books to use the standard AS curve, and to tell "off the curve" stories of dynamic adjustment. There are two problems with that "solution." One of these is pedagogical, and the other involves the intuitive reasonableness of the story being told.

Let us consider the pedagogical problem first. Principles books cannot tell "off the curve" stories because principles students don't yet have a real understanding of what it means to be on the supply and demand curves. It is to avoid telling "off the curve" stories that principles books use inconsistent explanations of what underlies the aggregate supply curve. Such inconsistencies are necessary to keep steps along the adjustment process on the supply curve when telling the Keynesian dynamic story of aggregate adjustment--stories that remain central to most principles book's underlying analytic presentation.

The second problem involves the intuitive logic of the dynamic adjustment process. That problem is best seen by considering a specific downward adjustment such as that in Exhibit 2a.

Exhibit 2



Standard Dynamics

Macro Policy Alternative

Say there is a shift back in aggregate demand of 10. Given that shift of 10, the aggregate equilibrium demand curve shifts by a multiple of 10--the multiple determined by IS/LM analysis that has not been presented to students. In that standard dynamic story, shown in Exhibit 2a if one wants to incorporate sticky prices, the initial leftward shift of the AED curve must move the economy to a point such as A, off the AS curve. To complete the analysis one needs some reasonable explanation of how the economy moves from point A to

point B--the point consistent with the AS/AD fixed nominal wage equilibrium implicit in the intermediate interpretation of macro equilibrium. It is here where the problem arises. Economists do not have a good dynamic story of how the economy moves from Point A to Point B which would entail firms increasing output as the price level falls, wages remaining constant. Most economists accept the institutional reality of a downward rigidity of prices, and that a significant fall in the price level would undermine financial markets, thereby making downward price level flexibility an undesirable alternative. Thus, given institutions, point A can be an quasi-equilibrium--once the economy arrives at A there are no realistic dynamic forces that will move it--unless there is another shock.[4]

This lack of an acceptable dynamic adjustment story going through point A is solved in intermediate books by eliminating point A. The intermediate story simply eliminates all dynamics from the analysis and focuses on final equilibria with its assumption of perfect competition. The model implicitly assumes that the economy can move to the new equilibrium at Point B. By assumption the economy could be at no other point.

In a full mathematical presentation, that perfectly competitive goods market story becomes clear, and it is that story that economists like Kennedy say is logically consistent. We agree. But the story lacks the intuitive appeal and the applicability to the real world that the principles books require of the story they are telling. Herein lies the problem: the introductory books are trying to tell *a more complicated story* that involves a movement to point B via point A. *It is in mixing these two stories where the intuitive dynamic logic of the story is questionable.* If the economy has actually moved to point A, and output supplied has fallen, one must explain what underlies the firm's supply decision that led it to point A, and how, once the firm is at point A, what the nature of the incentives are that will lead it to change output to point B. That explanation must incorporate a discussion of any implication of that supply decision, such as feedback effects on the labor market, and on aggregate demand.

Essentially one must explain how, as the price level falls, nominal wages remaining constant, firms are increasing their output, and why, when the adjustment to point A occurred, the demand for labor curve remains constant. If, in the quantity adjustment to point A, and firms actually reduce output which is what one is saying happens when one states that the economy is at point A, *the disequilibrium interdependencies between the goods and labor market must be included in the analysis.* The level of aggregate demand will become a determinant of the marginal product of labor, and hence a determinant of the amount firms choose to supply. Specifically, when firms reduce output, they will reduce their demand for labor. As they do so the effective marginal product of labor will fall, and as it falls, what might be called the effective supply curve of firms--the labor market equilibrium curve given a level of aggregate demand--will fall.

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[4] We do experience disinflation; interpreting the vertical axis as the price level relative to the expected price level allows us to get downward flexibility relative to expected price levels, and provides a reasonable set of dynamics if the economy has an ongoing inflation. But for that to work, there must be underlying inflation in the economy above the level of the disinflation needed.

Notice what the assumption of non-perfectly competitive markets does to the analysis of downward shifts of the AED Curve. It removes perfectly competitive equilibrium as a meaningful reference point, and requires one to explicitly state how the economy will return to that an initial equilibrium, if shocks push it away. The new supply path-AED equilibrium is a real world equilibrium--aggregate supply equals aggregate demand, by definition of the AED curve. It is true that long run equilibrium can only exist is there is no labor market disequilibrium. So, at this equilibrium there will be some downward pressure on the wage, and through the wage on the price level. But the existence of that pressure in no way tells us that the perfectly competitive equilibrium is a meaningful one. One could, for example, argue that the required fall in the price level would disrupt the institutional structure and cause a significant fall in aggregate supply as that deflation transfers money from debtors to creditors, and forces many debtors (firms and entrepreneurs into bankruptcy).

If this is true that price level changes can affect supply, aggregate equilibrium is path dependent, and cannot be considered independently of disequilibrium dynamics that accompanies it. The reasonableness of the dynamic argument is asymmetrical. For expansions, with a technologically determined output maximum, there is a fixed point beyond which the economy can only expand temporarily, but, for contractions, if major short run falls in the price level are not institutionally feasible, the fixed point is lost.

The problem of creating an acceptable textbook macro model is not one of pedagogy; it is a problem of macroeconomic theory. The currently held macro theory--which is essentially an expansion of the intermediate macro story--is logically consistent *given perfect competition*, but has not yet provided an acceptable foundation onto which on can incorporate dynamics and possible path dependencies. The currently in-vogue model with its assumption of perfect competition in the goods market eliminates, by assumption, my interpretation of Keynesian economics as a simple example of possible disequilibria expectational effects affecting the final equilibrium. All such effects are eliminated by the assumption of perfect competition in the goods market. If there were perfect competition in the goods market, aggregate demand would play no role in the economy, and there would be no role for Keynesian economics.

The above is not an argument to return to Keynesian economics; its dynamics are too simplistic to be generally acceptable. It is, however, an argument that the macro model we use take into account the interdependencies between supply and demand decisions that characterize many of our real world markets.

The standard principles presentation of the issues does not solve the problem; it simply presents aspects of both the Keynesian model and the perfectly competitive AS/AD, mixes the two, and creates an analysis that involves inconsistencies that naturally flow from combining two models--one the intermediate perfectly competitive model, and the other the institutionally fixed price model. In doing so, in our view, the standard principles presentation crosses the line between acceptable and non-acceptable dirty pedagogy.

The Aggregate Supply Path Alternative

Our proposed solution is to *explicitly choose a non-perfectly competitive market as the underlying framework for the principles presentation of macro issues*, and to explicitly incorporate the institutional rigidities into the explanation of what happens to the price level. Our aggregate supply path is essentially a more precise name for the curve the principles books are trying to describe with their institutional story. It is an empirically determined curve, not a deduced curve. Calling it a supply path alerts students to the fact that the curve is not a supply curve, and that the dynamic story it is telling is not based on a perfectly competitive institutional structure. Because it isn't a perfectly competitive model, the supply path reflects real world firm's strategic pricing behavior within semi-oligopolistic markets.

We expect that a likely complaint about our macro policy model is that the AS path has ambiguous microfoundations. We fully admit this. We can do so because the problem with the standard AS/AD model for us is not ambiguity, it is "hidden ambiguity". We believe that it is unacceptable pedagogy to hide the ambiguity behind the AS curve and to imply to students that an institutionally based curve has definite micro underpinnings in a perfectly competitive market. But this is precisely what one is doing when one calls the institutionally-determined price output path an aggregate supply curve.

The relabeled aggregate supply path allows the model to deal more easily with what we consider the standard case relevant to short run output fluctuations in the real world: the case in which both the price level and the wage level are semi-flexible. In this case a fall in aggregate demand can affect the demand for labor independently of any change in the real wage, *making labor market equilibrium conditional on the state of the goods market.* Expectational coordination problems can lead to a fall in the marginal product of labor, causing unemployment, even if wages are as inflexible as prices (meaning the real wage, W/P, hasn't changed). Thus, the standard Keynesian interpretation of the model as a model of demand-constrained markets (what Hicks and Rao call Q-markets) can be presented as consistent with the supply path, as can the New Keynesian coordination view (that Colander was arguing for in his alternative AS/AD model) without moving off the curves. In the current AS/AD model, these interpretations of the workings of the economy are difficult, if not impossible, to incorporate into the model.

The More Limited Applicability of the Macro Policy Model

The third difference between the macro policy model and the standard AS/AD presentation is that the macro policy model is not presented as a complete model of the economy. The reason is that the analytic micro foundations of the AS path are to be found in game theoretic strategic pricing models that are not yet fully developed. At best, our ability to predict what will happen in such models is limited to considering first order differences--what will happen to an existing historically-determined equilibrium, given a shock. These models might be called first order difference models--they tell how the economy will adjust from a historically given equilibrium; they do not tell how the economy arrived at the equilibrium to begin with.

Similarly, in the macro policy model there is no formal graphical analysis of the movement to long run equilibrium, or what long run equilibrium is. Such a formal analysis is, in our view, beyond what we can hope to acceptably present in a principles course. That

doesn't mean that we can't talk about the different views, and give students a flavor of the arguments, but to pretend that any formal model of that process we could present to them at the principles level is any more than a suggestive story would, in our view, be inconsistent with the state of modern macro understanding.

While the macro policy model takes slowly adjusting short run prices as an institutional given, it need not be given a Keynesian interpretation. It can be used to illustrate both Keynesian and New Classical views. For example, in the third edition of the U.S. edition of the Colander text, the Keynesian multiplier story is questioned specifically by considering the strategic decisions that would likely undermine it, and the New Classical argument that any expected policy would be incorporated into expectations is presented as part of the discussion of the strategic decision model of the economy.

In the macro policy model there is no implicit assumption that an economy with such price setting institutions, left on its own, will achieve the desired equilibrium, nor is there a presumption that it will not. In that it is consistent with what we consider is the highest level macro theory. Instead of being a positive model, the macro policy model is primarily a descriptive model of what is observed in the economy. It is an institutionally-based, not analytically based, model. At the principles level of macro such a descriptive model is the most one can realistically hope to convey to students. Given the state of current macroeconomic theory, pretending to be doing more is misleading unacceptable dirty pedagogy.

Summary

Albert Einstein once said that a theory should be as simple as possible, but not more so; the same holds true for models. We think the problem with the standard AS/AD analysis is that it is "more so." Specifically, it has been trying to be both a two dimensional summary of what happens in the real world, and a model of what happens in a perfectly competitive model. In combining the two, it has been neither; it has, instead been a mishmash of terminological inconsistencies and unexplained assumptions.

There are a number of pedagogically acceptable solutions to the problem--one possibility is to forget the real world, and develop a model that applies only to a perfectly competitive world--that is the intermediate macro book solution. On the principles level that solution does not work because the appropriate model is too complicated, and too far from the real world to present introductory students. The alternative we propose here is to limit the applicability of the model we present to students to one relevant to the institutional structure of the economy they live in. One can do so using the same curves as are currently used in principles texts, but slightly relabeling them, and providing a honest description of the institutional assumptions that underlies them. The macro policy model described here does that; in doing so it achieves all the goals that a good teacher should want from the AS/AD model, and thus we urge its much broader use as a pedagogical device. It's still dirty pedagogy, but it is a lot less dirty than the current AS/AD alternative.

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Stone and Allen (this volume) "title unknown"--I've only seen part of the paper.

The Price Level Flexibility Curve and the Phillips Curve

The traditional Phillips Curve analysis in which the level of unemployment is linked to the rate of inflation looks very much like a backwards price level flexibility curve, and in some ways the reasoning that leads to both of them is similar. But there's a big difference that distinguishes them. The price level is on the vertical axis of the macro policy model, and inflation -- the change in the price level -- is on the vertical axis of the Phillips Curve analysis. It was because the price level was on the vertical axis that we could add the AED curve (which was based on reasoning relevant to the price level) to the price level flexibility curve (since it refers to the price level) and create the macro model. That's an advantage of the macro policy model. But the macro policy model also has disadvantages.

Specifically, to talk about an ongoing inflation in the macro policy model we have to talk about an ongoing movement along the vertical axis -- an ongoing shift from one price level to higher price levels; to talk about inflation in the Phillips curve analysis we simply have to refer to a point on the vertical axis. Thus the Phillips Curve analysis can accommodate discussions of expectations of inflation into the analysis much better -- which is why we use it. The difference between the two can be seen by considering the price level flexibility curve a photograph, and the Phillips Curve a moving picture. By quickly flipping through a whole number of still photos, the photos can become a moving picture. But to see the movement, you need a large number of them which you flip through. So to talk about an ongoing inflation rather than simply a one time jump in the price level using the price level flexibility curve requires us to assume that the steps will be repeated.

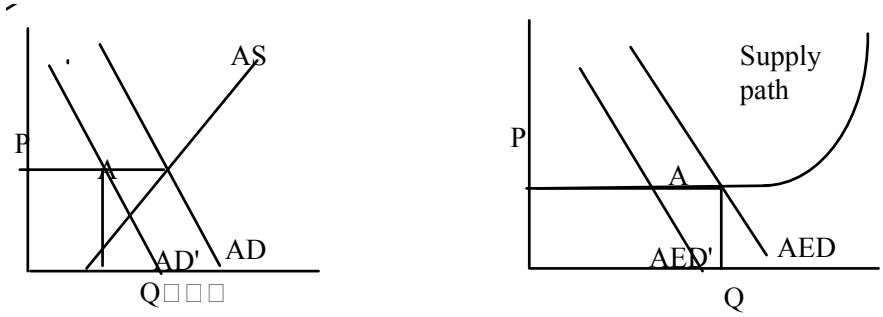
But whether the steps can be repeated again and again depends very much on whether the rises in the price level will become expected. Will they? Well that depends, and there are continually debates about whether a particular one-time price level rise will generate an ongoing inflation. Shock inflation -- rises in the price level that have particular one-time causes -- is far less likely to generate an ongoing inflation than a rise in the average level of wage settlements. And both depend on whether the government follows a policy of accommodation or not. When one considers this still photographic limitation of the macro policy model, you can see one of the reasons why there is considerable debate about what is the level of potential income. In the macro policy model we simply assumed that the government expanded demand and that it led to a one-time rise in the price level -- that we could stop the analysis there. In certain cases we can, but in others we can't. That's what the Phillips Curve analysis tells us.

For example, consider Exhibit 3. Say the AED curve shifts up -- that will increase output from Y0 to Y1 and the price level from P0 to P1. Output expands and real income rises (unemployment falls). But the Phillips Curve analysis tells us that if that rise in the price level becomes fully expected, the price level flexibility curve will shift up to PLF1, and the price level will rise not just to P1, but to P2, and that the rises will continue. So simply choosing a higher price level is not an option for the government; they are creating an ongoing inflation if they expand and an accelerating inflation if they continue to try to expand real income beyond Y0. So the lesson from the Phillips Curve for the macro policy

model is that the economy's actual potential income is not as high as the AGGREGATE SUPPLY PATH suggests, but instead is back much closer to the range where the price level starts rising.

This is a central debate in macro policy -- those who believe most rises in the price level will become expected favor less expansionary macro policy than do economists who believe that many changes in the price level will not become built into ongoing inflation through expectations. [insert exhibit 3] **Using the Macro Policy Model**

In Exhibit 2 we compare the macro policy model with the standard AS/AD analysis.



Those underpinnings that have been worked out, and which are usually correctly presented in the intermediate-level textbooks, relate that AS curve to a labor market equilibrium curve. Here, one has a logically consistent model, but one of dubious value if one believes the aggregate economy can involve inter market disequilibrium interactions that affect the final equilibrium. Specifically, the standard AS curve cannot incorporate elements that many economists believe are central to the dynamic adjustment of the aggregate economy--such as a fixed price level--without moving off the labor market equilibrium interpretation of the AS curve. The current use of the AS curve, and explanations that are given to it, entice students to treat it as something different than what it is. By relabeling it an *AS path*, one can make the formal distinctions clearer, and avoid inconsistencies in explaining the determination of the shape of the curve.

The Aggregate Supply Path and Real-World Institutional Structure

We believe that the use of an aggregate supply path rather than an aggregate supply curve will help students in their understanding of what an aggregate supply curve is, and the strict assumptions about market conditions it requires. It is realistic, and instructive, to use a curve that reflects a non-perfectly competitive economy in the principles course. The institutional structure of most Western economies is not perfectly competitive. It's highly competitive all right, but it is not perfectly competitive in the sense that firms offer goods on the market and accept whatever price they receive. Instead, the firm both makes the product and makes the market within which that product is sold. What this means is that for most goods, and hence for GDP, a composite of all goods, it doesn't make sense to assume that firms offer their goods on the market and accept whatever price the market chooses to pay them as one does assume in a perfectly competitive market.

In setting their price they take into account demand conditions, so the price they set reflects both supply and demand conditions, but in most markets, *sellers set price*; the market does not set it. For the market to set the price, the suppliers would have to offer all they have to the market in a type of auction and accept whatever price the market determined. As Rao (1996) has documented, that is not the case in the majority of goods markets.

The aggregate supply path accepts this institutional reality; its shape is determined by historical observation of how the price level has tended to fluctuate with fluctuations in income. It has no high theory behind it, but a fair amount of institutional reality. To use this curve appropriately in combination with the AED curve as a description of our economy, one would have to carefully model it to include the institutional realities. Doing so is beyond what can be done in a principles textbook. What we do with the Aggregate Supply path is to tell students precisely that, and we have found no problem with them accepting that as reasonable.

In the macro policy model, the degree of price level flexibility in built into the supply path, and the dynamic story that is emphasized is the decisions of supplier, given market structure. Demand falls; they can't sell all their output; they decrease supply, and decrease their demand for labor. This decrease in supply can reverberate back and cause them to decrease their supply some more. The economy moves along the supply path.

In the longer run, what happens is in dispute; in the Keynesian view, the economy is essentially stuck at this low employment equilibrium, because given institutions, a fall in the price level would undermine the structural integrity of the market (In our text we call this the wormhole effect.) Thus, for all intents and purposes, the equilibrium given by the supply path and the AED curve is the relevant equilibrium. In the Classical view, the disequilibrium in the labor market will cause the wage level and price level to fall, increasing the quantity of aggregate demand, making the relevant supply path more inelastic. That story would have to include the story of how the economy moves from this short run equilibrium to the proposed long run equilibrium, something current stories generally don't include.

Notice the difference between the two explanations. In the standard story, the final equilibrium drives the analysis and the disequilibrium dynamic story is chosen to fit. In our proposed alternative, the dynamics drives the analysis, and the equilibrium is chosen to fit.

One could incorporate the Keynesian view that a fall in the price level would undermine the structure of the economy, causing equilibrium output to fall. To tell that story within the aggregate supply/demand story, one would have to undermine the logical structure of the model. When the dynamic story one tells so deviates from the logical framework of the model, as it does in this case, the framework becomes a hindrance rather than a help.

Justifying Ambiguity

Some economists will likely recoil at the ambiguity of the formal specification of the aggregate supply path curve. We see that ambiguity as an advantage. The most honest statement economists can make about the determination of aggregate equilibrium is that,

formally, we have not progressed far enough to capture that determination in a full analytic model. The interdependencies on this aggregate level are too great.

But when analytic determination fails, empirical observation of regularities provide a good first step in predicting. The supply path is based upon those empirical regularities.

This observation early on in economics could go a long way in helping to create a stronger empirical focus of economics. It can also lead into a discussion of which new work in time-series econometrics, and in vector autoregression, such as that by David Hendry and Chris Sims, about the problems of separating out exogenous and endogenous variables, of the structural limitations placed on data by models, and lead into a discussion of the importance of a sophisticated understanding of data analysis to make any sense of the empirical tests of models.