WHAT WENT WRONG WITH IS-LM/AS-AD ANALYSIS — AND WHY?

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"... all novelty is but oblivion"
Francis Bacon

INTRODUCTION

The AS-AD approach used in macroeconomic textbooks to analyze the working of a market economy has come under increasing fire [Barre, 1994; Colander, 1986; 1992; 1993; 1994/1995; 1995; Clower, 1994; Neville and Rao, 1996]. But these recent criticisms of the AS-AD approach, and especially of the conventional aggregate demand curve, are but the latest stage of an ongoing but largely overlooked debate, starting with Robin and Birch [1982], that points out the inconsistency of determining the equilibrium price level with aggregate demand and aggregate supply curves while at the same time interpreting the IS curve as the equilibrium locus of the goods market. This debate has now broadened into a discussion of various alternatives to the conventional aggregate demand and aggregate supply curves. The pedagogical drawbacks of the conventional AS-AD analysis are succinctly expressed by Geithman:

As presented in most introductory and intermediate textbooks, the AS-AD framework offers textual neatness and expository convenience at the cost of impeding the development of student analytical abilities. Whenever key assumptions, equations, and conditions are hidden or inarticulated, essential parts of the reasoning chain are lost and students become unable to think the problem logically through for themselves to reach their own conclusions. Unable to follow the reasoning processes, they have little choice but to fall back on the authority of the textbook and instructor. (ibid., 477)

Accordingly, the AS-AD exercise amounts to a form of intellectual indoctrination that relies primarily on... authority... to gain student acceptance rather than the power of reason. (ibid., 476)


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In the light of this sad state of textbook macroeconomic models, the only way out would seem to be to abandon IS-LM/AS-AD analysis, as suggested in Barro [1994]. In the view of the present author, however, it would be premature to discard IS-LM analysis altogether. Confronted with the inconvenient alternative of carrying on with an inconsistent framework or starting again from scratch, it seems to be a good idea to get the questions right. It cannot be denied that something went wrong along the way from IS-LM to AS-AD; but one should ask precisely what went wrong and why it went wrong.

Considering the complexities of the debate, it seems best to start with the original IS-LM model of Hicks (1937), which he called the IS-LL "apparatus," and see what happened to IS-LM between 1937 and today. In what follows, I present a stylized account of the relationship between the IS curve and the conventional aggregate demand curve to throw some light on the problem of what went wrong (and why) with textbook IS-LM/AS-AD analysis. What emerges is that the conventional aggregate demand curve, the cause of so many methodological and analytical problems, is not really needed.

WHAT DID HICKS DO IN 1937?

In contrast to common macro textbooks, Hicks [1937] presented IS and LM curves in (interest, nominal income \((Y, p)\)) space. He was forced to proceed in this manner because of the underlying macroeconomic model he used to compare the "classical" theory of the rate of interest to Keynes' theory. This short-period model assumed two sectors of production (consumption and investment good(s) sectors), a constant money wage, flexible prices (or price levels) of consumption and investment goods (equal to their respective marginal costs of production) and a constant capital stock. Within this framework it is impossible to talk of "the" real income, measured in physical units, because real output consists of two distinct kinds of goods. Consequently, Hicks proceeded in terms of nominal income defined as the money value of aggregate supply:

\[
Y_p = p, c + p, i
\]

and presented the IS and LM curves in \((i, Y_p)\) space. As can be gathered from equation (1), the resulting IS and LM curves in \((i, Y_p)\) space have characteristics that are of utmost relevance to the problem under consideration (i.e. the relationship between the IS curve and the aggregate demand curve):

- each point on these curves implies a specific combination of relative prices and quantities of consumption and investment goods,
- moving along these curves implies changes in quantities and relative prices and
- the point of intersection of the IS and the LM curve implicitly determines not only quantities \((C, I)\) but also relative prices \((p, c, p, i)\).

Thus Hicks [1957] had no need to construct an aggregate demand curve in order to determine relative prices or, for that matter, the price level.

VARIANTS OF HICKSIAN IS-LM

In a two-sector model it is impossible to unambiguously separate price effects from aggregate output effects. But if the two-sector assumption is dropped, nominal income is equal to real income \((Y)\) (quantity of the single good) multiplied by the price level \((P)\), i.e. \((i, P \cdot Y)\). At first sight, nothing much changes: as in Hicks' original model, points on the IS and LM curves imply specific values of price level and quantity (real income) variables. But new price level and quantity effects can be separated in a straightforward manner and, in principle, it becomes possible to geometrically represent IS and LM curves in various ways: they can be drawn in \((i, P \cdot Y)\) space, staying close to Hicks' original presentation of his model (as in Modigliani [1944]), \((i, Y)\) space and \((i, Y)\) space (and \((i, P)\) space). For analytical reasons, alternative (iii) is to preferred.

Let us look more closely at possibilities (ii) and (iii). Regardless of which is chosen, the resulting IS and LM curves always simply imply the "suppressed" variable. If IS and LM curves are drawn in \((i, P)\) space, every point on them implies a specific value of \(Y\), i.e. \((i, P \cdot Y)\), and if they are drawn in \((i, Y)\) space every point implies a specific value of \(P\), i.e. \((i, P \cdot Y)\). Accordingly, the intersection of IS and LM curves drawn in \((i, Y)\) space implicitly determines the equilibrium price level, while the intersection of IS and LM curves drawn in \((i, P)\) space implicitly determines the equilibrium level of output (see Barrens [1995] for the explicit geometrical determination of the equilibrium of price level and output, respectively).

Let us now turn to two extreme cases of this Hicksonian one-sector IS-LM model. First, assume that not only the price level but the money wage as well is flexible [Hicks, 1950, 1957 and 1967]. In this case, the equilibrium level of output is determined by labor market equilibrium and production technology (the aggregate production function). Thus, concerning the analysis of IS and LM curves, the full employment level of output \((Y_e)\) is exogenously fixed and the \((i, P \cdot Y)\) space changes into \((i, Y)\) space. The rate of interest and the price level are the only variables free to vary and IS and LM curves have to be drawn either in \((i, P \cdot Y)\) (as in Hicks [1957; 1967]) or in \((i, P)\) space. I will refrain from discussing the shape of the resulting IS and LM curves (on this, see Hicks [1957; 1967], Meyer [1969], 128-31, Modigliani [1944], 39-66 and Barrens [1995]), but one additional remark is in order at this stage: trying to draw the IS curve in \((i, Y)\) space results in a single point \((i^*, Y_0)\) (assuming, as most textbooks do, \(C = CY\) and \(I = R(i)\)) [Hicks, 1957, 292; 1967, 149; Issing, 1973, 338].

The second extreme case assumes that the price level (and the money wage) is fixed at a given value, say \(P_i\). The \((i, P \cdot Y)\) space then changes into \((i, Y)\) space. Now the rate of interest and the level of output are the only variables free to vary and IS and LM curves have to be drawn either in \((i, P \cdot Y)\) or in \((i, Y)\) space. Here, at last, we have the IS and LM curves of the simple textbook IS-LM model (Hicks [1980-81] discusses this model).
FIGURE 1
Various IS Curves

The IS and LM curves resulting from the full employment flexprice version and the fixprice version of IS-LM show a striking symmetry: while different points on the IS and LM curves derived from the former model imply the same level of output (i.e., $Y_F$), different points on the IS and LM curves resulting from the latter model imply the same price level (i.e., $P_f$).

WHAT WENT WRONG WITH IS-LM/AS-AD ANALYSIS?

We are now in a position to answer the question of what went wrong in the development of textbook IS-LM/AS-AD analysis. Above it was pointed out that in IS-LM models with flexible price level, IS and LM curves should be drawn in $(i, P)$ space. But in what follows, they will be drawn in $(i, Y)$ space in order to accomplish a simple way of comparing the IS and LM curves resulting from the basic model and its two extreme cases.
WHY DID IS-LM/AS-AD ANALYSIS GO ASTRAY?

As has been shown, Hicks' original IS-LM model already was able to determine the prices of produced commodities. Furthermore, the IS-LM model used in Modigliani [1944] is a simplified version of Hicks' original model and can determine the price level without an aggregate demand curve (it is basically identical to the one-sector IS-LM model underlying the comparison of IS curves presented above). So why did Hicks' IS-LM model, or Modigliani's simplified version, have no influence when macroeconomic textbooks started to address the endogenous determination of the price level? At this stage, some remarks on the history of the evolution of IS-LM and AS-AD analysis are in order.

The first author to turn to, of course, is Alvin Hansen. Hansen [1953, 41 and 144-51] presented IS and LM curves in terms of nominal income. On the other hand, Hansen [1948] had proceeded in terms of nominal income until IS and LM curves were introduced. At this point, without any explanation, his analysis switched to real income [Hansen, 1940, 70a, 72a and 72n].

As was shown above, representing IS and LM curves in (I, Y) space as such raises no problem as long as the "suppressed" price level is not forgotten. It is not easy to find an answer to the question of whether Hansen did forget the "suppressed" variable, because he did not emphasize the connection between changes in output and changes in the price level. One reason for this may have been that he considered constant (marginal) costs of production (a horizontal aggregate supply curve) to be a reliable approximation of supply conditions in the presence of unemployment. So, even if Hansen did not misinterpret Hicks' IS-LM model by forgetting the "suppressed" price level, he did pave the way for the neglect of the price level in later IS-LM analysis.

McKenna [1955] seems to have been the first macroeconomic textbook that used an aggregate demand curve derived from IS-LM. As McKenna [1955, 197] notes, his exposition is based on Brownlee (1948). But the analysis in Brownlee (1948) is not based on IS-LM and is carried out on the assumption of an exogenously fixed rate of interest. Therefore, it seems more appropriate to say that McKenna's exposition is based on Brownlee (1950). In this paper, Brownlee derived the aggregate demand curve by shifting the LM curve (equilibrium curve of the money market) along the IS curve. The IS curve was the equilibrium locus of the commodity market (ibid., 419). But the meaning of this equilibrium, defined as "...the equality between real income (or output) and real expenditures on goods and services..." (ibid.), is ambiguous, because it is not clear whether real income referred to is meant to be realized output (with equilibrium implying equality between real aggregate demand and realized output) or output supplied by firms (with equilibrium implying equality between real aggregate demand and real aggregate supply).

So either Brownlee's AS-AD analysis was inconsistent, because the aggregate demand curve cannot be constructed if the IS curve shows combinations of real income and the rate of interest compatible with equality between aggregate supply and aggregate demand in the commodity market, or his IS-LM model was decisively different from Hicks' IS-LM. It is interesting to note that Brownlee considered the aggregate demand curve (his ZZ curve) as the "distinguishing feature of the 'Keynesian' theory" [1950, 414]. If this were true, neither Hicks' nor Modigliani's IS-LM analysis would qualify as expositions of Keynesian theory.

McKenna (1955) adopted this derivation of the aggregate demand curve, but, in contrast to Brownlee (1950), introduced a horizontal aggregate supply curve. The IS and LM curves were constructed assuming a constant price level and the horizontal aggregate supply curve served as a rationale for this assumption (McKenna, 1955, 171-72). This procedure runs into two interrelated problems. First, if the aggregate supply curve is horizontal, the price level is endogenous and the LM curve cannot be shifted by parametrical changes of the price level. If the LM curve is shifted to the right (left), the horizontal aggregate supply curve must be shifted downwards (upwards). Hence, every point on the aggregate demand curve will be intersected by a horizontal aggregate supply curve and it is misleading, and maybe even inconsistent, to combine this aggregate demand curve with a single horizontal aggregate supply curve. Second, combining this aggregate demand curve with a non-horizontal aggregate supply curve results in a diagram comprising contradictory assumptions about aggregate supply.

To sum up: whereas Hansen may not have misunderstood Hicks' IS-LM model, two early, maybe even the earliest, expositions of the AS-AD approach did not build upon Modigliani [1944] and either used IS-LM models different from Hicks' original model or were marred by serious inconsistencies. In particular, all the problems that still haunt present-day AS-AD analysis were already present in these two early contributions.

From the arguments presented in this paper, the answer to why conventional IS-LM/AS-AD analysis went astray seems to be straightforward: it is a case of "collective amnesia." When, after having initially presented only the simple IS-LM model with constant money wage and price level in textbooks, the need was felt to discuss price level determination, the relevant features of Hicks' ingenious approach apparently were forgotten. Therefore, it was also forgotten that the IS and LM curves of the simple IS-LM model are only special cases that cannot be transposed into more general IS-LM variants. This in turn led to the methodological blunder of constructing the conventional aggregate demand curve on the basis of IS and LM curves incompatible with the underlying model.
CONCLUDING REMARKS

The stylized account of the origin and development of textbook IS-LM/AS-AD analysis presented in this note has shown that

1. beyond the superficial similarity of using IS and LM curves, textbook IS-LM/AS-AD analysis bears very little resemblance to its alleged Hicksian origin;

2. severing the links to its origin results in the inconsistent use of an IS curve derived under the assumption of price (level) and money wage inflexibility in IS-LM models that contrast precisely this assumption, which, in turn, is the ultimate cause of the problems raised by the attempt to determine the equilibrium price level in textbook IS-LM models; and

3. by, at last, adopting the Hicksian approach, we could do without this methodological and analytical nonsense, the conventional aggregate demand curve.\textsuperscript{29}

Even if conventional AS-AD analysis should be discarded, there is, contrary to Barro's (1994) suggestion, no need to abandon a properly understood IS LM apparatus. Following Hicks' lead, we can construct an IS-LM model that does not fall victim to the inconsistencies of conventional IS-LM/AS-AD models and that may enable us to deal with questions of the implications of different assumptions about price (level) and wage flexibility for the working of a market economy.\textsuperscript{30}

This raises two important questions: What is the conceptual structure of Hicks' original IS-LM model and its variants that results in IS and LM curves so different from their textbook counterpart?\textsuperscript{31} Can the Hicksian approach to macroeconomic modelling serve as an alternative to conventional textbook IS-LM/AS-AD analysis or will we be forced to abandon his approach as well after careful scrutiny?

Whatever the answers to these questions eventually turn out to be, considering the present debates about alternatives to the conventional aggregate demand and aggregate supply curves of macroeconomic textbooks, the following remark seems appropriate. Before modifying curves or shifting them around or even discarding them, one should be clear about what these curves are (or what they were meant to be), how they are (or have to be) constructed and what their implications are, because, as the saying goes: you must learn to walk before you run...
only one price level is relevant and hence only one point on the aggregate demand curve, the one that lies on the horizontal aggregate supply curve. Therefore, it is misleading to suggest that the entire aggregate demand curve is relevant. The argument becomes incoherent as soon as a different point on the aggregate demand curve is considered (and interpreted as a disequilibrium situation), because such a different point corresponds to a different set of assumptions about the three exogenous determinants of the price level; see Neville and Bae [1998].

10. This property is manifest (as it may be called) of IS-LM/AD has been pointed out by Colander [1995, 161], Fildes and Hart [1988] and Neville and Bae [1998, 158 and 203]. It may be avoided by dropping the assumption of a horizontal aggregate supply curve. But in this case, the move away from the IS-LM model with a constant price level not only entails a change in the assumption concerning price level flexibility but also a change in aggregate supply conditions and, more importantly, in the character of the IS-LM model and, hence, of the aggregate demand curve. So, just like Browne’s AS-AD analysis, McKean’s exposition either is incoherent or his IS-LM model is desi-

sively different from Hicks’ IS-LM.

19. The AS-AD approach may have a different origin in the theory of inflation, see, for example, Hansen [1957] and Friedman and Friedman [1968].

20. An anonymous referee has suggested that maybe the relevant features of Hicks’ IS-LM model have not been forgotten but just not understood. This would be “collective amnesia” instead of “collective blindness.”

21. Concerning the problem raised by Rahim and Birt [1986]; it may be pointed out that in the Hicksian neo-Schumpeterian IS-LM model the IS curve indeed is the equilibrium locus of the commodity market.

22. It may be argued that textbook IS-LM/AD is more concerned with portraying the short-run ad-

justment to a Keynesian equilibrium of prices and money wages that are neither perfectly flexible nor perfectly inelastic.

In this interpretation, a vertical aggregate supply curve does not necessarily assume price flex-

ibility (and certainly does not imply that firms can actually sell their desired output [Barro, 1993, 261], indeed, it is a labor market equilibrium curve drawn in (P, Y) space showing constant full employment aggregate supply at alternative rigid price levels if the rigid money wage moves “in tandem” [Stiglitz, 1980, 498) with any change in the rigid price level. This “labor market equilibrium” may be artificial, but the components of AS-AD are no longer contradictory as both aggregate demand curve and aggregate supply curve refer to “sticky” prices and money wages.

Barro’s [1984] criticism of AS-AD seems to be excessive, What, of course, remains valid is that a IS-LM model resting on the assumption of scarce supply of goods must not be applied to situations that contravene this assumption (i.e., IS, LM and aggregate demand curves must not be drawn to the right of full employment output).

But even leaving aside the problem of whether this application of conventional IS-LM/AD can avoid the inconsistencies discussed in the present paper, it must be emphasised that IS-LM is a short-period model assuming, inter alia, a constant credit stock. If one takes into account empirically observed trends in the frequency of changes in rigid prices (Boll and Mackie, 1984, 123), the short run may easily be longer, so to speak, than the short period, with elastically adjusted prices and money wages changing after a shifting vertical aggregate supply curve. This would be a misuse of the IS-LM model [Bliss, 1987, 464].

23. On this see Bares [1998].

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