

THE KEYNESIAN CROSS REVISITED

by

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"If the teacher happens to be a man of sense, it must be an unpleasant thing to him to be conscious, while he is lecturing his students, that he is either speaking or reading nonsense, or what is very little better than nonsense."

Adam Smith, Wealth of Nations (V.i.f.14)

Contemporary textbook accounts of the elementary theory of income determination follow a curiously common pattern.¹ The presentation begins with some introductory remarks on national income accounting and related concepts, after which students are confronted with a diagram of the kind shown in Figure 1, where the horizontal axis is labelled "Income", "GNP", or simply "Y", and the vertical axis is labelled "Expenditure", "Total Spending", or "E". Attention is then directed to a point such as A in Figure 1 where E is less than Y . This cannot represent an equilibrium, students are told, because when aggregate income exceeds aggregate expenditure business firms will find themselves selling less than intended and so piling up unwanted inventories of unsold goods; to put an end to this, firms will reduce output and employment. A similar argument indicates that at

¹ The original source of the pattern is unclear (cf. Ambrosi, 1981, p. 503), but is probably A. H. Hansen (1945) and his students (see, for example, Bishop, 1948, pp. 318-20, and Samuelson, 1948, pp. 134-6). The continuing popularity of the pattern is no doubt attributable to its appearance in the first and all later editions of Samuelson's Economics. Some of the more notable "copies" may be found in Baumol and Blinder, pp 147-9; Lipsey, Steiner and Purvis, , pp. 528-529; Gordon, pp. 59-62; Dornbusch and Fisher, pp. 55-59.

points such as C, where E is greater than Y , firms will be selling more than intended and will therefore expand output and employment. So the point B, where $E = Y$, is shown to represent the only possible equilibrium. Various assertions are then put forward--only at B is intended saving equal to intended investment, only at B is unintended inventory investment zero, only at B will business firms be getting back in revenues what they are paying out as costs, only at B will aggregate income equal aggregate expenditure, only at B will product markets "clear"--to convince students that B is indeed an equilibrium point: there and only there will firms have no inducement either to expand or contract output and employment.

FIGURE 1

Most students will readily accept this "proof" that national income will be at its equilibrium level if and only if $E = Y$, and any who don't can usually be persuaded that it is their understanding or intelligence rather than the argument that is at fault. Occasionally, however, one comes across a student who insists on making trouble. . . .

I. CLASSROOM ENCOUNTER: ACT ONE

Student: Sir, I think I follow most of what you've said, but I'm having trouble with the beginning. I thought we were told earlier that E was total spending on final goods and services and that Y was just another way of looking at E . . . I mean, E and Y are just different names for GNP. Isn't that right?

Professor: Yes, that's roughly correct.

Student: Then I don't see how we can consider a situation where E is less than Y . As we've defined things, such a situation doesn't seem to be thinkable.

Professor: I think I see your problem. Perhaps I should have emphasized that for purposes of economic analysis we have to distinguish between actual spending as measured in the national income accounts and the relevant economic concept of planned spending as used in our diagram. The line EE refers to planned spending and this will differ from actual spending whenever unintended investment differs from zero; that is to say, any difference between planned and actual spending is defined as positive or negative investment spending by business firms. So you see there is really no contradiction involved in considering a situation where E differs from Y . O.K.?

Student (after long pause): Gee, I don't know! Do you mean we can't figure out GNP by knowing what buyers spend on goods and services... we also have to know what sellers plan to sell? Why didn't the text say something about that in the income accounting chapter? I thought sales of final goods and services meant purchases by persons other than producers of the goods and services offered for sale; I didn't realize it also included investment purchases by firms who get stuck with their own unsold goods.

Professor: No, no! Purchases of unsold goods by their producers enter the "earnings and cost" side of the national income accounts as a balancing item to ensure that actual spending on final goods and services is always just equal to income as looked at from the cost side.

Student: But Professor, doesn't that make GNP the same thing as planned spending.....so it's planned outlays by business firms that can differ

from GNP by the amount of unintended investment? But then I don't see why the horizontal axis in our text wasn't labelled "Planned Outlays" or something of that sort instead of GNP.² Gee, this can get confusing!

Professor: Well, from an economic standpoint you can think of unintended investment either as a difference between planned and actual spending on the vertical axis or as a difference between planned and actual income on the horizontal axis. Either way, you see there can be a relevant economic difference between total spending and total income, so there's nothing wrong with the diagram. You go away and think about it . . . go to the library and look at some other texts; I think you'll soon see just how trivial and obvious it is.³ Now, let's get on to the multiplier and other applications of our analysis. . . .

II. CLASSROOM ENCOUNTER: ACT TWO

Two days pass, another class begins, and once more the troublesome student raises his hand:

Professor: Yes? Oh, it's you again!

Student (genuinely apologetic): Sorry, sir. . . You remember my problem last time?

Professor (nodding affirmatively): Uh, huh.

Student: Well, I did what you said and I think I see how planned spending can differ from GNP, but now I can't follow the rest of the argument.

Professor: What do you mean? What can't you follow?

² The student is referring to Samuelson & Nordhaus, Economics, 12th ed., McGraw-Hill, New York, 1985, p. 152.

³ The professor is using techniques familiar to specialists in the theory of Generalized Logic (see Dunmore, 1973, pp. 29-33).

Student: Well, the text says B is the only point of equilibrium because anywhere else we have output different from planned expenditure.

Professor: Yes. . .

Student: Well, as the diagram is drawn, I can see that planned spending equals actual spending only at the point B, but I don't see how that tells us anything about equilibrium output or employment. . . it just doesn't make economic sense.

Professor: That's pretty vague. I don't see how I can help you if you can't express yourself more clearly.

Student: Well, its just. . . well. . . I really don't see how curves showing what people spend or plan to spend on goods and services can tell us anything about quantities of goods firms produce or plan to produce.... Like, suppose firms are selling all the goods they are currently producing, so there's no unintended investment; and customers are buying all they want to buy, so there's no difference between planned and actual spending; but businesses are charging high prices and making huge profits. So what does it matter if $E=Y$? Why shouldn't firms increase output? Or suppose firms aren't selling all they want to sell, so inventories are piling up; we still have $E=Y$ as long as customers are buying all they want to buy. I guess I just can't see how our argument makes any connection between GNP and output, so it all seems pointless. Do you see what I'm saying, Sir?

Professor: Well, I hear what you're saying, but it seems to me you're just confused and letting your words run away with you. In any case, let's leave it for now; I think all these difficulties will disappear as we get deeper into the subject.

Student: Gee, Professor, maybe so . . . but right now, I've gotta tell you frankly, I don't see how anyone can make sense of this stuff.

III. CROSSES TO BEAR

Classroom encounters come and go, but not so textbook arguments! The sad truth is that, for more than thirty-five years, students of elementary and intermediate macroeconomics have routinely been introduced to the subject via an argument which, as commonly set forth, make no sense. What is worse, they have been required to learn and regurgitate this pretense of an argument--and later apply it in countless loose discussions of "big" problems--in order to pass the course. It hardly matters that some students will be unaffected by all this and that a few will even go on to become professional economists; what matters is that most students will conceive an intense dislike for a subject that appears to thrive on specious argument and will have nothing more to do with it.

Just what is wrong with the standard textbook presentation of the Keynesian Cross? The answer is surprisingly straightforward. The argument starts off on the wrong track by treating the national accounting concept of "income" as if it were a measure of business outlays for factor services; in fact, "income" in this sense is simply another name for GNP, which is a measure of business receipts, not business outlays. The argument goes further astray by proceeding under the apparent illusion (made plausible by the confusion just noted) that the EE locus relates planned expenditure not to business receipts, which it actually does, but to business outlays, which it clearly doesn't. The intersection of the EE locus with the 45° line is then mistakenly considered to imply equality between planned expenditure and business outlays, when in truth it implies nothing more than equality between planned and actual expenditure: that buyers of final goods and services are "on" rather than "off" their demand curves.

So the entire argument is fraudulent, albeit unintentionally so. The patter that accompanies the presentation is mostly plausible, even sensible; no doubt there is some theory, somewhere, for which most of it is even true. In the context where it actually appears, however, the patter is simply gibberish. The argument purports to show how equilibrium GNP is determined, but what it actually does is establish a trivial, indeed almost fatuous necessary condition for GNP to be in equilibrium: people should be willing to spend just what they are actually spending!

Granted that the usual textbook account of the Keynesian Cross is a professional embarrassment, what is to be done? Surely the least we can do is present the "cross" diagram, if at all, only in the context of an explicit microeconomic theory of output and price determination so that the functional relationships represented in it can be assigned unambiguous meanings and used as a basis for rational discussion of macroeconomic problems. Two examples of what I have in mind are presented in the sections that follow. The first example, based on "classical" demand and supply analysis, yields a logically valid version of the cross but implicitly denies macroeconomics any claim to novelty. The second example, based on more controversial "customer market" ideas ⁴, yields another valid version of the cross but has problems of its own. I offer no theory in support of the conventional textbook cross because, as indicated above and as detailed more fully below, that construction appears to rest on confused and wishful thinking rather than economic analysis.

IV. DEMAND AND SUPPLY SOMETIMES APPLY

⁴ See, for example, Okun, 1980, pp. 138 ff.; Phelps, 1985, pp. 381 ff.

Imagine that we have to deal with a fiat money economy in which all trading of goods and services involves cash transactions in organized auction markets. Restricting attention to the short-run, let us suppose that producers--all presumed to be price takers--choose output and employment to maximize expected net revenue at prevailing prices (static expectations). Assuming free availability (excess supply) of labor, we may then regard short-run market supplies as well-defined functions of prevailing real wage rates. Now, there is no generally valid procedure for aggregating supply functions over different markets, but there can be no objection to supposing, purely for pedagogical purposes, that the economy contains just one "final goods and services" market. On that supposition, we may represent the production side of the economy by a single supply curve such as S in Figure 2A, which shows what level of aggregate output will be produced and offered for sale at alternative "expected" market prices or, what amounts to the same thing, what level of marginal cost must be covered by price if producers are to maintain any given level of output. More particularly, notice that areas below and to the left of alternative points on S --for example, the shaded area labelled Y_A in Figure 2A-- represent aggregate output valued at marginal cost or, equivalently, the flow of money proceeds that profit-maximizing producers must expect to realize from sales if they are to maintain any given level of output in the short run.⁵

FIGURE 2A

FIGURE 2B

⁵ This is just Keynes' "aggregate supply price", except that it is expressed in money rather than units of labor (see Keynes 1936, p. 24).

Turning next to product demands, let us suppose that households choose purchases to maximize expected utility subject to budget constraints that require payment in cash at prevailing money prices. Short-run market demands are then defined as functions of relative prices, real cash balances, and real earnings⁶ from sales of labor services or other household "outputs." Recognizing that explicit aggregation raises the same problems for heterogeneous demands as for heterogeneous supplies, we proceed as before on the pedagogically convenient assumption that the economy contains only a single product market. We may then graph the short-run aggregate market demand for "final goods and services" as a family of downward sloping curves $D(Y_A)$, $D(Y_B)$, $D(Y_C)$, etc. as illustrated in Figure 2B, each distinct curve corresponding to a particular value of real earnings as determined by alternative levels of "aggregate output valued at marginal cost", $Y_{(mc)}$.

Now, suppose that output and price are at S_A and P_A in Figure 2A so that quantity demanded is D_A as indicated by the demand curve $D(Y_A)$ in Fig. 2B. Then total expenditure, E_A ,--represented by the shaded area below and to the left of the point (D_A, P_A) in Fig. 2B--will be less than Y_A , reflecting the fact that at a price P_A the profit-maximizing supply of producers is greater than the utility-maximizing demand of consumers. If we identify the horizontal axis in our earlier "cross" diagram, Figure 1, with

⁶In general, household demands will depend on the distribution as well as total amount of real cash balances; but here we presume that the short run is sufficiently long to permit individual holdings of money to be "reshuffled" to accord with individual requirements (cf. Archibald and Lipsey, 1958; Clower, 1963). This implies a version of Say's Law to the effect that each household's short-period planned expenditures are just equal to its realized receipts. This, in turn, implies that individual demands will depend in the short run (though not in the very short run) on realized sales of factor services or other household "outputs".

alternative possible values of $Y_{(MC)}$, then we may regard the point A in Fig. 1 as indicating precisely the same fact: supply exceeds demand. Applying familiar principles, we may then argue that whenever income (defined as "aggregate output valued at marginal cost"?) exceeds expenditure (defined as "aggregate planned expenditure on final goods and services"), supply will exceed demand, price will fall, and output and employment will decline: so point A in Fig. 1 cannot represent a position of equilibrium for a competitive auction-market economy. By exactly similar reasoning, Point C in Fig. 1 cannot represent a position of equilibrium because it corresponds to a situation in which demand exceeds supply. Finally, point B does represent a position of equilibrium, because when income ($Y_{(MC)}$) equals expenditure we also have (real) quantity demanded equal to (real) quantity supplied.

I forego further elaboration of what must now be obvious. On the present interpretation, the 45° line in Fig. 1 indicates, for all possible configurations of demand and supply, values of income and expenditure at which a competitive market for final goods and services can be in equilibrium with (planned) quantity demanded equal to (planned) quantity supplied. The 45° line is just a necessary condition for "clearance" of markets for final goods and services; it has absolutely nothing to do with the national income accounting identity (which merely asserts that all expenditures on final goods and services during a given period of time may be regarded as accrued, but not necessarily received income for someone for the same period). To say that income ($Y_{(MC)}$) differs from expenditure is to assert nothing whatever about inventory movements: prices may adjust so

⁷ Note that this concept of income, being a measure of current business outlays, cannot be identified with the national income accounting concept, which is a measure of current business receipts.

rapidly that inventories never differ significantly from zero. And to assert that producers adjust output in response to disappointed sales expectations would deny perhaps the most fundamental characteristic of any competitive auction market: producers always sell just what they expect to sell; they adjust output only when their price expectations are disappointed--when the market-clearing price turns out to differ from the price expected to prevail when the current output level was chosen.

It is altogether unthinkable, of course, that anyone (a few New Classical Economists excepted) should seriously propose basing macroeconomics on conventional demand and supply analysis. I make no such proposal. My only purpose in outlining a "classical" version of the "cross" diagram has been to show that the standard textbook presentation cannot be reconciled with what is taught in the microeconomics section of the usual principles course.

V. SUPPLY ON DEMAND: CUSTOMER MARKET LAND

Altering perspective now, imagine that we have to deal not with an auction-market but with a customer-market economy in which all trading takes place in "proprietary" markets organized and operated by producers. A full theory of such markets has yet to be developed.⁸ What presently exists is little more than a collection of stylized facts: (i) "asking" or "list" prices are governed by long-run cost and sales expectations rather than short-run forces of supply and demand; (ii) short-run output levels are adjusted passively to accord with realized sales at prevailing list prices; (iii) price competition is sporadic and commonly takes the form of temporary discounts or sales promotion devices (coupons, prize contests, etc.) rather

⁸ But see Okun, 1975 and 1980, for indications of substantial progress.

than cuts in "posted" list prices. This is not much, but it will do for present purposes; we need only enough "theory" to define, not defend, a customer-market version of the Keynesian Cross.

Let us focus initially on a "representative" producer of a single output whose short-run variable and total costs are given by the curves AVC and ATC in Figure 3. In keeping with stylized fact (i), above, we suppose that the producer's current list price is set at p_0 in Fig. 3 --high enough to ensure that average total costs will be covered for a range of output levels less than capacity output s^* . Then since price will exceed average variable (and marginal) cost for all outputs less than s^* , the producer will be willing to produce and sell any less-than-capacity output at his posted list price. But the amount of output that can actually be sold will depend upon customer demand at that price, which will depend on a host of conditions over which the producer has no control. So it is plausible to argue, in keeping with stylized fact (ii) above, that output will normally be demand-constrained, which is to say that short-run "equilibrium" output is determined by short-run sales.

FIGURE 3

Turning now to the economy as a whole, let us suppose--in keeping with stylized fact (iii)--that aggregate short-run demand for any given class of products is independent of competitive maneuvering and depends only on list prices for that class. Then we may readily construct a "cross" diagram for a single-product ("goods and services") version of our customer-market

model by measuring aggregate output valued at list price⁹, Y_{Po} , horizontally and aggregate expenditure, E , vertically, as indicated in Figure 4. By an argument similar to that in Part IV, above, we may regard aggregate expenditure as a function of Y_{Po} , giving us the usual upward sloping EE curve. According to our earlier analysis, output is normally demand constrained; provided that all realized sales occur at list prices, therefore, it follows that the short-run equilibrium level of aggregate income (i.e., aggregate output valued at some given list price, P_o ¹⁰) is determined by the intersection of the expenditure locus EE with the 45° locus $E = Y_{Po}$.

FIGURE 4

On this interpretation, aggregate output appears to be strictly demand determined, in keeping with the usual textbook accounts of the Keynesian Cross. But matters are not quite so straightforward as this might seem to suggest. For suppose that some or all sales are made at prices below list--a likely possibility, because producers will obviously have a strong

⁹ In a customer market economy, "list price" will of course be an index of the list prices of individual producers. In what follows I shall denote the value of this index by P_o .

¹⁰ Note that this concept of "income", like the earlier one of "aggregate output valued at marginal cost", is a measure of business outlays and so cannot be identified with the national income accounting concept, which is a measure of business receipts. The most casual inspection of standard macroeconomics texts indicates that most authors fail to communicate this elementary distinction and so encourage students (and often themselves) to confuse the problem of measuring GNP with the completely distinct problem of explaining its economic determinants. Students would be better served if national income accounting were presented at the end rather than the beginning of macroeconomics courses, by which time they might be expected to know enough to appreciate the difference between empirical measurement and theoretical analysis. Their instructors might also be discouraged from trying to use the national income accounting identity as an equilibrium condition!

inducement to seek additional sales by offering discounts off list prices up to the point where net average revenue is equal to marginal production cost, MC_o . Then for any given level of actual expenditure, E^o , output valued at list as contrasted with transactions prices may lie anywhere between Y_{P_o} and βY_{P_o} , where $1 \leq \beta \leq P_o/MC_o$. Hence for any given expenditure locus, EE , the equilibrium value of Y_{P_o} may lie anywhere between Y_p^* and Y_p^{**} in Figure 5A, its exact level depending in a complicated way on the amount of competitive maneuvering in which businesses engage--a topic not covered by our "theory."

FIGURE 5A

FIGURE 5B

But that is not the end of the story. The expenditure locus EE is defined on the assumption that current business outlays for factor purchases are equal to output valued at some given list price P_o . For any given level of output, Q^o , however, such outlays may lie anywhere between $P_o Q^o$ and $MC_o Q_o$; in general, therefore, the expenditure locus may lie anywhere between some upper boundary EE and some lower boundary E^*E^* , as shown in Figure 5B. This added complication further widens the range of possible equilibrium values of Y_{P_o} since the intersection of an expenditure locus with an equilibrium locus $E = \beta P_o$ ($1 \leq \beta \leq P_o/MC_o$) may now occur anywhere in the shaded region shown in Figure 5B. Precisely where the intersection lies will depend not only on the kind of competitive maneuvering in which firms engage but also upon their payment practices. And the area of indeterminacy will change, of course, with every change in posted list prices!

The present example may very well portray the way in which most macroeconomists(perhaps including the ghost of J.M. Keynes) subconsciously

conceive their subject. Equilibrium output and employment are not well defined: "neutral" equilibrium is the general case and the normal state of the economy is, within broad limits, one of Brownian motion. If so, then that is the way the subject ought to be presented. It is no good pretending either to our students or ourselves that we presently understand how an economy of this kind actually works. Simple graphical constructions may convey an accurate impression of the problems that remain to be resolved, provided they are explicitly linked with intellectually coherent theoretical models; but that is about the limit of their usefulness in our present state of knowledge.

VI. CONCLUSION

Macroeconomics has been in a muddle since its inception. For this Keynes no doubt must bear some of the blame; the General Theory may have been his greatest but it surely was not his most perspicuous contribution to economics. Most of the fault lies, however, with those amongst Keynes' interpreters-- textbook writers and others--who have been so eager to apply "Keynesian" insights to practical problems that they have substituted assertion for argument and thereby produced confusion rather than understanding. The Keynesian Cross is just one chapter in a cautionary tale that might fill several volumes.

In this paper I have shown that it is possible to make sense of two versions of the familiar "cross" diagram, neither of them consistent with the standard textbook construction. The textbook "cross" appears to be neither fish nor fowl--the graphical counterpart of an ill-assorted collection of intuitively plausible hypotheses that are nowhere organized into a coherent body of theory. In justice to our better students it seems that we should either make the construction intellectually respectable or eliminate it from

our texts. But that raises other problems. How do we put students through multiplier and related comparative statics^{exercises} without a "cross"? Do we admit that most of what is currently taught on this subject is "mumbo-jumbo" rather than economic analysis? And what do we do with ISLM analysis, which in most treatments is directly connected with the conventional Keynesian Cross? Should we present ISLM analysis as an explicit few-commodity version of competitive general equilibrium theory, or should we eliminate it from the curriculum also? More generally, how can we hope to provide students with an honest and reasoned account of the short-run working of an ongoing economy when we have yet to provide one for ourselves? I have no easy answer to any of these questions, but as food for thought I close by completing my earlier quotation from Smith's commentary on the teacher who "...happens to be a man of sense....":

"It must too be unpleasant to him to observe that the greater part of his students desert his lectures; or perhaps attend upon them with plain enough marks of neglect, contempt, and derision."

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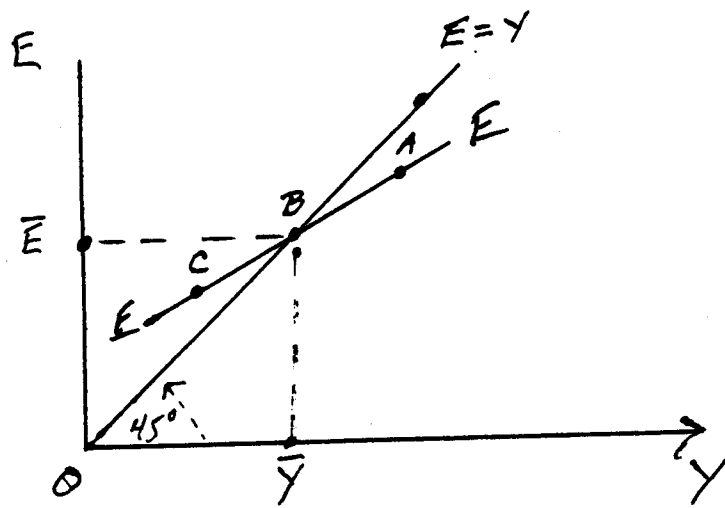


FIG. 1

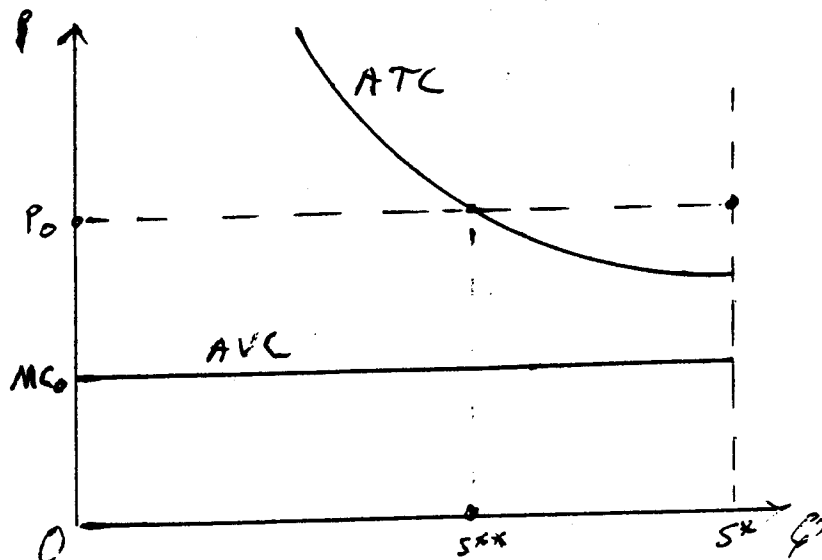
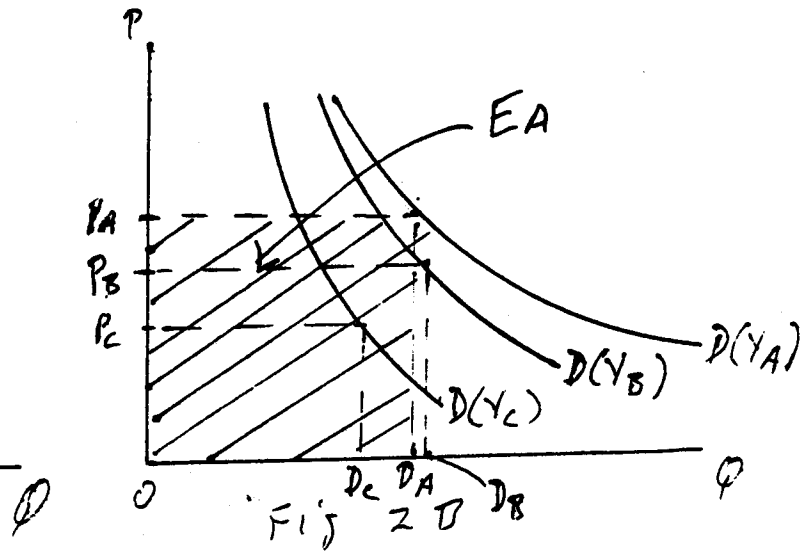
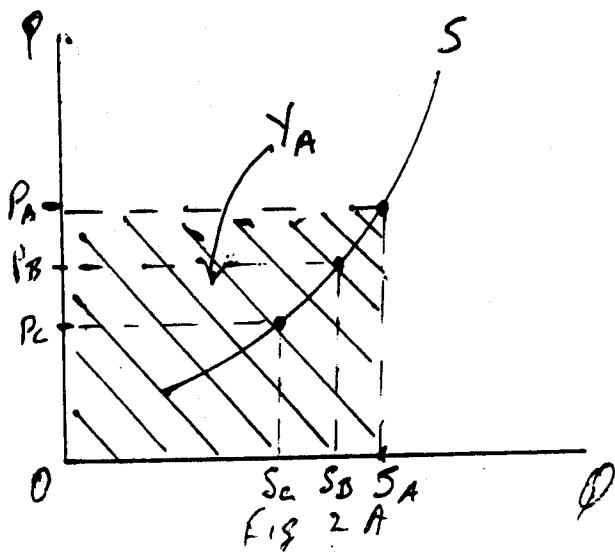


FIGURE 3

DIAGRAMS

THE KEYNESIAN CROSS

THE KEYNESIAN CROSS

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