SHORT-RUN EQUILIBRIUM GDP AS THE SUM OF THE ECONOMY'S MULTIPLIER EFFECTS

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ABSTRACT

The author suggests that macro principles students' grasp of the structure and workings of the short-run economy may be enhanced by conceptualizing the demand-side equilibrium level of GDP as the sum of all individual multiplier effects at work in the economy at a given point in time. A simple numerical example, presented after the concepts of equilibrium GDP and the multiplier have been introduced and discussed initially, illustrates the point. Considering the equilibrium level of GDP from a "multipliers perspective" highlights for students the variety of short-run factors affecting the magnitude of GDP. It also helps clarify the relevance of the concept of short-run equilibrium GDP in an economic system that never actually achieves a specific equilibrium and where "other things" are rarely constant.

INTRODUCTION

While the Keynesian concepts of the marginal propensity to consume and the multiplier no longer dominate principles of macroeconomics textbooks as they once did, most instructors still spend class time discussing them. Once students are familiar with the MPC and the major types of aggregate spending, the economy's short-run equilibrium level of GDP is determined, assuming a constant price level. Discussion then typically shifts to the multiplier, with a change in autonomous spending (usually investment) establishing a new equilibrium level towards which the economy moves until the next demand shock occurs.

In the process of studying those concepts many students become proficient at determining the equilibrium level of GDP, whether by utilizing a Keynesian cross/45º line-type diagram, comparing aggregate expenditures and production in a table, or manipulating a simple algebraic model of linear equations. And they quickly learn how to use the multiplier to calculate subsequent changes in the

equilibrium level of GDP. But when asked why equilibrium is established at any specific level of output, such as $10,000 billion or $12,000 billion, or whatever the numerical example may be, about the best most students can muster is, "because that's the level of total output matched by total expenditures."

The purpose of this brief paper is to suggest that once the concepts of equilibrium GDP and the multiplier have been introduced and discussed initially per the general sequence noted above, supplementing that discussion with a slightly different take on why the equilibrium level of output is established at any particular numerical level may enhance principles students' grasp of the underlying structure and workings of the short-run economy. Specifically it is suggested that students may benefit from conceptualizing any short-run equilibrium level of GDP as the sum of all individual (demand-side) multiplier effects at work in the economy at a given point in time.

To illustrate that point here a standard principles-level example of short-run equilibrium GDP determination is presented initially. Then the resulting equilibrium GDP dollar-amount is shown to be equivalent to the sum of the economy's autonomous-spending multiplier effects, broadly construed. Next, historical precedents of that notion are cited. Finally it is argued that, while an oversimplification, conceptualizing the aggregate level of short-run economic activity as the sum of an economy's multiplier effects gives principles students, among other insights, a better sense of both the variety of short-run factors affecting the magnitude of GDP and the relevance of the concept of short-run equilibrium GDP in an economic system that never actually achieves a specific equilibrium and where "other things" are rarely constant.

DETERMINING SHORT-RUN EQUILIBRIUM GDP: A STANDARD EXAMPLE

Table 1 presents a typical textbook example of short-run (demand-side) equilibrium GDP determination. All dollar amounts are in billions and a fixed price level is assumed. The underlying consumption function is C = $300 + .8Y; there are no taxes and no induced portions of investment, net exports, or government spending.

Comparing possible levels of aggregate output with associated levels of aggregate spending in the first and last columns, respectively, yields an equilibrium GDP figure of $9000 billion. Complementing those numerical comparisons with discussion of the rationale for producers' output adjustments from non-equilibrium

output levels shows students why GDP moves naturally towards $9000 billion in the short run. Discussion then typically turns towards what happens in the event of a demand shock. A change in autonomous spending is introduced and the multiplier principle is presented to explain why the equilibrium level of GDP changes more than autonomous spending.

Table 1: Short-run Equilibrium GDP Determination

GDP (Income)	Consumption (C)	Investment (I)	Government (G)	Net Exports (X-IM)	Aggregate Expenditures
$8000	$6700	$700	$600	$200	$8200
8500	7100	700	600	200	8600
$9000	7500	700	600	200	$9000 (*equi.*)
9500	7900	700	600	200	9400
10000	8300	700	600	200	9800

Note. All dollar figures are in billions.

SHORT-RUN EQUILIBRIUM GDP AS THE SUM OF THE ECONOMY'S MULTIPLIER EFFECTS

Once students have been introduced to the concepts of equilibrium GDP and the multiplier per above, they would be well served, I'd suggest, by brief further consideration of *why* the initial equilibrium level of output in this economy happens to be $9000 billion. Having compared aggregate production and spending levels in the table, they grasp the notion that individual producers adjust their output levels to unexpectedly weak or strong demand and that, in the aggregate, those adjustments move the economy naturally towards equilibrium, other things constant, at $9000 billion.

Beyond the basic production-adjusts-to-demand explanation of short-run equilibrium, however, the $9000 billion equilibrium level may be conceived broadly as the end product of the spending-multiplier effects simultaneously at work in the economy. Comparing changes in aggregate income to changes in consumption in Table 1's columns 1 and 2, respectively, reveals an MPC of .8 and a simple multiplier of 5. Furthermore the types of autonomous spending presented in Table 1 may be viewed broadly as the basis of four separate autonomous-spending

multiplier processes generated by $300 billion of autonomous consumption,[1] $700 billion of investment, $600 billion of government spending, and $200 billion of net exports. Table 2 shows the individual effects of each of those multiplier processes on output/income as well as their total impact of $9000 billion, the short-run equilibrium level of GDP.

Table 2: Short-Run Equilibrium GDP as the Sum of the Economy's Spending-Multiplier Effects

source of autonomous spending	amount of spending	multiplier (MPC=.8)	effect on equilibrium GDP
consumption	$300	5	$1500
investment	700	5	3500
government	600	5	3000
net exports	200	5	1000
Short-run equilibrium GDP:			$9000

Relating Equilibrium GDP to its Multipliers: Historical Precedents

While, to my knowledge, no explicit references appear in current macro principles' texts to the notion that short-run equilibrium GDP might be conceptualized as the sum of the economy's multiplier effects,[2] at least two indirect references to that notion appeared in the literature during the decade or so following the publication of Keynes' *General Theory* (1936).

Colin Clark (1938) noted the relationship of the economy's multipliers to equilibrium output/income in the process of investigating a separate, but related issue: estimation of the numerical value of Great Britain's multiplier through examination of national income data. As a starting point in his inquiry, he observed that some critics of Keynes' *General Theory* had questioned the "sovereignty of investment as the sole determinant of the level of economic activity"[3] asking, "Is it not possible … there are types of originating economic impulse other than the purchase of capital goods which may affect the general level of economic activity?" (436) In pursuing that question himself, Clark stated that by "… measurement of the 'determinants' [of the level of economic activity] of which the level of private investment is one element only, and by application of the multiplier to the

determinants[,] the level of money national income can be predicted." (443) In essence he was saying that the magnitude of the short-run equilibrium level of GDP equals the sum of the individual spending-multiplier effects.

A decade later, what Clark and others had called the "determinants" of the level of economic activity and "types of originating economic impulse" were presented as "exogenous factors" in Arthur Smithies' (1948) "simple formula" for "equilibrium national income":

$$\text{National Income} = \frac{\text{Sum of the influences of exogenous factors}}{\text{1- sum of the marginal propensities}}$$

While Smithies did not explicitly state that equilibrium national income is the sum of the multiplier effects, he related the level of equilibrium GDP directly to the specific amounts of exogenous/autonomous spending in the short-run economy.[4,5]

PEDAGOGIC LICENSE, STUDENT BENEFITS, CAVEATS

Multiplier effects, almost always refer to fluctuations in autonomous spending, not to the total amount of any category of autonomous spending. Yet statements, such as Clark's and Smithies', relating the total amounts of different types of autonomous spending to equilibrium national income confirm the author's sense that, in teaching principles students, exercising a measure of pedagogic license to conceptualize the short-run equilibrium level of GDP as the sum of the economy's multiplier effects is not only reasonable, but instructive. This sum-of-multipliers perspective can play the "role of logical organizer" (Colander 1991, 232), helping students organize their thinking about how the amounts of different types of autonomous spending in combination with the multiplier concept drive the short-run demand-side economy and determine its equilibrium level of GDP.

Granted, presenting equilibrium GDP as the sum of a string of multiplier effects has a mechanical ring to it, calling to mind at first Johnson's characterization of the multiplier as "that inexhaustibly versatile mechanical toy" (1961,11) and Colander's distinction between "mechanistic" and "interpretative" Keynesian models (1999, 368). And, were equilibrium GDP presented as the sum-of-multipliers in a bare-bones manner without elaboration, students could indeed get the impression of a short-run economy operating in a lock-step, deterministic manner, devoid of dynamism. But even a modest amount of explanation dispels that notion.

Presenting short-run equilibrium GDP as the sum of multiplier effects also makes it easier for students to think realistically about the concept of equilibrium GDP. They recognize readily that producers adjust their output levels to demand but rightly doubt that such adjustments ever result in the attainment of any numerically-specific equilibrium level of GDP. By supplementing that producer-adjustment discussion of equilibrium with the "multipliers perspective" noted above, students realize that the question of whether or not short-run equilibrium is ever achieved is a non-issue as they recognize that frequent fluctuations in business investment spending, home construction, consumer confidence, export demand, etc. alter existing autonomous-spending multiplier relationships, putting the economy on a new equilibrium path that too is bound to be interrupted subsequently by yet other demand shocks. Thus this sum-of-multipliers perspective enables students to appreciate both the relevance of the concept of short-run macroeconomic equilibrium and the role of demand-side dynamism in the short-run economy.

The multipliers perspective also makes evident that multiple demand-shocks may occur simultaneously, pushing the economy in the same or opposing directions, confirming students' personal observation of a world where "other things" are not constant and macroeconomic crosscurrents are not uncommon. They also easily recognize that negative spending shocks cause recession and see the potential, however modest, for government to utilize short-run stabilization policies to prod the economy in the direction of potential GDP from a less desirable equilibrium-GDP neighborhood.

Of course the insight gained into the workings of a short-run demand-driven economy by relating equilibrium GDP directly to its multiplier effects comes at a price. As noted previously a measure of pedagogic license must be taken in discussing multipliers in terms of total amounts of different types of autonomous spending as opposed to fluctuations in their levels. Also this multipliers perspective requires placing at least a modest amount of additional emphasis on the simple 1/(1-MPC) multiplier which ignores various factors: leakages that shrink the multiplier's numerical value substantially, measurement difficulties associated with forward-looking consumption, variation in the MPC across income groups and business-cycle phases, and aggregate-supply considerations. In my estimation, however, the insight gained by students into the nuts-and-bolts workings of the short-run economy by thinking "interpretatively" (not "mechanistically") about how the equilibrium level of GDP relates to the economy's multiplier effects is worth both the pedagogic liberty taken and the modest amount of time necessary to discuss the concept.

CONCLUSION

Many principles of macroeconomics students become adept at determining the short-run equilibrium level of GDP in a simple demand-side Keynesian model of the economy and quickly learn how to use the multiplier to calculate subsequent changes in that equilibrium level. Fewer students, however, display an intuitive feel for the specific magnitude of equilibrium GDP. It is argued here that supplementing standard discussion of equilibrium GDP and the multiplier with a slightly different take on why the equilibrium level of output is established at any particular numerical level may improve students' sense of the workings of the short-run economy.

Specifically it is suggested that students may benefit from conceptualizing the short-run equilibrium level of GDP as the sum of all individual (demand-side) multiplier effects at work in the economy at a given point in time. This perspective places additional emphasis on multipliers and, unadorned, could leave students with the impression that the short-run economy operates in a lock-step, mechanical manner. A modest amount of explanation readily reveals the opposite: the dynamic nature of short-run macroeconomic relationships. In establishing that sense of dynamism within an equilibrium framework, it is argued that students may better comprehend the workings of the short-run economy observable in their daily lives.

ENDNOTES

[1] Multiplying any level of income in column 1 of Table 1 by .8 indicates that induced consumption is $300 billion less than (total) C in column 2. With that information, students deduce that $300 billion is the amount of autonomous C in this simple economy.

[2] Among the textbooks checked were recent editions of Baumol and Blinder; Case and Fair; Hall and Lieberman; Mankiw; McConnell and Brue; O'Sullivan, Sheffrin, and Perez; Stiglitz and Walsh; and Taylor and Weerapana.

[3] While Keynes's discussion of the multiplier in the *General Theory* was couched mostly in terms of investment, statements such as, "Pyramid-building, earthquakes, even wars may serve to increase wealth …" (1936, 129) make clear that he did not view investment as the "sole determinant of the level of economic activity."

[4] The 'Sum of the marginal propensities' noted in the denominator of the equation refers not to the MPC alone but to Smithies' broader assertion that, "*Each* [emphasis added] of the behavior variables --- consumption, investment,

government spending, exporting, and importing --- can be regarded as partly endogenous and partly exogenous." (300)

[5] The algebraic equivalent of Smithies' equilibrium equation (usually defined in terms of Y) appears in chapter appendices of some principles' texts and occasionally in the body of a chapter. But in no instance found by the author is that algebraic equation supplemented by a statement indicating that the short-run equilibrium level of output (Y) might be conceived broadly as the sum of the economy's multiplier effects.

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