

THE PERSISTENCE OF THE IS-LM MODEL IN INTERMEDIATE MACROECONOMICS TEXTBOOKS

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ABSTRACT

This paper reviews some of the early and current applications of investment-saving (IS)-liquidity-money (LM) and aggregate demand (AD)-aggregate supply (AS) models at the intermediate macroeconomics level. While the IS-LM model is not discussed as much today as it was in the 60s and 70s, it is still an important part of some of the leading intermediate macroeconomics textbooks. By using the two models, a better understanding can be obtained of why the economy behaves a certain way in the short-run and long-run when certain key variables such as the money supply, government spending, consumption spending, or taxes change. The IS-LM model has not faded away at the intermediate macro level as some thought it would.

INTRODUCTION

David Colander (2006, pp. 173 - 188) wrote a paper about the IS-LM model a few years ago which he published in a book of readings he authored. He made the following concluding remark in the article (p. 187): “As the work in macro becomes more dependent on data extraction and agent-based simulation, the pedagogy of macro will change. It will focus more and more on standard simulations and statistical techniques that pull information from data. As it does so, the teaching of macro will move from the printed page to the computer where dynamic models and simulations will be the standard techniques. Within this computer framework the two-dimensional elegance of IS/LM will no longer be a virtue, and IS/LM will fade away, along with the intermediate macro texts that gave it lifeblood.” As Mankiw states (2019, pp. 321 and 326): “...the IS curve shows the combinations of the interest rate and income that is consistent with equilibrium in the market for goods and services...the LM curve shows the combinations of the interest rate and income that are consistent with equilibrium in the market for real money balances.” This paper shows that the IS-LM model has not faded away as rapidly as Colander thought it would.

The IS-LM model has been taught at the intermediate macroeconomics level for several decades. The IS-LM model was developed by Sir John Hicks (1937) to help those reading *The General Theory of Employment, Interest, and Money* by John Maynard Keynes obtain a better understanding of Keynes’ message. The AD-AS model started being covered at the intermediate macro level in the 70s. The IS-LM model was covered more at the intermediate macro level in the 60s and 70s than it is today. However, it is still presented in several of the leading intermediate macroeconomics textbooks today. As a matter of fact, most intermediate macro textbooks today either discuss the IS-LM model or some aspect of it. On the other hand, at the graduate level, IS-LM is not covered as much as it was in the 60s and 70s (Colander, 2006, pp. 174 – 175).

In the first part of the paper we will cover some of the early applications of the IS-LM model (i.e., the 60s and 70s). We will explain how it was used to explain Keynesian economics. In addition, it is noted how monetary and fiscal policy were illustrated with the model.

The second part of the paper will review how the IS-LM model is used in some of the current leading intermediate macroeconomics textbooks. For example, it is noted how the model is used with the AD-AS model to clarify demand and supply shocks. The paper ends with some concluding remarks.

SOME EARLY APPLICATIONS

One of the leading intermediate macroeconomics textbooks in the 60s and 70s was by Dernburg and McDougall (1963). They developed the IS-LM model in Chapter 9. Applications of the model are given in Chapters 10, 11, 13, 15, and 17. Mathematical appendices are given at the end of the text for Chapters 10, 11, 13, and 15.

Paul Samuelson shows how important the IS-LM model was in the 70s with the following remark (1976, p. 353): “The Hicks-Hansen diagram not only succeeds in synthesizing fiscal and monetary policy, the theory of income determination, and the theory of money; in addition, it helps synthesize the monetarist and Keynesian theories of macroeconomics by providing a definite and general theory of the velocity of M. Thus, the monetarist counterrevolution reduces to debate about the shapes of LM and IS.”

Figure 18-5 (p. 352) in Samuelson’s textbook shows how the IS-LM model can be used to answer the above quote. The IS curve has a negative slope and LM curve has a positive slope. The monetarist believe the IS curve is very flat and the LM curve is quite steep. Therefore, fiscal policy which would shift the IS curve is not very effective. It would change real gross domestic product (GDP) very little. On the other hand, monetary policy which would shift the LM curve would have a much greater impact on GDP. Keynesians take the opposite position. They believe the IS curve is fairly steep and the LM curve is rather flat. This means that fiscal policy would have a much greater impact on the economy (real GDP) than monetary policy would.

Some intermediate macroeconomics textbooks in the 70s covered the controversy between the monetarist and Keynesians using the IS-LM model. This is covered by Wycoff (1976) in Chapter 17 of his text. The current macroeconomics text by Froyen (2013) has a chapter on the monetarist controversy.

One of the first intermediate macroeconomics textbooks to show how the IS-LM model could be used to derive the AD curve was the one by Branson (pp. 69-70). Most principles of economics textbooks did not start using AD-AS analysis until the 90s (Colander, 2006, p. 143).

SOME CURRENT APPLICATIONS

Some current leading intermediate macroeconomics textbooks that have a lot of applications with the IS-LM and AD-AS models are as follows:

- (a) Gregory Mankiw. (2019). *Macroeconomics*, (10th ed.). Worth.
- (b) Oliver Blanchard. (2017). *Macroeconomics*, (7th ed.). Pearson.
- (c) Able, Bernanke, and Croushore. (2017). *Macroeconomics*, (9th ed.). Pearson.
- (d) Richard Froyen. (2013). *Macroeconomics*, (10th ed.). Pearson.

The Mankiw text is among and perhaps the leading intermediate macroeconomics textbook. Since the Mankiw text is the top selling text at the intermediate level, we will use his text as the primary guide to our discussion of current applications of the IS-LM and AD-AS models. This is the text used by one of the authors when intermediate macroeconomics is taught.

Blanchard develops the IS-LM model in Chapters 5 and 6 of his text. Rather than using the typical upward sloping LM model, he uses a flat curve. He believes this is more consistent with current monetary policy since the Federal Reserve chooses an interest rate target.

In Chapter 6, Blanchard extends the IS-LM model by using two interest rates rather than one. His version of the IS-LM model is as follows (p. 121):

$$(1) \quad \text{IS: } Y = C(Y-T) + I(Y, i - \pi^e + x) + G$$

$$(2) \quad \text{LM: } i = \bar{i}$$

In the model, $r = i - \pi^e$, where r is the real rate of interest, i is the nominal rate of interest, and π^e is expected inflation. Spending decisions depend on the real rate of interest not the nominal rate, other things being the same. The term x stands for a risk premium. As stated by Blanchard (p.121): “It may be high because lenders perceive a higher risk that borrowers will not repay or because they are more risk averse. Or it may be high because financial intermediaries are reducing lending, out either of solvency or liquidity worries.” He presents several applications with this model. The basic IS-LM model above is for a closed economy (i.e., no international trade). Also note that Y equals GDP, C equals consumption, I equals investment, G equals government spending, and T equals taxes.

In Chapter 9, Blanchard replaces the traditional AD-AS model with the IS-LM-PC model. PC means the Phillips curve. Blanchard makes this comment (p. xiii), “The traditional aggregate supply-aggregate demand model was cumbersome and gave too optimistic view of the return of output potential. The model has been replaced by an IS-LM-PC model (where PC stands for the Phillips curve), which gives a simpler and more accurate description of the role of monetary policy and of output and inflation dynamics.” In Chapters 17 through 20, the open economy is discussed using IS-LM.

Abel, Bernanke, and Croushore develop the IS-LM model in Chapter 9. They initially present applications with the FE (full-employment) model (pp. 329-338). Then, in the next part of the chapter (pp. 339-347), they use the IS-LM model to develop the AD-AS model.

In Chapter 10, Abel, Bernanke, and Croushore present the misperception theory model (pp. 390-394). They also present short-run and long-run effects of an unanticipated change in some variables. For example, they present an unanticipated increase in the money supply with this model (Figure 10.8, p. 391). In addition, an example is given for an anticipated increase in the money supply (Figure 10.9, p. 392).

In Chapter 11, they present several applications with this model from a Keynesian perspective. For example, in Figure 11.4 (p. 421), an increase in the money supply is illustrated. Figure 11.5 (p. 424) analyzes an increase in government purchases within the IS-LM framework. Figure 11.6 (p. 426) does the same thing using AD-AS analysis. In the last part of this chapter, supply and demand shocks are illustrated with the IS-LM model. Using the IS-LM model in an open economy is discussed in Chapter 13.

In the last part of this section, we will discuss how the Mankiw text presents IS-LM and AD-AS analysis. As noted above, since it is the leading text at the intermediate level, more emphasis will be placed on this textbook.

In Chapter 10, Mankiw introduces AD and AS analysis (pp. 292-301). Mankiw reviews the classical long-run model then presents the short-run Keynesian model. He then covers stabilization policy using these models.

Mankiw uses IS-LM analysis in several chapters. The chapters are as follows:

- (a) Chapter 11: Aggregate Demand I: Building the IS-LM Model.
- (b) Chapter 12: Aggregate Demand II: Applying the IS-LM Model.
- (c) Chapter 13: The Open Economy Revisited: The Mundell-Fleming Model and the Exchange Rate Regime.
- (d) Chapter 14: Aggregate Supply and the Short-Run Tradeoff between Inflation and Unemployment.

He also has some applications of the IS-LM model in Chapter 19 on Investments. In addition, in Chapter 14, he integrates the IS-LM, AD-AS, and PC models. Problem 5 on p. 429 deals with this.

In Chapter 12, he uses the IS-LM model to develop an aggregate demand curve (Figure 12-5, p. 343). As Mankiw states in Chapter 12:

“First, we examine the potential causes of fluctuations in national income. We use the IS-LM model to see how the exogenous variables (government purchases, taxes, and the money supply) influence the endogenous variables (the interest rate and national income) for a given price level. We also examine how various shocks to the goods market (the IS curve) and the money market (the LM curve) affect the interest rate and national income in the short run.

Second, we discuss how the IS-LM model fits in the model of aggregate supply and aggregate demand we introduced in Chapter 10. In particular we examine how the IS-LM model provides a theory to explain the slope and position of the aggregate demand curve. Here we relax the assumption that the price level is fixed and show that the IS-LM model implies a negative relationship between the price level and national income. This model also reveals what events shift the aggregate demand curve and in what direction” (p. 333).

As Mankiw also states in Chapter 12 (p. 334), “The IS-LM model has played a central role in the history of economic thought, and it offers a powerful lens through which to view economic history, but it has much modern significance as well. Throughout this chapter we will see that the model can also shed light on more recent fluctuations in the economy; two case studies in the chapter use it to examine the recessions that began in 2001 and 2008. Moreover, as we will see in Chapter 15, the logic of the IS-LM model provides a good foundation for understanding newer and more sophisticated theories of the business cycle.”

Mankiw notes (pp. 346-347) that the IS-LM model can be used to show the main difference between the Keynesian and classical models of income determination. With the basic IS-LM model, we have two equations but three unknown variables. The unknown variables are the price level (P), the level of income (Y), and the interest rate (r). The classical model solves the IS-LM model by making the assumption that the economy always achieves the full-employment output. Therefore, r and P will adjust to achieve this equilibrium output.

With the Keynesian approach, P is given or fixed in the short-run. Y and r will then adjust to achieve an equilibrium output level. This level of equilibrium output can be at less than full-employment in contrast to the full-employment output level with the classical model. Mankiw shows the relationship between the IS-LM and AD-AS models on pp. 346-350. (See Figures 12-6 and 12-7 on pp. 344-345.)

To analyze the Great Depression, Mankiw changes the form of the original IS-LM model (pp. 350-352). He makes investment spending a function of the *ex ante* real interest rate ($r = i - E\pi$, where r is the real rate, i is the nominal rate, and $E\pi$ is the expected rate of inflation). The adjusted IS-LM model is as follows:

$$\begin{array}{ll} Y = C(Y-T) + I(i - E\pi) + G & \text{IS,} \\ M/P = L(i, Y) & \text{LM.} \end{array}$$

The 25 percent decline in the money supply (M) from 1929-1933 caused the price level to fall by 22 percent over this period of time. This caused a large increase in the real interest rate and, therefore, caused a shift of the IS curve to the left. Figure 12-8, p. 352, presents a graphical representation of this.

CONCLUDING REMARKS

Maybe someday in the future IS-LM will fade away, as noted by Colander, but based on some of the leading intermediate macro textbooks reviewed in this paper, this has not happened. As noted in the body of this paper, such authors as Blanchard have made additions to the model, but it is still a very important part of the text. As Blanchard has stated in his text (p. 89), “Macroeconomics has made substantial progress since the early 1940s. This is why the IS-LM model is treated in this chapter and the next rather than in Chapter 24 of this book. (If you had taken this course 40 years ago, you would be nearly done!) But to most economists, the IS-LM model still represents an essential building block—one that, despite its simplicity, captures much of what happens in the economy in the short run. This is why the IS-LM model is still taught and used today.”

In the 7th edition of his text, Mankiw added a new chapter that presented a dynamic model of the economy. This is Chapter 15 in the 10th edition. As stated by Mankiw (p. 436), “Compared to the models in preceding chapters, the dynamic AD-AS model is closer to those studied by economists at the research frontier. Moreover, economists involved in setting macroeconomic policy, including those working in central banks around the world, often use versions of this model when analyzing the impact of economic events on output and inflation.” Therefore, it appears that Mankiw is aware of the need for students at the intermediate level in macro to be introduced to what is being done at the research frontier in macroeconomics.

The macro textbooks discussed above are not the only macro texts that discuss some aspect of the IS-LM model. For example, the textbooks by Jones, Mishkin, and Hubbard, O’Brien, and Rafferty, and Dornbusch, Fischer, and Startz discuss the model. They also use the AD-AS model.

Combining the IS-LM model with the AD-AS model gives a better understanding of why the economy behaves a particular way when certain variables change. As Abel, Bernanke, and Croushore have stated (p. 340), “Why then do we bother to present both models?...The IS-LM model relates the real interest rate to output, and the AD-AS model relates the price level to output. Thus the IS-LM model is more useful for examining the various shocks on the real interest rate and on variables, such as saving and investment that depend on the real interest rate...However, for issues related to the price level, or inflation, the AD-AS model is more convenient to use.” To illustrate this point, the following problem from a recent exam given by one of the authors will be used:

Use the IS-LM and AD-AS diagrams to describe the short-run and long-run effects of changes in GDP, the interest rate, the price level, consumption, investment, and real money balances with an increase in investment spending. Assume the economy is at long-run equilibrium when this happens.

Answer:

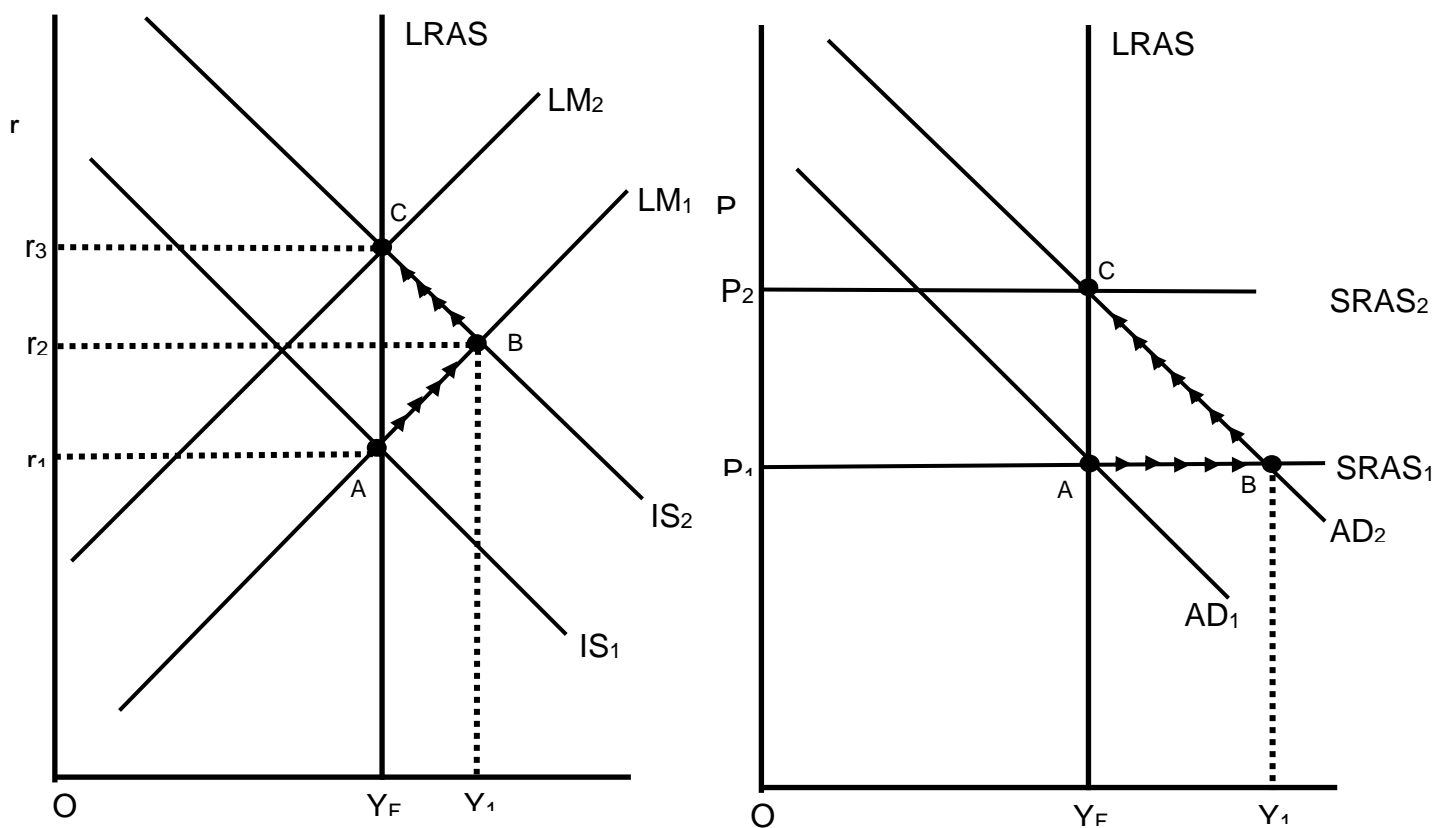
This question can be answered if the student understands the material presented in Chapters 11 and 12 of Mankiw. The following IS-LM model, as presented in Mankiw (p. 346), is assumed:

$$Y = C(Y - T) + I(r) + G \quad \text{IS}$$

$$M/P = L(r, Y) \quad \text{LM}$$

Investment spending is negatively related to r (the real interest rate). Money is negatively related to r and positively related to Y (GDP).

Figure 1



In Figure 1, as I goes up, IS shifts up to IS_2 . This puts upward pressure on r and reduces the increase in I ; however, I still increases. As Y increases, so does consumption. As AD shifts to the right to AD_2 , the $SRAS$ shifts upward to $SRAS_2$ in the long-run. This is due to the increased demand for labor and other factors of production. As the price level increases, real money balances are reduced causing an upward shift of the LM curve to LM_2 . Finally, a new

long-run equilibrium is reached at C (the same as before) but at a higher price and interest rate. Consumption and Investment spending go back to where they were before.

As this paper indicates, most of the leading intermediate macro textbooks still have several chapters devoted to the IS-LM model. They show how the IS-LM and AD-AS models can be used to explain how various changes in economic variables such as changes in government spending and investment spending effect the economy both in the short-run and long-run. It does appear that the IS-LM model has not faded away as rapidly as some thought it would.

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