



"For years my intermediate macroeconomics students have had difficulties understanding the IS-LM framework. Now that I'm using a **STELLA** model of the IS-LM system, my students are showing a graduate level understanding of macroeconomics."

---Mark Paich, Colorado College

Case Study

Barriers and Opportunities

Every year, the world economy becomes more complex. This increased complexity has driven economics teachers to cram more and more material into already demanding basic and advanced courses.

Fifteen years ago, for example, the bulk of the typical introductory course in macroeconomics was devoted to the basic Keynesian model of aggregate demand. Today's introductory students are expected to master the complexities of the aggregate supply-aggregate demand model – complete with dynamic price adjustment. By contrast, most faculty members did not learn this model until their first year of graduate school!

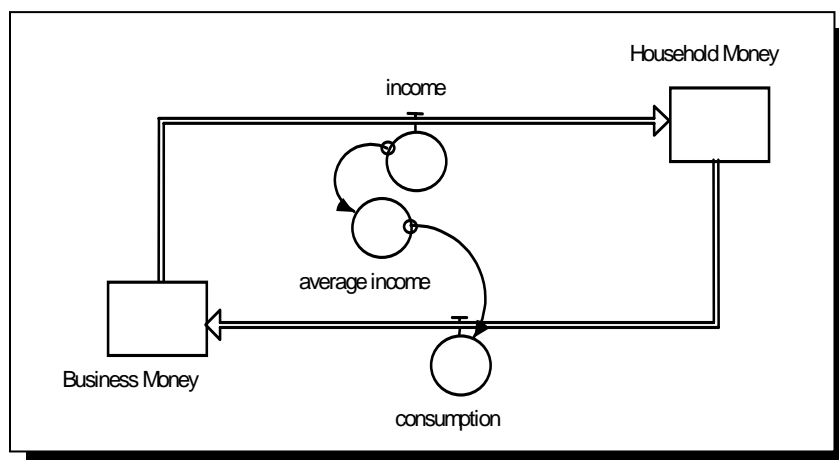
The problem compounds as students demand to understand more and more about the world economy. Topics such as international trade and finance, formerly reserved for senior economics majors in elective courses, now have become an essential component of basic principles courses. It's becoming almost impossible to effectively deliver all of this content using traditional teaching methods.

The **STELLA**® software is a tool that can dramatically increase learning and teaching productivity in the economics curriculum. With the **STELLA** software, it's easy to diagram a set of assumptions about the workings of an economic process. As you (or your students!) add detail to the relationships, concepts will be stated more rigorously and precisely than is possible using words or static diagrams. Then, the **STELLA** software simulation capability provides the means to analyze the dynamic behavior of the models you construct. As a result, you can cover more material, in a shorter period of time, *achieving a much deeper level of student understanding.*

The Setting: A prestigious liberal arts college
The Topic: Introductory Macroeconomics
The Challenge: Teaching the basic Macro Model

Background: An economics professor at an elite liberal arts college faced a difficult but common problem: how to fit an increasing volume of material into a basic economics class without sacrificing student understanding. From long experience, the professor believed that most students could easily understand the *substance* of economic relationship, but that they have a great deal of difficulty mastering the *technique* of manipulating graphs. In macroeconomics, the most difficult of these graphs are the infamous IS-LM curves. The professor decided to use a **STELLA** model as an alternative to the standard graphical and algebraic presentation techniques.

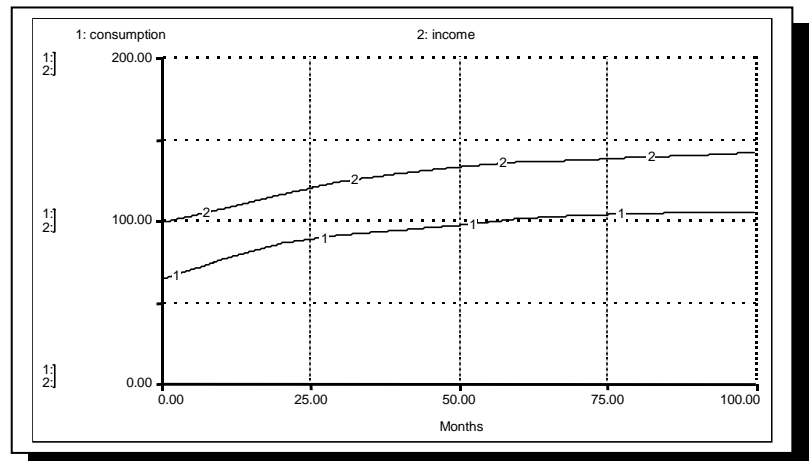
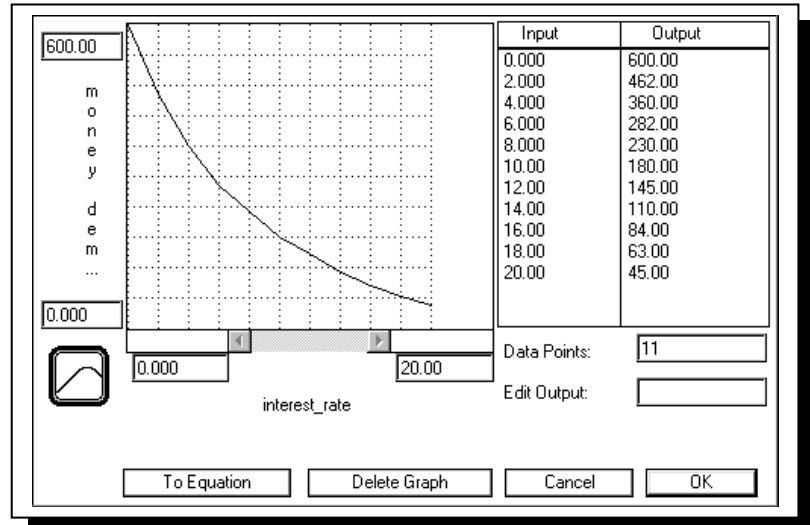
Step 1: Map. The professor began by creating a simple map (shown below) of the key stocks and flows in the basic macroeconomic model. This diagram has two immediate advantages over the traditional IS-LM curves. First, it virtually duplicates the circular flow diagram that is included in most macroeconomic textbooks. Many students find the circular flow diagram intuitively clear. Second, the diagram explicitly differentiates between stocks and flows – a major source of student confusion. How many students never really understand the distinction between money (a stock) and income (a flow)?



Step 2: Model. After the diagram had been created, the next step was to incorporate assumptions about the way the economy operates. With the **STELLA** software's graphical function (illustrated at right), it was easy to specify non-linear functions such as the demand for money. What's more, the **STELLA** software made it easy for students to experiment with different strengths for these relationships.

Step 3: Simulate. Once the key relationships were defined, the model was ready to simulate. The professor conducted an extensive set of simulation tests to ensure that model output was consistent with the standard IS-LM results. Initially, he used the **STELLA** software's animation capabilities to look at model behavior. Tables and plots enabled the professor to see precisely what was going on in the model. The plot at right, for example, shows a smooth transition between equilibria in response to a surge in government spending. These tests convinced the professor that the model both generated the correct equilibrium results, and provided a clear dynamic explanation of the underlying adjustment mechanisms.

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While resting the model, the professor uncovered some anomalous results. These revealed gaps in the professor's own knowledge of macroeconomic theory. The professor was pleasantly surprised that he was able to develop a deeper appreciation for macro through the process of model building testing, and refinement. He felt confident that his students would have a similar experience as they "played" with the concepts in the model.

Step 4: Celebrate! The professor found that the **STELLA** software dramatically increased the productivity of his class sessions. He was able to cover the core of macroeconomics in a fraction of the time it took with standard algebraic and graphical techniques. This freed a great deal of time to cover important topics in international trade and finance. As an added bonus, many of the students took it upon themselves to learn the **STELLA** software, and made some interesting modifications to the standard model. Several of these students reported that the opportunity to create original models was a high point of their college careers!