Delete this before using. Handout provided electronically. Ran over time.

Adding a constant rate of technological progress, *g*, to the Solow Model triggers a cascade of difficulties. The laws of motion get more complicated, so the algebra gets harder. The steady-state is now changing at a constant rate so convergence becomes trickier. Clever variable transformations into efficiency units enable continued use of the canonical graph to solve the model, but the transformations are hard to follow and easy to forget. But without a doubt, the most confusing feature of the conventional exposition of the model—and the primary reason for implementing the model in Excel—lies in the comparative statics properties of *g*.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (save as into your I drive folder)

Barreto

Macro Topics

The Solow Model with Technological Progress

Technological progress (innovation) is how we get economic growth. We model it as population growth because it’s a clever way to find the steady-state. Unfortunately, this approach causes great confusion. We must remember: “The actual economy is what really matters.” We will figure out how adding *g > 0* changes the model in today’s class, apply the model to real-world data next time, and you will present comparative statics analyses after that.

Open TechProgress.xls and click the Show Algebra button in the *Tech* sheet.

1. The point of the algebra is to show why cell H14’s formula is =(F14-G14)/((1+n)\*(1+g)). Add comments on the equations (in your own words) as I walk through them. Ask if anything is confusing. Row 108 is a doozy. Write below what it means.
2. What if we modeled technological progress as A steadily increasing? Not the clever A1- trick, but just plain A. We could do this, but why don’t we? What do we lose and gain with plain A versus A1-? Should prepare questions with ShockA sheet.

**Wait.**

1. Let’s review your answers to Tasks 1 and 2.
2. In essence, when we simulate the economy we get time series graphs for y that look like this:

What does the graph on the left represent? How about the one on the right?

1. What was the analogy used in the screencast for the graph on the right? What does the curve act like?
2. Did you use the transparent chart trick on your answer to Task 2? Well, you could have. Do it now and paste your completed chart below. Did not have enough time for this.

**Wait.**

The canonical graph for the Solow Model is now this:

*i* = *sf*(*k*)

*(+n + g)k*

$ per effective worker per year

*keff* (capital per effective worker)

k\*

1. What if a friend asked, “Hey, where’s *A* and **? They’ve gone missing.” What would you say?
2. If *g* = 0, we can easily do comparative statics with this graph. Show a comparative statics analysis on this graph. You can click on the objects and text boxes to copy and paste as needed.

**Wait.**

1. If *g* > 0, however, the canonical graph is no good for comparative statics. Why not?
2. What about the math? Is there an analytical formula for *y\**? Write something down, then below whatever you wrote, write the answer.

The Answer:

**Wait.**

1. So say I wanted to explore the effect of *n* on steady-state *y* (with *g* > 0) what would I have to do?
2. Do it.
3. What questions do you have about this model with technological progress?

HW: Watch screencasts 3, 4, and 5 in the *ToDo* sheet of TechProgress.xls and do task 3. We will do tasks 4 and 5 in class, so please watch the screencasts carefully.