PRINCIPLES OF MACROECONOMICS
LECTURE PLAN:

THE SUPER SIMPLE SOLOW MODEL AND IDEAS
PART 2

MRUNIVERSITY

1 Lecture Objective

- Students will be able to identify incentives and factors that increase the production of ideas
- Students will be able to list the costs and benefits of using patents, prizes, and subsidies to increase idea creation

2 Pre-Class Assignment

Students should watch the following videos before class:

Video: The Economics of Ideas | Marginal Revolution University | Principles of Macroeconomics course

Video: Patents, Prizes, and Subsidies | Marginal Revolution University | Principles of Macroeconomics course

Video: TED Talk: How Ideas Trump Crises (with Alex Tabarrok)

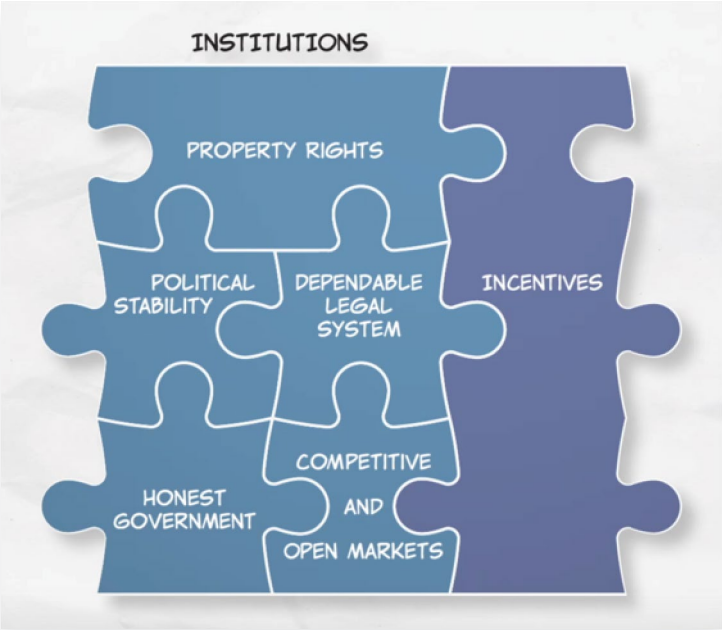
Video: The Idea Equation | Marginal Revolution University | Principles of Macroeconomics course

3 Lecture Plan

Introduction

1. The Economics of Ideas, Patents, Prizes and Subsidies, and The Idea Equation videos focus on the importance of ideas and what factors affect idea accumulation. Caution students that there is still a lot we don't know about how ideas are 'produced'. [Note: Additionally, economists have many different terms for this important factor: some call it technological progress, productivity, etc. Some of the referenced material will use slightly different terminology.]

Factors that Affect Idea Production



1 Review factors that affect idea production, from good institutions (figure above), to people, to patents/prizes/subsidies.

The Costs and Benefits of Patents

Check for Understanding: Practice Question 9 and 10

In Patents, Prizes, and Subsidies, the video identifies the tension between incentives for increasing the number of new ideas vs. spreading the use of new ideas.

1 You may wish to have students watch the following two-minute video, End Software Patents, in class. Have students identify the main criteria presented for when patents do and do not make sense. ("When innovation costs and imitation costs are more balanced, patent protection isn't needed to incentivize innovation.")

2 After the recap, listen to one or both of the following clip(s) from NPR's Planet Money: a. Can You Patent a Steak? (or read) and b. the Patent on Podcasting. Have students discuss in groups whether or not they think it's reasonable to grant a patent in this/these instances. You can also provide them with an update on the podcast patent here.

Alternate Exercises

Listen to Planet Money's: The Case Against Patents and have students answer the following questions. Why did Elon Musk of Tesla put Tesla's patents in the public domain? What are the benefits of eliminating patents? What are the risks? Which industries are most likely to be negatively affected if patents are eliminated?

4 **Public Policy assignment:** Some prominent academics have proposed a hybrid version of patents and subsidies, calling for governments to buy patents or commit to purchase certain products. What drawbacks from patents and/or subsidies would these solutions solve? Would it create any new disincentives in either idea creation or idea sharing? How is the 'patent buyout' similar to and different from a prize?

The Idea Equation

Check for Understanding: Practice Question 11

The Idea Equation video emphasizes the role that people, specifically, researchers play in increasing the production of new ideas. As mentioned earlier, there is still a lot of uncertainty about how to increase idea production. Ensure students understand that developing countries such as China, despite having a relatively low number of researchers per 1000 people (compared to the United States) are making a large contribution to global research and development because their populations are so large.

1 **Assignment:** Pick one of the following quotes from Alex Tabarrok's TED Talk, and have students explain its meaning, specifically focusing on mechanisms that affect idea production: "Larger markets save lives," "We will see an Einstein in Africa in this century," or another one of your choice.

Alternate Assignment (requires laptops)

Provide students with a list of countries: Germany, Argentina, Brazil, Russia, United States, France, Turkey, South Korea, Japan, and India. Have students predict the order of these countries from highest **absolute** number of researchers to lowest absolute number of researchers. Then, in groups, have students look up the answer using UNESCO data (have them use 2010 data). If time permits, have groups calculate each country's growth rate of researchers from 2000-2010 and identify the country with the largest/smallest growth rates (Turkey has highest, Russia has lowest). Discuss. Students may correctly realize that countries with the most absolute number of researchers are usually large countries (China, US, Russia).

Country	Number of Researchers		Growth Rate
	2000	2010	
China	695,062	1,210,841	74%
United States of America	983,208	1,198,280	22%
Japan	647,572	656,032	1%
Russian Federation	506,420	442,071	-13%
Germany	257,874	327,996	27%
Republic of Korea	108,370	264,118	144%
France	172,070	243,533	42%
India	115,936	192,819	66%
Brazil	73,875	138,653	88%
Turkey	23,083	64,341	179%
Argentina	26,420	47,580	80%

Source: UNESCO statistics, number of researchers

1 Optional: Connect Solow Model to GDP

Additionally, growth models are limited by our ability to measure growth. Many new ideas result in a lot of consumer surplus and don't always neatly register in GDP measures. Some examples seem very obvious to students since they can use Google, Facebook, etc. for free (though advertising costs etc. are counted in GDP), but many new inventions bear the same characteristic: a famous example (from Robert Gordon) is the flush toilet. For Robert Solow waxing poetic on the flush toilet, start listening at 31:02-33:00 (Russ Roberts starts by asking the question).

> *"Most inventions, I suppose, create what economists call consumer surplus, benefits beyond what you actually have to pay for."*
>
> – Robert Solow from EconTalk interview

2 Tie this concept back to earlier lectures on GDP. You may wish to ask some review questions on GDP and quickly teach/review consumer surplus if students have not been exposed to this idea.

3 **Assignment:** Have students think of an invention/innovation that they believe is not properly captured in GDP or other traditional standard-of-living measures. Explain what benefits are not properly captured and why. Or try the reverse — have students identify an invention that they believe is perfectly captured by GDP. Afterwards, have students reflect on the following question: If some inventions are not properly captured in standard measures of economic well-being, are all countries equally affected by this mis-measurement issue?

4 Post-Class Assignments

Student Exercises:

Ideological Turing Test: Have students create their best arguments for and against ideas exhibiting increasing returns and ideas exhibiting diminishing returns. Share the best in class.

Teacher Reflection:

Reflect on the class discussion and student exercises. When were students most engaged? Confused? Bored? What could you do to change/improve the discussion? Are there any concepts to revisit?

5 Supplemental Resources

Textbook:

The videos are based on "Growth, Capital Accumulation, and the Economics of Ideas: Catching up vs. the Cutting Edge" in *Modern Principles of Economics* by Tyler Cowen and Alex Tabarrok but are appropriate for use by any teacher using any textbook.

Additional Videos:

- End Software Patents with Alex Tabarrok | Startup Bytes

Podcasts

- Planet Money: Episode 399, Can you Patent a Steak?
- Planet Money: Episode 462, When Patents Hit the Podcast
- Planet Money: Episode 551, The Case Against Patents
- EconTalk interview with Robert Solow

Articles/books/blogs:

- Glennerster, Rachel, and Michael Kremer. "Better Way to Spur Medical Research and Development, A." Regulation 23 (2000): 34.

Data Sources/additional resources:

- Angus Maddison
- UNESCO data on R&D and researcher spending
- Penn World Tables
- World Bank GDP growth rates

6 Practice Questions

We've included a lot of questions throughout the lecture (and below) to quickly gauge student understanding. We recommend using a specific polling site such as Poll Everywhere so that you can easily tabulate student participation and understanding, but having students raise their hands also works. As a general rule, if >70% of students miss the problem, review the concept. If roughly 40-70% of students miss a specific problem, we suggest using peer learning. Ask students to convince their neighbor that they have the right answer. After a few minutes of discussion, retest the class. Teach the concept if students continue to persist in misunderstanding. For more on the benefits of peer learning, google "Eric Mazur peer learning."

Question 9:

Ideas are

a. Rivalrous.

b. non rivalrous.

Question 10:

Patents give entrepreneurs a _____ on their ideas.

a. price floor

b. price ceiling

c. negative externality

d. positive externality

e. monopoly

Question 11:

True or false: Given that China has far fewer researchers per 1000 citizens than the United States, they are not yet playing an important role in the world's production of ideas.

a. True

b. False

Have Feedback?

View online and share feedback at MRUniversity.com/solow-lecture-plan-2. Your suggestions will help us improve this resource for economics teachers everywhere. Additional resources available at MRUniversity.com/teacher-resources.

Email questions or comments to support@mruniversity.com.