

Intermediate Microeconomics: Topic 1

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Economic Models

ECONOMICS IS DONE by building models of social phenomena. What is an economic model? A model is merely a simplified representation of reality¹. Why do we need simplified representations of reality? Because we cannot build a model *of* reality. A map of Barbados that is as big as Barbados is useless. Where would you put it? Think of an economic model as an old-time map: it only has the highways and important roads; not all the backtracks and houses in Barbados. Even with Google maps, as you zoom in on a small area to get more detail, you have to ignore the bigger picture.

That means we have to make some **assumptions** about what is relevant and what is not. Relevance is determined by the question at hand. Suppose the question at hand were “How to get from Bridgetown to UWI?”; then you’d need to ignore the roads in St. Joseph. Assumptions are used to ignore certain aspects of reality so that we can simplify the question. Assumptions are how we get rid of irrelevant detail. The assumptions of a model are therefore the key to the entire model. Good assumptions have to be *clear, practical, and relevant*.

Features What are the main features of an economic model?

- An economic question
- Assumptions
- Economic behaviour
- Optimisation
- Equilibrium

We need economic models because the world is complex, because economics is hard, and because economics is counter-intuitive. Remember this: economics is frequently counter-intuitive. We also need economic models because we want to understand behaviour so that we can ‘predict’ outcomes in the future.

Ingredients The key ingredients of an economic model are: ²

- Who are the agents? (Players)

¹ See <http://www.imf.org/external/pubs/ft/fandd/2011/06/basics.htm> for a deeper discussion.

² These ingredients are all types of assumptions really. This list is taken from Terence Johnson’s [Micro Theory Notes](#)

- What can the agents decide to do, and what outcomes arise as a consequence of the agents' choices? (Actions)
- What are the agents' preferences over outcomes? (Payoffs)
- When do the agents make decisions? (Timing)
- What do the agents know when they decide how to act? (Information)

A complete model needs to specify all of these things. Sometimes you'll notice that a model doesn't explicitly specify one or more of these ingredients. In reality, by not specifying them they are really making implicit assumptions about them. Be cautious with the unearthly power of economic models!

The first model you will be introduced to is the supply and demand model that underpins all of economics. I suggest you read Chapter 1 of *Economics Rules* by Dani Rodrik during the course of the semester.³ You'll see, read, and hear some things that appear very unrealistic in this course, and will make you question what we're doing. Reading this chapter by Rodrik will help you to put it in context. One key point made by Rodrik is that economic models are like fables: remember the story of the tortoise and the hare? Forget whether its realistic or not—instead concentrate on getting the *moral of the story*.

³ Copy online here: <https://www.economicas.uba.ar/wp-content/uploads/2016/03/Economics-Rules-Dani-Rodrik.pdf>.

Key Tools

THERE ARE TWO KEY TOOLS that we will focus on throughout the course. We will learn them both using heuristic methods⁴, and using calculus.

The two methods are the optimisation principle and the equilibrium principle.⁵ Heuristically (without math), optimisation is tricky to *calculate*, but easy to *understand*. With calculus⁶, optimisation is very easy to calculate but it's difficult to *know exactly* what you're doing without the intuition.

Heuristically, optimisation is about trying to figure out what is best for *each individual*. Microeconomics starts from the assumption that each person does exactly what is best for them. In the economic world, everyone is *self-interested*. This is probably the centrepiece assumption of the construct some call 'homo economicus'.⁷

With calculus, we first specify a individual's objective—what they're trying to maximise. Then we use differentiation—a small change in the variable they can then use differentiation to identify

⁴ A heuristic technique is a practical or rule of thumb method for solving problems. It's usually a shortcut, and helps us to understand the intuition behind a formal solution.

⁵ Read Varian Section 1.2.

⁶ Here's a full calculus review: <https://www.nyu.edu/econ/user/flinncc/courses/intermicro02/calc.pdf>.

⁷ This term is often used disparagingly by non-economists to criticise how naive economists are: https://en.wikipedia.org/wiki/Homo_economicus.

conditions that describe the point where they must be maximising their objective.

Economics focuses on balancing trade-offs.⁸ Optimisation is entirely about trade-offs. You like cake. But if you eat all the cake in the world, you'll surely die an unhealthy and unhappy death. So in deciding how much cake to eat, you consider the trade-off between satisfying your sweet tooth and the possibility of a sugary death. When you've balanced those things and decided that you'll only eat one slice every day⁹, you've made an **optimal decision**.

Calculus makes the study of trade-offs easy. You'll see that the main rule that we get from calculus-based optimisation is that *at the optimal, the marginal cost of your choice must be exactly equal to the marginal benefit of your choice*¹⁰. This concept permeates all of economics—get a very good grasp of it!¹¹

Throughout the course, we will ignore many of the special cases or extreme examples that are frequently taught to pique students' interest. Instead, we'll focus on the core cases, and instead try to apply those key tools to real-world situations.

Chapter 1: The Market

Exogenous v Endogenous An exogenous variable is taken as fixed, and is unexplained by the model. An endogenous variable is one we want to explain using the model. Differentiating between exogenous and endogenous variables is one of the most important ways in which we use assumptions to strip away 'irrelevant detail'. We might need a variable for the model to work, but we do not need to know how it is determined. We are then left with three layers of assumptions:

1. Ignore a variable altogether;
2. Assume a variable is exogenously determined;
3. A variable is endogenously determined and is the focus of the model.

Endogenous variables are the focus of the model. These are the variables that we care about *how they work*. This is what an economic model is trying to explain. Of course a variable can be exogenous in one model and endogenous in another; it simply depends on what question we are trying to ask.

Simplification Varian makes the assumption that all apartments are identical. Is this a good assumption? You'll frequently see this type of assumption—that all of something or someone is identical.

⁸ A decision without a trade-off—that is, there is no negative side to it—is called a 'free lunch'. Economists don't believe such easy decisions exist (in general), hence the common saying "There ain't no such thing as a free lunch!"

⁹ Still far too much cake!

¹⁰ When an economist says 'marginal', we do not mean 'unimportant'; we mean 'at the margin'. See <https://en.oxforddictionaries.com/definition/marginal> for uses of this version of marginal. Get used to it!

¹¹ See <https://pdfs.semanticscholar.org/presentation/4b95/05d7dd516ed4f2bd49177bbccc49a7632f5b.pdf> for a useful introduction to the intuition behind 'marginal analysis'.

It makes life easy, but whether this is a good assumption or a bad assumption depends on the specific instance.

Zoom out The reason we move from a very kinked-looking demand curve to a very smooth one is that we effectively zoom out. Think about when you zoom in on an image and you can see all the pixels. Then think about zooming out and you see a smooth image of the beach.

This is why we talk about smooth demand curves. It makes life a lot easier, and a lot prettier.

Proposition & Proof Note in Paragraph 2 of Section 1.4, Varian makes a statement then provides an argument to back it up. He says "It is clear that if all landlords are trying to do the best they can and if the renters are fully informed about the prices the landlords charge, then the equilibrium price of all the apartments in the inner ring must be the same". Then he says "The argument is not difficult", and goes on to provide a logical argument to back up his statement. This is analogous to a typically mathematical process: you make a proposition, then provide a proof. You will see this form of reasoning quite often. Make sure that you can follow the logical argument.

Equilibrium Concepts In every new model, the word "equilibrium" will be used to define something slightly different. However, the broad concept of equilibrium almost always means that there is some perfect balance in the world you're describing. Think of a cat walking on galvanise—perfect balance is required. All economics models have trade-offs, and balance is reached when all trade-offs are perfectly satisfied.¹² In a perfectly competitive market, you can think of equilibrium as a magnet. We reach the equilibrium price p^* , and if anyone tries to deviate from it, they lose out because they either pay too much or get too little. Buyers and sellers will then always be drawn back to this equilibrium. It's a beautiful concept, based on the idea that there's always balance in the universe.

Comparative Statics Comparative statics is the third key tool. Equilibrium requires optimisation. Then we can compare two different equilibria *by changing exogenous variables*. Remember that we can set our exogenous variables at any value we want to. What comparative statics tells us is "how do endogenous variables change when we alter the assumed value of an exogenous variable?" How does this work? Well agents re-optimize given the new exogenous variables, and their new choices mean that we reach a new equilibrium. The key skill of an economist is in describing the process by which

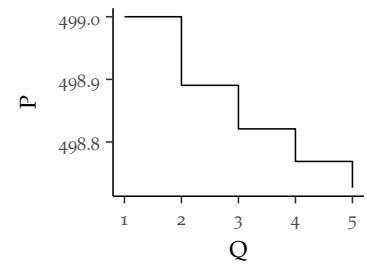


Figure 1: A snapshot of a small part of the demand curve looks pixelated.

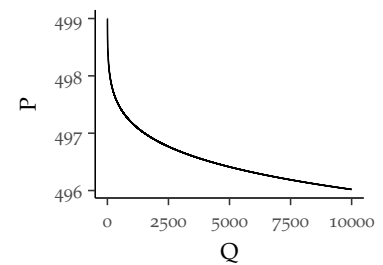


Figure 2: Zoom out to look at the entire demand curve and it's a lot smoother.

¹² That is, marginal costs are equal to marginal benefits.

changes in exogenous variables work to alter buyers' and sellers' choices, and the process by which this leads to a new equilibrium. These processes are known as the **mechanisms** of the model. Understand the mechanisms of these models and you'll be well on your way to economic stardom.

Math Review

Ensure that you are able to

- do standard algebraic manipulations
- differentiate all types of functions, including understanding the chain rule, the product rule, and the quotient rule
- understand unconstrained optimisation
- solve a constrained optimisation problem using the Lagrange method.

Reading Material Head to the Mathematical Appendix of the Intermediate Microeconomics Textbook.¹³ Make sure you understand everything in here. I have uploaded material to help you with what you might now know. Note that everything in this course you *should know already* before you get into this class. If you don't, use this week to get up to speed. What you don't understand, Google.

¹³ Page 741 of the Varian in 8th edition, Page 759 of the 9th edition.

How to Learn Math Grab a pencil and a blank piece of paper. Use that paper to write the functions, equations and formulas you see. Even sketch the graphs you see. Try all of the algebra for yourself. Answer the problems set out for yourself. You need to do math in order to get it. Reading alone won't help. Trust me, I know.