

Welcome! (Lecture 1)

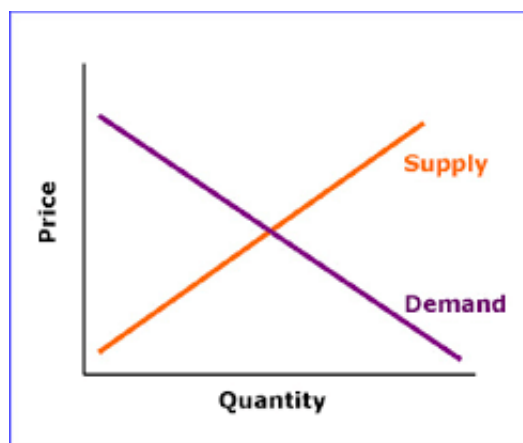
1 I'm Dan Quint, and this is Econ 690, Markets and Models

- Who am I
- Who are you
- I'm excited as hell about this class, but also nervous
 - nervous, because I'm teaching this for the first time, and there's no textbook – I'm designing this class from scratch
 - and excited, because that means it's about exactly what I want it to be about and I think it will be an extremely cool class
- Apologies a more complete syllabus isn't up yet
- I'll have Canvas site up today, with an updated syllabus and readings for the first part of the class
- More on this later
- Two goals for today:
 1. overview of what this class will be about (topics)
 2. a bit about logistics and what to expect

2 Markets

2.1 allocation

- Economics is often defined as the study of the **allocation of scarce resources** – how much of something there is, and who ends up with it
- And we mostly think of allocations as being determined as market outcomes
- So in a large sense, economics is the study of markets, and of how markets determine the allocation of resources
- But when we talk about markets in an undergrad class, we often do this:



- Because,
 - hey, someone decided we should put price on the y axis;
 - and supply is probably increasing,
 - since firms should make more of something when they can sell it for a high price;
 - and demand is probably decreasing, since people buy less when it's expensive,
 - and if supply equals demand, it has to be right there
- But this sometimes seems like a fairly simplistic way to describe things
- If you think about the scarce resources you've tried to acquire recently
 - getting into the classes you wanted for this semester,
 - finding the apartment you're in right now,
 - getting into graduate school or finding a job for next yearit's not obvious this captures exactly what's going on

2.2 “the market will decide”

- Economists also like to think of markets as perfectly impartial decision-makers and say things like, “the market will decide,” as if the market will always reach the single, perfect, inevitable, “correct” conclusion
- In the mid-2000s, when HD-DVD and Blu-ray were competing to catch on as the next video standard, Kazuhiro Tsuga, the CEO of Matsushita/Panasonic (part of the consortium making Blu-ray) was asked whether the two technologies might merge. He answered, “We are not talking and will not talk. **The market will decide the winner.**”
- Well, it did, but the way the standard war was “won” ...
- The “big six” movie studios were initially equally divided – Universal, Paramount and Warner initially supported HD DVD, while Sony, Disney, and 20th Century Fox supported Blu-ray
- Sony decided to make Playstation 3 game consoles play Blu-ray discs, which came at a huge cost – they lost about \$200 on each console, and total losses were estimated at **\$3 billion**, expecting to make it up on game sales
- About a year after both formats launched, Blockbuster decided to drop HD DVD and only rent Blu-ray, because 70% of their high-def rentals were Blu-ray
- But that was a pretty early signal, and could have been based on PS3 owners who were mostly gamers trying out movies just to see, or based on the particular movies available at the time
- Once Blockbuster decided, Target quickly started carrying only Blu-ray players; a little later, Warner Bros switched from HD DVD to Blu-ray; and then Walmart dropped HD DVD, which ended the war
- So “the market deciding” looked a lot like Sony deciding to eat a \$3 Bn loss on PS3 players to promote Blu-ray, getting an early bump in video rentals, and Blockbuster deciding early to pick a winner – *not* a whole world of consumers gradually deciding that Blu-ray was the better product
- Again, the market decided – but not in the simplistic way economists like to make it sound

2.3 so... the details matter?

- So economics is about the allocation of scarce resources,
which often happens through markets,
but maybe the details of those markets matter
- That's part of what this semester will be about – the details
- We'll be looking at examples of how real markets determine the allocation of scarce resources,
and how this happens differently in different settings
- That's half of what this course is about

3 Models

- The other half is about models
- That is, about how we can apply models to these different types of markets, and what we can learn from those models
- A model is just a simplified version of reality –
a way to strip down a rich, complex reality into a sketch with a few moving parts that keeps a few of the key pieces
and helps us learn a bit about the reality
- If reality is a 3D satellite image in complete detail,
a model is a road map
- It excludes a lot of detail, but adds some useful structure that helps us to make sense of reality
- (Statistician George Box, who created UW's Department of Statistics, famously said, "All models are wrong, but some are useful.")

- Economists love models
- The two-lines-crossing picture was a model –
and a powerful one, as you may remember from 101 –
but many real markets demand a different model
- For each "type" of market we look at, we'll be thinking about how we could model it, and see how a model can help us learn about how the market will behave
and how we might improve it

4 What markets are we thinking about?

- Suppose I told a bunch of people, “I’m teaching a class on markets – what markets should I talk about?”
- If it was a year ago, everyone would have said Bitcoin
- People might have thought about what markets were very large, or what markets seemed to be very visible, or very important in a financial or political way
- We could brainstorm what markets might be interesting to think about
- That’s not what I did

- If we did that, we might end up with a bunch of huge financial markets that all look kind of similar
- Of course, all the details would be different, but the big-picture structure might be similar
- And some of them might not be markets we have a lot interesting to say about

- Instead, I thought about markets which were very different from each other
- I’ve organized this course around different “types” of markets
- Or really, markets which “clear” in different ways – markets where, given peoples’ preferences, the way the allocation is determined is different

4.1 Walrasian

- We'll start with markets that look a bit like the simple, Econ 101 supply-and-demand graph I just showed you –
economists call these **Walrasian markets**, where everyone trades at a single “market price” which equates supply and demand
- We'll look at a couple of markets that are designed like this –
stock markets, which use a continuous-time limit order book to aggregate supply and demand and make a trade each time the two curves cross,
and day-ahead electricity auctions, which again aggregate individual firms' bids into market supply and demand curves and calculate the price that clears the market
- But with each one, we'll see an interesting complication that makes things trickier than the “simple” model would seem to suggest
- (In fact, the point of the first unit will be that even “simple” markets aren't that simple.)

4.2 Queuing

- The second type of market we'll look at is something that people don't necessarily even think of as a market
- That is, many people think of a market as people buying and selling things, where willingness to pay determines who ends up with a resource
- But some goods don't trade that way
- By a simple definition, there is no market for certain things
- But they still have to get allocated – *someone* ends up with them – it's just that something other than who's willing to pay the most might determine it
- By our definition, that's still a market – just a market that doesn't clear by price
- (A grad school friend of mine was the TA for a class on the World Food Economy. He told me the professor always liked to say, “All markets clear. But in this case, starvation is one type of market clearing.”)

- What's an example of this type of market? Taxi rides.
- In most cities, taxi rates aren't determined by supply and demand; both the supply (the number of licensed cab drivers) and the price are regulated
- So at slow times, drivers can't find passengers (supply is greater than demand) and late on a Saturday night, passengers can't find drivers (demand is greater than supply) and on New Years Eve, it's almost impossible to find a cab
- So how do markets clear?
well, we might think of them as clearing randomly – out of all the people who want a cab at 11 p.m. on New Years Eve, some random few get lucky, and many fail
or we might think of them as clearing by waiting – lots of people want cabs, and it takes a long time for them to find one

- We'll think more specifically about markets that clear by **queuing** – people have to wait in line to get the good in question
- There are lots of examples of this, we'll talk about a few
 - Duke student basketball tickets
 - people lining up outside Apple stores to get an iPhone on day one
 - bread lines in communist countries
- And here, we'll spend a bunch of time constructing models of markets like this, and see why most economists think this is a terrible way to clear a market, and therefore why most economists like Uber's surge pricing just fine and prefer it to taxis

4.3 Decentralized two-sided markets

- Next, we'll consider markets where there are two well-defined "sides" of the market that have preferences over who they trade with from the other side
- This could be firms and workers –
when you look for a job, you don't just announce the wage you're willing to work for and see whether that's above or below the market price for labor
Since each job is a bit different, you need to interview with each firm, see which ones like you enough to offer you a job, and see which one you like enough to accept
- This could be landlords and tenants –
when you look for an apartment, each one is different, you might go check them out in person or look closely at listings,
and the landlord or manager is also thinking about whether they want you as tenants
- This could be schools and students –
UW doesn't admit everyone who's willing to pay the tuition, it decides which students it wants,
and then tries to convince those students to come here instead of going somewhere else
- For about 90% of you, it could be men and women trying to pair up –
trying to meet each other at parties, or in bars and clubs, or on Tinder
- We'll think about what outcomes we might expect to see in two-sided markets like these, and what happens when two "sides" of the market have to find each other to make trade happen

4.4 Centralized two-sided markets

- Along with two-sided markets, we'll talk about some of the things that can go wrong in them
- And one of the solutions: having a centralized clearinghouse that pairs up the two sides of the market
- This is a matchmaker – instead of each person having to swipe left and right until they find a match, everyone describes what they're looking for to a single person (or computer, or algorithm), and they're told who they should pair up with
- Some markets really do this –
when U.S. medical school students graduate, they apply and interview for residencies at hospitals,
but then each hospital and each new doctor submits a list of their preferences to a central computer,
and an algorithm tells each hospital which doctors to hire!
- There are a number of other markets that work in this way
 - assignment of U.S. Military Academy cadets to branches of service
 - assignment of students to public schools in many large cities (“school choice” programs)
- We'll talk about how these markets work, and some of the very elegant theory behind it, including a surprising application

4.5 Auctions

- I'm an auction guy – a lot of my research involves markets with auctions in them
- Interestingly, auctions are one of the areas where there's the biggest gap between where the theory is well developed and what some of the most interesting applications are
- There is an extraordinarily elegant and well-established theory of one-shot auctions for a single good,
with striking results that I'll show you if we have time
- But many interesting “auction markets” aren't auctions for a single good,
they're platforms like eBay, where there are thousands or even millions of sales going on at the same time,
or extremely complex auctions with lots of things for sale at once
- We'll look at two particular examples where auctions are used to clear the market:
Internet ad sales,
and a recent \$20 billion auction to “free up” and allocate bandwidth for 5G wireless
(explain)

4.6 Contests and Wars of Attrition

- Finally, some markets are settled via a winner-take-all competition
- When the U.S. Department of Defense wants a new fighter jet developed for the Air Force or Navy, they don't contact a bunch of different manufacturers and just compare prices
- There's a complex procurement process, where they specify what they want, a small number of qualified sellers investing lots of time and money in developing a proposal, and then a "winner" is chosen
(with little or no negotiation on price, even though there were other proposals submitted)
- Similarly, we can think of "markets" to gain political power – two candidates expend a bunch of time and money, and then one of them wins the election
- Or "markets" to influence a decision-maker – two lobbyists spend time and money winning a dining a politician, hoping to get him to vote in a particular way on some bill, and then in the end, just one of them gets what he or she wanted
- We'll look at two different, related models and a couple of interesting, recent applications

5 Before we get to all that...

- So those are the types of markets we'll be considering
- But before we get into all that,
we'll start out with what's largely review:
why economists generally start out trusting markets
- That is, many economists begin with a presumption that markets will work well,
at least until they hear a reason why they wouldn't in a particular case;
we'll start out talking about where this comes from
- In particular, we'll look at two key "pro-market" results:
the Coase Theorem, and the First Welfare Theorem
- and also review some of the shortcomings and limitations to both

6 So that's the plan

- we'll look at these types of markets
- for each one, we'll look closely at an example or two,
and also build a formal model to better understand how these markets work
and see what we can learn from the model

7 Other course details

7.1 Market Design

- There's a recently developing field in economics known as "market design"
- It's typified by Al Roth, a professor at Stanford who won the Nobel Prize in 2012
- Prof. Roth's background is not in economics – he got his undergrad degree in Operations Research and wrote a paper a few years ago titled *The Economist As Engineer*
- Market design tries to see market failures as engineering problems – things that can be "fixed" by understanding the problem thoroughly and applying a clever combination of theory, computation, experimentation, and other tools
- A recent paper titled "An Invitation to Market Design" notes, "By redesigning both the rules that guide market transactions and the infrastructure that enables those transactions to take place, market designers can address a broad range of market failures."¹
- This class is related to market design, but this is not a class in market design
- However, the literature on market design makes interesting related reading, and some of our examples will come from this "world"

¹Kominers, Teytelboym, and Crawford (2017), "An Invitation to Market Design," *Oxford Review of Economic Policy* 33.4

7.2 Readings

- Related to that...
Al Roth has a fairly recent book out,
titled “Who Gets What – And Why”
- This class won’t follow a textbook, but I would like you to have Roth’s book
- We won’t cover everything in it, but we’ll cover some parts of it
- Also, it’s \$10 on Kindle and \$11 in paperback, so I don’t feel bad asking you to buy it

- The other readings for this class will all be posted on Learn@UW
- I’ll try to have an updated version of the syllabus, with readings for the early part of the semester, posted in the next day or two
- I’ll update it as we go, with readings for each segment of the class
- And I’ll post my lecture notes after each class
(but not before)

7.3 What I’m assuming you know

- as you know, only prereq is intermediate micro,
but I want to make it very clear:
this class is for people who are comfortable using calculus
- Nothing crazy advanced or high-brow, but you’ll have to take integrals and derivatives on the homeworks and exams
and if that makes you nervous, you won’t enjoy some of my lectures

- I’m also not assuming you already know game theory,
but I am assuming you’ll pick it up very quickly,
as I’ll basically be showing you the parts of game theory we need

7.4 Evaluation and grading

- grades will be based on three things:
several homework assignments,
a midterm exam,
and a final exam
- The preliminary syllabus said there would be just 3 homework assignments,
but I'm realizing that doesn't make any sense,
there will be more like 5 or 6
- The midterm exam will either be just before Spring Break or Tues April 2,
depending on how fast we seem to be moving
- And the final exam is May 9

7.5 Full disclosure

- This is my first time teaching this class
- It's not following a textbook or any obvious sequence of sources
- And it's going to evolve as the semester goes on –
as I learn what types of material you all connect with and what material doesn't work,
what's too technical or too simple and what's just right
and what you guys are interested in
- So, the details – the exact readings, the exact pacing, and so on –
are going to evolve
- I'm very confident this will be a fun, interesting class
- But there may be some of you who crave a certain type of order –
who like to know on day one when the homework will be due,
what types of questions will be on the final exam,
and things like that –
and for those of you who fit that description, this class may be really really frustrating

7.6 Device policy

- this is the first time I've done this teaching, but I'm going to ask that you not use electronic devices in this class
- I've observed a lot of colleagues' teaching from the back row, and when I see laptops open, even when they start off on lecture notes and slides, they usually drift over to email and Facebook and Reddit and other things and they're distracting to other students
- There's also recent research suggesting that you learn better when you take hand-written notes, rather than typed notes – it helps your brain record the information
- So, if you have a particular unusual need to use an electronic device in class, please come talk with me,
but aside from that, I'll ask that you keep all devices off while we're here

8 That's it for now

- See you all Thursday!