

MATH IN ECON: A NECESSARY EVIL?

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‘THE END’. The movie just finished. This was the fifth movie we’d watched, in a row! We discussed the latest movie for quite some time, only to realise, we were clueless what to do next. We decided to step out, because we really needed a little fresh air after all that bingeing. We stepped out, adjusting our eyes to all that harsh sunlight, when my friend points to this woman. We looked at her, intently staring at this handbag, she was probably just window shopping, like any other person there, but there was something weird and different about her. She looked the same as the others, but still managed to stick out like a sore thumb, but both of us couldn’t really make out what was wrong with her. After a few minutes of scratching our heads about this woman, we realised what was wrong, and both of us exclaimed, “SHE HAS CONCAVE PREFERENCES!”

I’m sure anyone will seldom encounter such a situation ever in their lives (not the bingeing), let alone brand a person different and call her out for having concave preferences. But considering all the microeconomics we study, we spend a considerable time talking about consumer behaviour and branding their preferences. All this has only been possible because of a tool that we so often use, but quite often, are scared to use - Mathematics.

As a school student, whenever I studied economics, I never realised why everyone said that economics can get extremely mathematical, and be quite a burden, if I decide to study it further. I paid no heed to

this advice, because at that point, I really couldn’t think of economics being extremely mathematical apart from a derivative here or there. I don’t think I’ve ever been this mistaken in my life.

One of the biggest misconceptions that I held about social sciences is that they can never be mathematical. They are just all about theory, and the math is left for the sciences. But after about spending a year in an arts college, I started to understand the importance of math in social sciences, although, I did not understand to what extent is the use of mathematics justified, especially in economics?

To start with, let’s talk about Adam Smith. He’s known as the Father of Economics, for the remarkable work in his book, *The Wealth of Nations*. If you know who Adam Smith is, I’m sure you’ll also know that he wasn’t an economist. He studied philosophy all his life, and yet could write on the working of a free market and successfully characterise it for the world.

The only point of bringing up Adam Smith here was that the foundation of modern economics was laid down by a moral philosopher. This should not surprise us, considering economics is nothing but a social and ethical exercise, and at its very basic, it will always stay the same. The origin of modern economics did not show any signs of the use of mathematics, and yet, mathematical economists revere Adam Smith till date for his work.

Let’s try to draw a parallel with another subject that sees a frequent use of

mathematics - physics. Although physics is a natural science and economics a social science, both extensively depend on math to explain various happenings in their surroundings. Although we do apply math to both these subjects, we fail to realise the shortcoming that economics has with the application of math. Physics being a natural science, has universal laws that are irrefutable and have been proven with the help of math. Economics, on the other hand, has no such laws, and heavily runs on assumptions. With changing surroundings, consumer behaviour can easily vary, and always quantifying it with the help of mathematics is not possible. A consumer isn't always going to stay rational, some might never be the perfect rational consumer we expect to see.

Consumer theory is something we spend a lot of time trying to understand. We try to deduce the behaviour of a rational consumer by looking at her consumption habits, trends and patterns, and try to depict it by an indifference curve, which shows the different combinations of two goods that a consumer will be indifferent to, from the point of view of consumption, for a given utility level. This makes the preference of a consumer presentable in the form of a mathematical equation, and using that equation, we can easily map the indifference curve. All this seems so good, because there is a general conception that quantifying any theory will solidify the belief that people have in that theory. A theory proposed with appropriate mathematical proof does show a lot of credibility, and that's exactly what all of us believe in too.

Here's where the problem lies. Generally, in economics, a model or theory proposed starts with a list of assumptions made that need to be kept in mind. For example, in the indifference curve theory, we blatantly

assume that a consumer consumes only two commodities. All of us do realise that this assumption is something you will never observe, the lady who was intently interested in the handbag, must be interested in a thousand more things apart from that handbag. The reason that we make this assumption is to quantify our model! Think about it, if we did consider anything more than 2 commodities, how would we ever represent it on an x-y cartesian plane? Anything more than 2 commodities would make it a little too complicated to quantify. This makes our job, as aspiring economists, so much more difficult. We realise that all this math that we're breaking our heads over, might actually not even help us in the real world. I'm sure no consumer is going to have a perfect Cobb-Douglas utility function, and that too for every combination of 2 goods she chooses to consume! If our handbag lady even consumes 99 more essential commodities, and is the ideal rational consumer according to economic theory (so many assumptions right here!), and we sit down to plot indifference curves for every possible combination, it will be nearly 5,000 indifference curves of different combinations that we end up plotting, and she's just one of the million consumers that probably more than just window shop.



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Then here comes the question, why quantify anything in economics? Why not just study economics independently, and brush away the mathematics? Here's why mathematics is important to economics, it has given the required push to economics as a subject. Progress in understanding economics is only because of the tool that we use is flawless, and has absolutely no limitations. The limitations lie in our subject, which can never explain the behaviour of any economic unit perfectly. Mathematics has made it possible for us to dive deeper into consumer theory, the utility function of a consumer helps us calculate an equilibrium state for that consumer, with respect to the prices prevailing, such that the economy functions at a point which is best for all the economic units which are a part of the economy, and there is no resource wastage.

That's exactly what economics is all about - the optimum allocation of scarce resources. If math is helping us achieve this goal, why abandon the poor soul who's working to help us out? And, if not math, then what?

So, here's what I feel. Math is the necessary evil in economics. It gives the push to explore different aspects of economics in greater depth, but this push can be a little too feeble. We get stuck with all this mathematics and fail to realise that math is just the tool - we consider it part of the subject matter itself. Math can certainly help us understand the basics behind any theory, but it is our job to look past all the math, and concentrate on the economic interpretation that it provides us with. I've seen people opt out of studying economics just because they are too intimidated by all the 'x' and 'y' being differentiated and integrated, but again, this math is just a means to understanding

the economic happenings and explain a pattern, and this explanation is right beneath all the math that we consider so difficult. After all, economics is always going to be more about the 'social' than the 'science'!