Hi everyone, my name is Mateusz Stasiak. I study applied mathematics on the faculty of Pure and Applied Mathematics. My future job might be connected with banking and economy so today I would like to tell you something about Solow-Swan model.

This is a topic from the field of macroeconomics. It concerns economic growth. But why do we even bother to analyze such thing? The goal of economic models is to understand the factors responsible for development in our company or country. With such data we can maximize production and in the result, increase wealth of our inhabitants or workers.

**ASSUMPTIONS**

Every model in economy is based on some assumptions. When it comes to this particular one, there is unlimited demand for goods. It means that if we produce something, it always ends up being sold or consumed.

Production Y is determined by the function of two variables. As we can see, these are K – capital and L – labour.

To be honest, this name isn’t really important. What it does is that if we want to double our production, we need to multiply all the variables by 2, so we need to double both capital and labour.

**COBB-DOUGLAS FUNCTION**

This is probably the most common function used in Solow model.

When it comes to measuring the wealth in the economy, we should use values per capita. For example, GDP. It is an equivalent of polish PKB. It measures the income earned from production, but we want to know how much of this money is allocated to one person. That is why we divide the equation by L - labour.

Now instead of staring at these equations let’s finally see some graphs.

**GRAPH 1**

We can see three graphs representing three similar eco nomies. What differentiate them is the level of technology, so we have our first observation, pretty obvious one. If blue economy has better technology, it develops faster than the others. The second important thing on this graph is that our function is concave, it bends or slows down we can say. Let’s take a look at this and create the graph that will show how fast this function increases over time.

**GRAPH 2**

This is the same graph, but it has different Y axe. Now we can easily see that increase of the production per capita has the highest value in the initial phase of development. And still, if blue economy has better technology, it develops faster.

**GRAPH 3**

Quick reminder, the only thing which was different between those economies was the level of technological progress. Now let’s assume that it is equal, so we have only 1 line - one path of development. If we consider two economies with the same technological progress but different capital, we can observe that the poorer one develops faster than the rich one.

**ENHANCEMENT OF THE MODEL**

Model that I have already presented works fine but it does not include one important factor. Technological progress isn’t constant. It does change over time.

There was a debate in the history about what exactly is affected by the technological progress. For example, if a doctor has more and more patients every day, does he use his equipment in a better way or his knowledge allows him to work more efficiently. Maybe both of them? The solution that was proven to be correct is that technology increases the efficiency of our work, not the capital. Any alternative led to unsustainable economic growth and was rejected.

We need to remember that wealth of the economy is measured by values per capita so once more, we divide the equation by L.

**GRAPH 4**

We can see a significant difference between these two functions. Green function consults the change of technological progress, while red function has a constant level of technology. For example, if green one hits the value that is two times bigger than the red one it means that red economy would have to double the number of their workers to do exactly the same work.

No matter what we will always end up in this point.

Next part of presentation would be to analyze what are the relationships between all the values, but it is a wide topic and I don’t have time for this. I can tell you only the most important thing, that in a stable state, growth rate of production equals the change of technological progress.

Let’s call it a day. Thanks for coming to my ted talk. I hope it wasn’t too complicated to follow. If you have any questions feel free to ask them.