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Project: “Trade and Topography of Spatial Economy”
Professor Costas Arkolakis

Description:

This project studies the spatial distribution of economic activity. A theoretical and quantitative framework has been developed, where the equilibrium is composed of differential equations. This kind of equations is largely used in scientific fields – the Equation of Free Oscillations is one good example. By using the solutions of known differential equations, this project seeks to understand how geography influences the distribution of wages and population, and vice-versa.

Responsibilities

My research involved a lot of mathematics. I went over reference books and online sources of solutions for both differential equations and integral equations. I also used the graphing tool of Mathematica to judge if the solutions would be applicable for this project. I had to compile a list of final solutions, test them, and then write a detailed solution for each type of equation. Some of them were quite challenging to write as they involved some creativity - change in variables, manipulations – to be found. The main topics covered were:

- Solutions to linear differential equation;
- Symmetry of kernel in the integral equation (which is the form that differential equations originally are at)
- Solutions to nonlinear differential equations

The SRO experience

I highly enjoyed taking part in SRO. Now, I have a clearer idea of what “doing research” in Economics means, specially the steps of the process – developing a framework, finding theoretical solutions, applying to available data, etc. Research in Economics is very broad. For instance, it can be very mathematical.

Besides the skills learned, the highlight of this project was definitely working with a faculty. Prof. Arkolakis made me see how research can be exciting. By hearing the way he thinks, I got a glimpse of how research in Economics works. Whenever I got “stuck”, he would help with some hints. His valuable feedback was key to achieving the findings I had.

I highly recommend SRO for anyone interested. I want thank the Economics Department for providing this amazing opportunity during the summer.