

Constrained Optimization and its applications in economics

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Introduction

- In economic theory we seek to explain the world around us through economic models, one of these models being constraint optimization.
- Constraint optimization is the idea of optimizing the allocation of our resources such as time or money to achieve the biggest amount of payback possible.
- We do this through representing each idea as a function and then use a set of conditions to achieve the best result when it comes to maximizing or minimizing the relation between two functions.
- Through the research done at UROP, we sought to better explore the different possibilities that this technique could be used in real-world possibilities in an abstract manner.

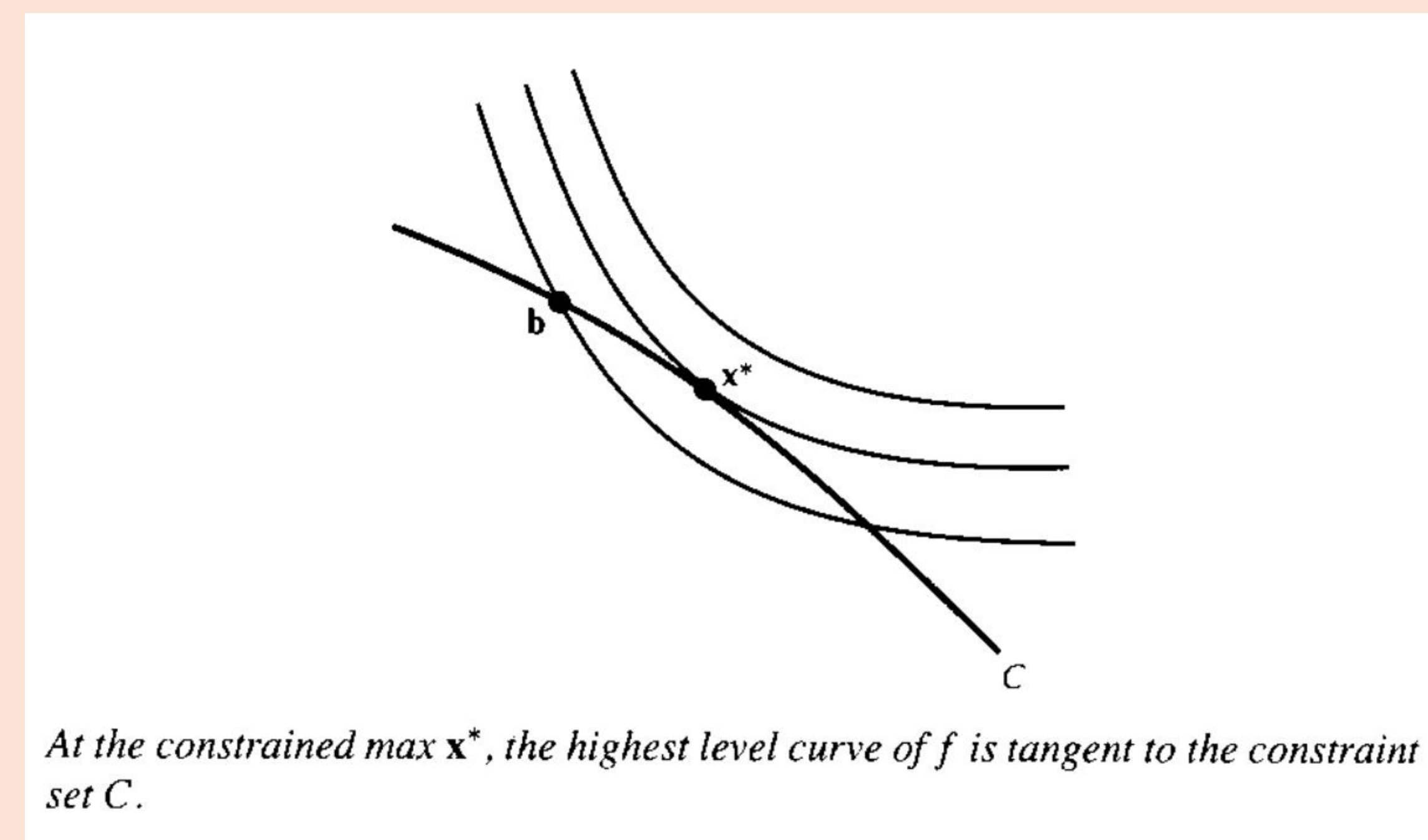


Figure 1. The image shows the basic idea of constraint optimization (Simon & Blume).

Results

- Throughout our research in constraint optimization, we were able to understand a lot regarding the possibilities of the applications of this idea in real-world scenarios.
- For example, ideas such as the judge case review papers scenario was a good idea regarding the applications of this topic in real world scenarios.
- We also were able to find some kind of connection between this and utility functions.
- This is because utility functions are also constrained in some way as there are limited resources.
- With two functions that are constrained of some sort, we can find the most efficient points by minimizing or maximizing each function.

Methods of research

- Throughout the research, there were two methods that were mainly used. One being literary reviews, while the other being the use of academic books to learn about the different applications of constraint optimization in economics.
- Through literary reviews, I was able to analyze the different ways in which previous researchers made use of constraint optimization and other similar ideas in real-world applications.
- Furthermore, through academic books, I was able to better comprehend what constraint optimization and work problems are such that I am better be able to comprehend what is the theory behind it and how it came to be.

Conclusion

- All in all, the research done in this project not only helped me understand more about a different, more abstract type of research than the usual, but also pushed me to learn more economic techniques that an economics student usually does not learn.

References

- Simon, Carl P., and Lawrence Blume. *Mathematics for Economics*. New York, NY: W.W. Norton & Co, 1994.
- Caplin, Andrew, Andrei Gomborg, and Joyce Sadka. *Judging the Judges: Indexing of Complex Information Reduces Injustice*. No. w32587. National Bureau of Economic Research, 2024.