THE ROLE OF MATHEMATICS IN INCREASING THE PROFESSIONAL COMPETENCE OF THE FUTURE ECONOMIST

Mirzamaxmudova N.T.
Senior Lecturer at Fergana Polytechnic Institute, Fergana, Republic of Uzbekistan
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Abstract. *This article emphasizes the importance of integrating mathematics and economics for the development of the competencies of future economists and the uniqueness of this approach to learning based on the requirements for modern specialists.*
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Integrating mathematics and economics can bring several benefits:

1. Enhanced analytical skills: Integrating mathematics into economics helps improve analytical skills. Mathematical methods and models provide a rigorous framework for analyzing economic phenomena and making logical deductions. This sharpens critical thinking and problem-solving abilities in economic analysis.

2. Precise and accurate modeling: Mathematics offers precise and accurate modeling tools that can represent complex economic systems and dynamics. By incorporating mathematical methods, economists can develop more accurate models of economic behavior, allowing for deeper insights and more reliable predictions.

3. Improved decision-making: The integration of mathematics and economics enables better decision-making. Mathematical models help quantify and analyze trade-offs, risks, and uncertainties, allowing decision-makers to make more informed and rational choices. This is particularly valuable in areas such as investment planning, risk management, and policy formulation.

4. Increased efficiency and optimization: Mathematics provides optimization techniques that can help identify the most efficient allocation of resources, maximize output, minimize costs, or optimize decision variables. By utilizing mathematical optimization methods, economists can find optimal solutions to economic problems, leading to improved efficiency and productivity.

5. Robustness and validity of economic theories: Integrating mathematics into economics strengthens the robustness and validity of economic theories. Mathematical rigor allows economists to formulate and test hypotheses, ensuring the logical consistency of economic theories and models. This enhances the credibility and reliability of economic research and analysis.

6. Interdisciplinary collaboration: Integrating mathematics and economics fosters interdisciplinary collaboration between mathematicians and economists. This collaboration can give rise to innovative research, as both disciplines bring complementary expertise and perspectives to complex problems. It also encourages the synthesis of knowledge from different fields, leading to new insights and approaches.

7. Advancements in financial analysis and forecasting: Mathematics plays a crucial role in financial analysis and forecasting. By using mathematical methods, economists can develop sophisticated models for analyzing financial markets, predicting asset valuations, and assessing

investment risks. This allows for more accurate financial projections and improved decision-making in investment and finance.

Let's consider a common economic problem: finding the optimal production level to maximize profits for a manufacturing company.

To solve this problem using mathematics, we can utilize techniques from calculus and optimization. For example:

Define the variables: Let's say we have a manufacturing company that produces a product. We need to determine the optimal amount of production so that the profit is maximized. We can define the variables as follows:

- Q: Quantity of production
- P: Price of the product
- C(Q): Cost function, which represents the production costs as a function of the quantity produced
- R(Q): Revenue function, which represents the total revenue earned as a function of the quantity produced.

Calculate the total revenue function: The total revenue is the product of the quantity produced and the price of the product:

- $R(Q) = Q \cdot P$

Calculate the total cost function: The total cost includes both fixed costs and variable costs. Let's assume we have a linear cost function with fixed cost F and variable cost per unit V:

- $C(Q) = F + V \cdot Q$

Define the profit function: Profit is calculated as the difference between total revenue and total cost:

- Π(Q) = R(Q) - C(Q) $P(Q) = Q \cdot P$

Maximize the profit function: To find the optimal quantity of production, we need to find the value of Q that maximizes the profit function Π(Q). We can do this by taking the derivative of Π(Q) with respect to Q and setting it equal to zero:

- dΠ(Q)/dQ = d[R(Q)]/dQ - d[C(Q)]/dQ = 0

Solve for the optimal production level: Solve the above equation to find the value of Q at which the derivative is zero. This will give us the optimal quantity of production that maximizes profits.

Conduct sensitivity analysis: Finally, we can use mathematical modeling techniques, such as sensitivity analysis, to assess the impact of changes in key variables (e.g., prices, costs) on the optimal production level and profits.

By applying mathematical techniques like calculus and optimization, we can solve the economic problem of determining the optimal production level that maximizes profits for the manufacturing company. This approach provides a systematic and analytical way to make informed decisions and achieve better economic outcomes.

Overall, the integration of mathematics and economics brings numerous benefits, empowering economists with powerful analytical tools, enabling better decision-making, and enhancing the accuracy and robustness of economic theories. It leads to a deeper understanding of economic phenomena and facilitates evidence-based policy-making and strategic planning.

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