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Currency arbitrage detection using a binary integer programming model.

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Summary: In this article, we examine the use of a new binary integer programming (BIP) model to detect arbitrage opportunities in currency exchanges. This model showcases an excellent application of mathematics to the real world. The concepts involved are easily accessible to undergraduate students with basic knowledge in operations research. Through this work, students can learn to link several types of basic optimization models, namely linear programming, integer programming and network models, and apply the well-known sensitivity analysis procedure to accommodate realistic changes in the exchange rates. Beginning with a BIP model, we discuss how it can be reduced to an equivalent but considerably simpler model, where an efficient algorithm can be applied to find the arbitrages and incorporate the sensitivity analysis procedure. A simple comparison is then made with a different arbitrage detection model. This exercise helps students learn to apply basic operations research concepts to a practical real-life example, and provides insights into the processes involved in operations research model formulations.

Classification: M35

Keywords: linear programming; binary integer programming; network simplex method; currency arbitrage detection

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