

Math 408 — LP Modeling

Solution to the Arbitrage in Currency Markets Problem

The Decision Variables

DE= quantity of dollars changed into euros
DP= quantity of dollars changed into pounds
DY= quantity of dollars changed into yens
ED= quantity of euros changed into dollars
EP= quantity of euros changed into pounds
EY= quantity of euros changed into yens
PD= quantity of pounds changed into dollars
PE= quantity of pounds changed into euros
PY= quantity of pounds changed into yens
YD= quantity of yen changed into dollars
YE= quantity of yen changed into euros
YP= quantity of yen changed into pounds
D = quantity of dollars generated through arbitrage

The Objective Function

$$\max D$$

In this model we make available \$100 in US dollars to purchase other currencies and pump through the system. If at the end of the day we get back more than our \$100 investment, then an arbitrage exists.

The Constraints

Arbitrage dollars: $D = .8706 ED + 1.4279 PD + .0075 YD$
Dollar Budget: $DE + DP + DY \leq 100$
Euro Conversion: $ED + EP + EY = 1.1486 DE + 1.6401 PE + .00861 YE$
Pound Conversion: $PD + PE + PY = 0.7003 DP + 0.6097 EP + 0.00525 YP$
Yen Conversion: $YD + YE + YP = 133.38 DY + 116.12 EY + 190.45 PY$
Bounds: $0 \leq DE, DP, DY, ED, EP, EY, PD, PE, PY, YD, YE, YP$