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Exchange Rate Arbitrage Analysis

Topic: Exchange Rate Conversion & Arbitrage Opportunities

Given data:

Bank A:
Bid: ¥100/$
Ask: ¥120/$
Bank B:
Bid: $1.25/€
Ask: $1.5/€
Bank C:
Bid: ¥200/€
Ask: ¥250/€

(a) Convert Bank A's Quote to American Terms

To convert the Bank A quote from Japanese Yen per Dollar (¥/$) to U.S. Dollar per Yen ($/¥), the reciprocal of the existing quotes must be taken.

Bid Price (Bank A):

$$\text{Bid} = \frac{1}{\text{Ask in ¥/$}} = \frac{1}{120} = \$0.00833/\text{¥}$$

Ask Price (Bank A):

$$\text{Ask} = \frac{1}{\text{Bid in ¥/$}} = \frac{1}{100} = \$0.01/\text{¥}$$

Explanation: The conversion involves taking the reciprocal to switch from an indirect quote (foreign currency per unit of domestic currency) to a direct quote (domestic currency per unit of foreign currency).

Supporting Statement: The quotes are now in American terms as $/¥.

(b) Calculate the Cross Rates for Yen/Euro from Bank A and B

Utilize the Yen/Euro cross rate for both bid and ask prices based on Bank A and B.

Cross Rate Calculation:

$$\text{Cross Rate Bid} (\text{¥/€}) = \text{Bid} (\text{¥/$}) \times \text{Bid} ($/€)$$

$$\text{Cross Rate Ask} (\text{¥/€}) = \text{Ask} (\text{¥/$}) \times \text{Ask} ($/€)$$

From Bank A and Bank B:

Bid (¥/€): $\text{Bid} (\text{¥/€}) = 100 \times 1.25 = ¥125/€$

Ask (¥/€): $\text{Ask} = 120 \times 1.5 = ¥180/€$

Explanation: The cross rates use the product of the bid rates of USD/JPY and EUR/USD for bid and the same for ask.

Supporting Statement: Cross rates for ¥/€ calculated using Bank A (¥/$) and Bank B ($/€).

(c) Arbitrage Trading with Bank C

Check for arbitrage opportunities by comparing cross rates from step (b) with Bank C's quotes.

Bank C:

Bid (¥/€): ¥200/€
Ask (¥/€): ¥250/€

Comparison:

Arbitrage Buy (¥/€): from Bank B @ ¥125/€
Arbitrage Sell (¥/€): to Bank C @ ¥200/€

Explanation: Arbitrage profit exists if buying low and selling high in different markets/banks is possible.

Supporting Statement: Arbitrage trading involves divergence between derived cross rates and actual bank rates.

(d) Calculating Arbitrage Profit with $10,000

Starting with $10,000:

1. Convert $10,000 to ¥ using Bank A:
   $\text{Amount in ¥} = 10,000 \times 100 = ¥1,000,000$
2. Convert ¥1,000,000 to € using Bank C (Bid rate):
   $\text{Amount in €} = \frac{1,000,000}{200} = €5,000$
3. Convert €5,000 to $ using Bank B:
   $\text{Amount in $} = 5,000 \times 1.25 = \$6,250$

Explanation: Track how $10,000 initial capital converts through each step of arbitrage trading.

Supporting Statement: Each step accurately follows arbitrage conversion to find out profit.

Final Output:

Resulting profit by arbitrage:

$\text{Arbitrage Profit} = \$6,250 - \$10,000 = \$250$

Conclusion: The final arbitrage profit using triangular arbitrage with an initial capital of $10,000 results in a final profit of $250.