PROBLEMS

1. **Euroshipping Corporation maintains separate production and distribution facilities in Sweden, France, Spain, and Italy. The corporate headquarters is in France. As a consultant to the treasurer of Euroshipping, you have been asked to estimate how much money the firm could save by creating a centralized cash management pool. Currently, each affiliate maintains precautionary cash balances equal to 3 standard deviations above its expected demand for cash.**

Affiliate	Mean Demand for Money	1 Standard Deviation
Swedish	**€25,000,000**	**€7,000,000**
French	**€50,000,000**	**€13,000,000**
Italian	**€35,500,000**	**€10,000,000**
Spanish	**€20,000,000**	**€6,000,000**

By how much could Euroshipping reduce its overall demand for cash if it were to create a centralized cash pool for the four affiliates? (Assume that the cash needs are normally distributed and are independent of each other.)

Answer: Currently, each of the four affiliates is holding cash equal to the mean of their perceived demand plus three standard deviations. The total demand for cash by each affiliate is therefore

Swedish = €25,000,000 + 3 × €7,000,000 = €46,000,000
French = €50,000,000 + 3 × €13,000,000 = €89,000,000
Italian = €35,500,000 + 3 × €10,000,000 = €65,500,000
Spanish = €20,000,000 + 3 × €6,000,000 = €38,000,000

The total demand for cash sums these demands to give €238,500,000.

If we centralize the cash management, we would want to know the distribution of the sum of the demands for cash. The mean of the sum would be the sum of the means, and the variance of the sum would be the sum of the variances, because the demands are independent of each other. Thus, the mean demand for cash of centralized cash pool is

€25,000,000 + €50,000,000 + €35,500,000 + €20,000,000 = €130,500,000

The variance of the demand for cash of centralized cash pool is

$€7{,}000{,}000^2 + €13{,}000{,}000^2 + €10{,}000{,}000^2 + €6{,}000{,}000^2 = €18{,}814{,}888^2$

Thus, the total demand for cash by the centralized cash pool is

€130,500,000 + 3 ×€18,814,888 = €186,944,664

The demand for cash from the centralized cash pool is €51,555,336 = €238,500,000 - €186,944,664 less than the total demands for cash from the separate affiliates. This cash can be distributed to shareholders.

2. **Euroshipping is also considering developing a multilateral netting system.**
   a. **Given the cumulative monthly payments in the following payments matrix, derive the minimum transfers that could be made.**

Euroshipping Intracompany Payments Matrix (millions of euros)

Receiving Affiliate	Paying Affiliate Swedish	French	Italian	Spanish
Swedish	**—**	**16**	**14**	**18**
French	**19**	**—**	**12**	**15**
Italian	**22**	**7**	**—**	**11**
Spanish	**9**	**15**	**3**	**—**

Answer: If we add the total payments for each affiliate, we find the following:

Swedish: 19 + 22 + 9 = 50
French: 16 + 7 + 15 = 38
Italian: 14 + 12 + 3 = 29
Spanish: 18 + 15 + 11 = 44

With no netting system, total payments would be 50 + 38 + 29 + 44 = 161.
If we add the total receipts for each affiliate, we find the following:

Swedish: 16 + 14 + 18 = 48
French: 19 + 12 + 15 = 46
Italian: 22 + 7 + 11 = 40
Spanish: 9 + 15 + 3 = 27

With no netting system, total receipts would therefore be 48 + 46 + 40 + 27 = 161.
If we subtract each affiliate's total receipts from its total payments, we find the net payments that must be made by a multilateral netting system:

Swedish: 50 – 48 = 2
French: 38 – 46 = -8
Italian: 29 – 40 = -11
Spanish: 44 – 27 = 17

Clearly, a total of €19 million must be transferred among the affiliates. This can be achieved by having the
Swedish affiliate pay €2 million to Italian affiliate, a
nd the Spanish affiliate pay €9 million to the Italian affiliate
and €8 million to the French affiliate.

b. If the transaction costs on these fund transfers are 0.45%, how much would the company save by switching to a multilateral netting system?

Answer: The difference in the total amount transferred without and with a multilateral netting system is €161 million - €19 million = €142 million. If the transactions cost is 0.45% of the amount transferred, the total savings is

$$€142 \text{ million} \times 0.0045 = €0.639 \text{ million}$$

3. Suppose the euro borrowing and lending rates for a German parent and its Spanish affiliate for a 90-day period are as follows:

	Borrowing Rate (in percent per annum)	Lending Rate (in percent per annum)
German parent	**9.3**	**8.1**
Spanish affiliate	**9.6**	**7.9**

In each of the following cases, determine the direction funds should flow and the return to the MNC of transferring EUR1,000,000:

a. **The German parent has positive funds; the Spanish affiliate has negative funds.**

   Answer: The German parent should lend to the Spanish affiliate. The return to the MNC is

   $$(0.096 - 0.081) \times €1,000,000 = €15,000$$

b. **The German parent has negative funds; the Spanish affiliate has positive funds.**

   Answer: The Spanish affiliate should lend to the German parent. The return to the MNC is

   $$(0.093 - 0.079) \times €1,000,000 = €14,000$$

c. **The German parent has positive funds; the Spanish affiliate has positive funds.**

   Answer: The Spanish affiliate should lend to the German parent. The return to the MNC is

   $$(0.081 - 0.079) \times €1,000,000 = €2,000$$

d. **The German parent has negative funds; the Spanish affiliate has negative funds.**

   Answer: The German parent should lend to the Spanish affiliate. The return to the MNC is

   $$(0.096 - 0.093) \times €1,000,000 = €3,000$$