INTERNATIONAL FINANCE
- Exercises -

**Considered issues:**

- Currency parities
- Arbitrage
- Economic risk
- Options
- Foreign exchange risk hedging

**NB:** All numbers are indicated in *American* terms (p.e.: 1,000 = one thousand).
Exercise 1:

Consider the following exchange rates:
- 1 GBP = 1.4845 USD
- 1 USD = 1.2563 CAD
- 1 EUR = 1.2520 USD
- 1 USD = 1.5964 AUD
- 100 JPY = 1.0430 USD
- 1 USD = 1.2125 CHF

Calculate now the following currency parities:
- 105.05 EUR = ... CAD ?
- 5,009.00 JPY = ... CHF ?
- 20 AUD + 15.25 CAD = ... EUR ?
- 31.10 EUR = ... GBP ?
- 15.99 USD = ... CHF ?

Solution:
Exercise 2:

Consider the following exchange rates in New York:

- 1 USD = 0.6744 GBP
- 1 EUR = 1.2544 USD
- 1 USD = 3.0823 PLN
- 1 USD = 10.5633 ZAR

Calculate the following exchange rates:

- 1 EUR = ... GBP ?
- 1 EUR = ... ZAR ?
- 1 ZAR = ... PLN ?

You notice the following exchange rate in Paris: 1 USD = 10.4125 ZAR. Could you take advantage of this situation?

Solution:
Exercise 3:

The “German Sunpower AG” produces for a leading local telecommunication group special elements allowing to recharge mobile phones by solar energy. However, production costs in Germany are relatively high and allow to realize only a small profit. As the shareholders of the company are not satisfied anymore by this miserable return, they ask the management to envisage a delocalization of the production.

The management asked a business consulting group to carry out research about production costs in Eastern Europe and in Asia. The consultants presented two different solutions: either to delocalize to Ukraine or to directly go to Mongolia. In both cases, production costs would shrink. However, as the products are exclusively dedicated to the German market and as the local business partner expects on-time delivery, transportation costs have to be added to lower production costs. Moreover, the Mongolian government strives a limitation of exportations and thus taxes each exported product with a penalty fee corresponding to 250% of the total unit production costs. The monthly production output of the company is 125,000 units. Let’s furthermore consider that the selling price of the product is 39.95 EUR per unit.

<table>
<thead>
<tr>
<th></th>
<th>Fixed costs per unit</th>
<th>Variable costs per unit</th>
<th>Transportation costs</th>
<th>Other costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>3.00 EUR</td>
<td>34.75 EUR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ukraine</td>
<td>26.00 UAH</td>
<td>95.00 UAH</td>
<td>240.00 UAH</td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td>3,050.00 MNT</td>
<td>9,150.00 MNT</td>
<td>16,950.00 MNT</td>
<td>250% X-tax</td>
</tr>
</tbody>
</table>

1 UAH = 1 Ukrainian Hryvnia = 100 kopiýok ; 1 MNT = 1 Mongolian Tögrög = 100 möngö

The exchange rates of the currencies mentioned above were as follows (exceptionally numbers are indicated in European terms here!):

<table>
<thead>
<tr>
<th>Month</th>
<th>1 EUR =</th>
<th>12,100 UAH</th>
<th>1545,00 MNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1 EUR =</td>
<td>11,650 UAH</td>
<td>1575,00 MNT</td>
</tr>
<tr>
<td>March</td>
<td>1 EUR =</td>
<td>11,200 UAH</td>
<td>1645,00 MNT</td>
</tr>
<tr>
<td>April</td>
<td>1 EUR =</td>
<td>10,750 UAH</td>
<td>1735,00 MNT</td>
</tr>
<tr>
<td>May</td>
<td>1 EUR =</td>
<td>10,850 UAH</td>
<td>1765,00 MNT</td>
</tr>
<tr>
<td>June</td>
<td>1 EUR =</td>
<td>9,650 UAH</td>
<td>1785,00 MNT</td>
</tr>
<tr>
<td>July</td>
<td>1 EUR =</td>
<td>9,350 UAH</td>
<td>1805,00 MNT</td>
</tr>
<tr>
<td>August</td>
<td>1 EUR =</td>
<td>9,850 UAH</td>
<td>1825,00 MNT</td>
</tr>
<tr>
<td>September</td>
<td>1 EUR =</td>
<td>9,450 UAH</td>
<td>1815,00 MNT</td>
</tr>
<tr>
<td>October</td>
<td>1 EUR =</td>
<td>9,150 UAH</td>
<td>1865,00 MNT</td>
</tr>
<tr>
<td>November</td>
<td>1 EUR =</td>
<td>8,650 UAH</td>
<td>1895,00 MNT</td>
</tr>
<tr>
<td>December</td>
<td>1 EUR =</td>
<td>8,350 UAH</td>
<td>1930,00 MNT</td>
</tr>
</tbody>
</table>

- Should the company delocalize its production and in which country?
- Base your reflection on a differential benefit analysis.

Solution:
Exercise 4:

A big European company exporting to the US wants to hedge its foreign revenues with a maturity of 6 months. The spot rate is 1.0750 USD = 1.0000 EUR. The 6 month forward rate is 1.0885 USD = 1.0000 EUR.

- Which option will the company choose? Imagine a possible strike price.
- If the company decides to buy a USD-Put with strike 1.1100 USD per EUR and a premium of 1.7% (on the spot rate), what happens if the spot rate at expiration is:
  - 1.0800 USD = 1.0000 EUR
  - 1.1500 USD = 1.0000 EUR

Solution:
Exercise 5:

A big European company importing from the US wants to hedge with a maturity of 6 months. The spot rate 1.0750 USD = 1.0000 EUR. The 6 month forward rate is 1.0885 USD = 1.0000 EUR.

➤ Which option will the company choose? Imagine a possible strike price.

➤ If the company decides to buy a USD-Call with strike 1.0700 (USD per EUR) and a premium of 1.8 % (on the spot rate), what happens if the spot rate at expiration is:
  - 1.0500 USD = 1.0000 EUR
  - 1.1200 USD = 1.0000 EUR

Solution:
Exercise 6:

The American BIPBIP Corp. has recently signed (end of June) a contract to sell 1,000,000 cell phones to a British mobile company. Delivery and payment of the phones will take place in December.

- Total price = 10,000,000 GBP
- Total cost = 9,000,000 USD
- Current exchange rate (June) : 1 USD = 0.5150 GBP
- December future price for 1 USD = 0.6740 GBP

➢ Is the situation risky for BIPBIP Corp.?

➢ How to hedge?

➢ As CFO of the company, you decide to hedge the financial position by future contracts. What will be the profit / loss generated if the exchange rate USD/GBP in December is:

- 1 USD = 0.7550 GBP
- 1 USD = 0.4815 GBP

➢ Let’s assume that BIPBIP Corp. has no access to financial markets. How can it replicate the future contracts?

Solution:
Exercise 7:

An American company signed at the end of March a contract to buy computers from Japanese Company for 100,000,000 JPY. The payment and delivery will take place at end of September. The current (March) exchange rate is: 1.0000 USD = 118.0400 JPY. Moreover, the American company signed another contract to sell the computers to a Canadian company, at a price of 1,000,000 USD.

- Why is this situation risky? What type of risk is highlighted by this situation?
- When (for which USD/JPY rate) would the project make a profit?
- The September JPY-future price is: 1.0000 USD = 115.00 JPY. Is it possible for the American company to hedge? How? What is the total final profit generated by the project, locked in by your hedging proposal?
- At the end of September, the spot rate is: 1.0000 USD = 110.00 JPY. Calculate the profit or loss generated by the future contract you have bought or sold (based on the hedging you have determined in sub question 3) and by the project.

Solution:
Exercise 8:

A German company has just signed a contract (end of March) to sell sunglasses to a company located in Hong Kong, for 10,000,000 USD. Payment and delivery will take place at the end of July. Total expenses amount to 9,000,000 EUR.

- Why is this situation risky?
- Calculate at which currency parity (EUR per USD) this project generates profit.
- The 4 months future rate is 0.9000 EUR = 1.0000 USD. Is it possible to hedge? What would be the profit in this case?
- At the end of July, the spot rate is 1.2000 EUR = 1.0000 USD. Calculate the profit or loss generated by the future contract you have bought or sold before.

Solution:
Exercise 9:

The French industrial company « Produits du Millénaire » produces and exports industrial equipment to Great Britain. Today (2008/07/01), the company signed a contract with its British customer to sell equipment at the following conditions:

- Selling price per unit: 35,000 GBP
- Delivery date: 2008/11/01
- Payment term: 2008/12/01

If « Produits du Millénaire » produces the industrial equipment, the production cost will be 40,000 EUR per unit (to be paid on the 1st of December). The company has the opportunity to import the equipment from an American supplier. In this case, the purchasing cost (including transportation fees) is 50,000 USD per unit, to be paid on the 1st of December 2008. Today (2008/07/01), we observe the following conditions on the French foreign exchange market (Let’s assume here that the bid-ask spread is equal to 0).

- **Spot rates:**
  - EUR 1 = USD 1.2103
  - EUR 1 = GBP 0.6900

- **4 months - Forward rates:**
  - EUR 1 = USD 1.2160
  - EUR 1 = GBP 0.7000

- **5 months - Forward rates:**
  - EUR 1 = USD 1.2170
  - EUR 1 = GBP 0.7020

The management of « Produits du Millénaire » wants to maximize the profit achieved on this contract, but does not accept to take any financial risk. Imagine that you are the financial manager of this firm. Your task is to present to the management team the financial decisions you will take in relation to this commercial contract.

a) The management of « Produits du Millénaire » has to choose between two solutions: producing the equipment itself (solution 1) or subcontracting the production to the American supplier (solution 2). Explain the financial risks induced by each of those solutions.
b) You decide to hedge with futures. Explain how you will hedge the financial risks in both situations (solution 1 and solution 2). Calculate, for each solution, what will be your profit in December. Which solution do you choose: producing or importing from America the industrial equipment?

c) On the 1st of December, the €uro has appreciated. We observe the following conditions on the Forex market:

Spot foreign exchange rates:
- Spot €/$   EUR 1 = USD 1.2200
- Spot €/£   EUR 1 = GBP 0.7200

Calculate the economic profit (on the commercial contract), the financial profit (on the future contract), and the total profit (economic + financial) generated by « Produits du Millénaire ». Comment briefly your results.

Solution:

a) Solution 1:
- simple foreign exchange risk (transaction exposure)
- customer payment will be in £ while cost will be in €, and payment will be in the future
- fluctuations of the EUR/GBP between July and December may generate losses for the company

Solution 2:
- double foreign exchange risk (on transactions)
- profit in € depends on the fluctuation of two exchange rates between July & December → GBP/EUR (export) and USD/EUR (import)

b) Solution 1: Hedging on export
- sell F5 €/£ for 35,000 GBP at 1 EUR = 0.7020 GBP
- profit:
  - Sales: 35,000 / 0.7020 = 49,857.55 EUR
  - Costs: 40,000 EUR
  - Profit: 9,857.55 EUR
Solution 2: Hedging on export sales revenue

- sell F5 €/£ for 35,000 GBP at 1 EUR = 0.7020 GBP
- hedge import costs: buy F5 €/$ for 50,000 USD 1 EUR = 1.2170 USD

Profit:
Sales: $35,000 / 0.7020 = 49,857.55 EUR
Costs: $50,000 / 1.2170 = 41,084.63 EUR
Profit: 8,772.92 EUR

⇒ Chose solution 1, which is more profitable.

c) Economic profit:
Sales: 35,000 / 0.72 = 48,611.11 EUR
Costs: 40,000 EUR
Profit: 8,611.11 EUR

Financial profit (future margin):
Future market: 35,000 GBP → 49,860.00 EUR
Spot market: 35,000 GBP → 48,611.11 EUR
Future margin: 35,000*(1/0.7020-1/0.7200) = 1,248.89 EUR

Total Profit:
Economic profit: 8,611.11 EUR
Future margin: 1,248.89 EUR
Total profit: 9,860.00 EUR

⇒ The total profit was already known; the appreciation of the spot rate is compensated by the future margin.