Chapter 11

International Debt Financing

PROBLEMS

1. In 1985, R.J. Reynolds (RJR for short) acquired Nabisco Brands and financed the deal with a variety of financial instruments, including three dual-currency Eurobonds. The first dual-currency bond, lead-managed by Nikko, raised JPY25 billion (which was equivalent to USD105.5 million at the time of issue). Coupons were paid in yen, but the required final principal payment was not JPY25 billion but USD115.956 million. The coupon was 7.75%, even though a comparable fixed-rate Euroyen bond at that time carried only a 6.375% coupon. The actual 5-year forward rate at the time was around JPY200/USD.

a. Given the “fat” coupon, is this bond necessarily a great deal for the investors?

Answer: No, it isn’t a particularly great deal for the investor because the payment at the end is worth substantially less than the face amount of the bond. To see this, note that the yen value of final payment can be found by multiplying the USD115.956 million by the forward rate:

\[
\text{USD115.956 million} \times \frac{\text{JPY200}}{\text{USD}} = \text{JPY23.191 billion}
\]

which is less than JPY25 billion, the original principal.

Of course, the coupon is higher than the coupon on a straight Euroyen bond, so we shouldn’t expect the final principal payment to be JPY25 billion otherwise the rate of return on the bond would be 7.75%. If we hedge the dual currency bond and find the internal rate of return on the yen cash flows, we find the value, y, which sets the discounted yen payoffs equal to the cost of the bonds:

\[
\sum_{i=1}^{5} \frac{0.0775 \times \text{JPY25 billion}}{(1+y)^i} + \frac{(\text{JPY/USD}) \times \text{USD115.956 billion}}{(1+y)^5}
\]

Using Excel’s IRR command, we find that the internal rate of return on the bond is 6.48%, which is greater than the rate of return offered by the straight Euroyen bond. Thus, the bond is a good deal for investors if they can hedge at the forward rate of JPY200/USD.
b. At maturity, in August 1990, the exchange rate was actually JPY144/USD. Was the bond a good deal for investors?

*Answer:* We need to calculate the return to investors if the investors were unhedged. Investors received

\[ \text{USD115.956 million} \times \text{JPY144/USD} = \text{JPY16.698 billion} \]

which is almost ¥7 billion less than if they had sold the face amount forward at the forward rate prevailing in August 1985. This loss happened because the yen appreciated by much more than was predicted by the forward rate. It is therefore also unlikely that the “fat coupon” would have made up for this huge capital loss. In fact, it is straightforward to compute the actual internal rate of return investors made on an unhedged investment in this bond. It is the rate that solves:

\[
25 \text{ billion} = \sum_{i=1}^{5} \frac{0.0775 \times 25\text{ billion}}{(1 + y)^i} + \frac{16.698 \text{ billion}}{(1 + y)^5}
\]

We find \( y = 1.28\% \). This is a much lower return than the yield offered in 1985 by a regular Euroyen bond! This is not so hard to understand considering that the payment at the end represents a capital loss of approximately 30%!

2. GBA Company wishes to raise $5,000,000 with debt financing. The funds will be repaid with interest in 1 year. The treasurer of GBA Company is considering three sources:

   i. Borrow USD from Citibank at 1.50%
   ii. Borrow EUR from Deutsche Bank at 3.00%
   iii. Borrow GBP from Barclays at 4.00%

If the company borrows in euros or British pounds, it will not cover the foreign exchange risk; that is, it will change foreign currency for dollars at today’s spot rate and buy foreign currency back 1 year later at the spot rate prevailing then. The GBA Company has no operations in Europe.

A representative of GBA contacts a local academic to provide projections of the spot rates 1 year in the future. The academic comes up with the following table:

<table>
<thead>
<tr>
<th>Currency</th>
<th>Spot Rate</th>
<th>Projected Rate 1 Year in the Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD/GBP</td>
<td>1.5</td>
<td>1.55</td>
</tr>
<tr>
<td>USD/EUR</td>
<td>0.95</td>
<td>0.85</td>
</tr>
</tbody>
</table>

a. What is the expected interest rate cost for the loans in EUR and GBP?

*Answer:* For the EUR, the expected cost is

\[
(1 + .03) \times (0.85/0.95) - 1 = -0.0784 \text{ or } -7.84\%
\]

For the GBP, the expected cost is

\[
(1 + 0.04) \times (1.55/1.50) - 1 = 0.0747 \text{ or } 7.47\%
\]
These costs reflect both the interest costs and the expected capital gains or losses on the currency positions. If the academic’s projections prove accurate, the interest cost in GBP is higher than the GBP interest because the pound is expected to appreciate relative to the dollar, and GBA will need more than $5,000,000 to repay the pound loan. In contrast, the EUR is expected to decrease in value by more than 10% relative to the dollar, providing a large capital gain to GBA, which borrows in a depreciating currency and hence must use much less than the initial $5,000,000 to repay the euro loan.

b. What are the projected USD/GBP rate and USD/EUR rate for which the expected interest costs would be the same for the three loans?

**Answer:** These are the exchange rates that satisfy Uncovered Interest Rate Parity,

$$E_t \left[ S(t+1,\$/FC) \right] = \frac{S(t,\$/FC) \times (1 + i(\$)) \times (1 + i(FC))}{1 + i(\text{FC})}$$

where FC indicates either the EUR or the GBP. For the euro we find

$$E_t \left[ S(t+1,\$/FC) \right] = \frac{0.95 \times 1.015}{1.03} = \frac{0.9362}{\text{U}}$$

Hence, the euro must depreciate only a little bit for the euro loan to be as cheap as the USD loan. For the pound, we obtain

$$E_t \left[ S(t+1,\$/FC) \right] = \frac{1.50 \times 1.015}{1.04} = \frac{1.4639}{\text{E}}$$

**c. Should the company borrow in the currency with the lowest interest rate cost? Why or why not? Would your answer change if GBA did generate cash flows in the United Kingdom and continental Europe?**

**Answer:** When using the forecasts of the academic, the lowest interest cost occurs in EUR. However, the academic’s forecast is quite far away from the “break-even” rates computed in part b., which may be closely related to the market determined forward rates. Moreover, currency forecasters do not have the best of records (see Chapter 10). Consequently, it is not at all clear that the “expected” low interest cost will actually be realized. If anything, the empirical evidence suggests that borrowing in low interest countries (in this case the US) may eventually save money (see Chapter 7 on the deviations from Unbiasedness). What a company can do is to investigate in what country its (multiplicative) credit spread is minimized, borrow in that country and hedge back to dollars when there is no reason, as in this case, to hold foreign exchange risk. If GBA generates cash flows in Europe, borrowing in currencies there may provide a natural hedge.
3. FE Company wishes to raise $1,000,000 with debt financing. The treasurer of FE Company considers two possible instruments:
   i. A 2-year floating-rate note at 1% above 1-year dollar LIBOR on which interest is paid once a year
   ii. A 2-year bond with an interest rate of 5%

Currently, the dollar LIBOR is 1.50%.

a. Is it obvious which security the Treasurer should pick?

   Answer: It is not at all obvious which debt to pick. While the two-year floating rate starts out at a lower rate (2.50% versus 5%), it is not clear at all what the eventual cost of the note will be to the company. The cost will also depend on the reset of the interest rate in the second year. If that interest is high enough, the 2-year bond may ex post prove to be the cheapest financing vehicle. Typically, an upward sloping yield curve suggests the market does indeed expect that short-term interest rates will rise in the future.

b. Suppose the Treasurer believes that 1-year LIBOR, 1 year from now, will rise to 4.50%. Which security has the lowest expected AIC if borrowing fees are similar for the two instruments?

   Answer: The AIC for the two-year bond is simply 5%. For the two-year floating rate note, we must compute the y that satisfies:

   \[ 1,000,000 = \frac{25,000}{(1 + y)} + \frac{55,000}{(1 + y)^2} + \frac{1,000,000}{(1 + y)^3} \]

   where we computed the coupon payments as 2.5% for year 1 and 5.5% (4.5% +1%) for year 2 on the $1,000,000 principal. The solution for y is 3.97%. Hence, at this forecast, the floating rate note is cheaper than the bond.

5. Suppose Intel wishes to raise USD1 billion and is deciding between a domestic dollar bond issue and a Eurobond issue. The U.S. bond can be issued at a 5-year maturity with a coupon of 4.50%, paid semiannually. The underwriting, registration, and other fees total 1.00% of the issue size. The Eurobond carries a lower annual coupon of 4.25%, but the total costs of issuing the bond runs to 1.25% of the issue size. Which loan has the lowest all-in cost?

   Answer: To keep things simple, we express the cash flows on bonds with a face value of 100, instead of $1 billion. We use a cash flow diagram similar to the one used in the Point-Counterpoint.

   The U.S. bond is special as it features semi-annual coupon payments (of 4.5% / 2 = 2.25%). It is best to simply compute the AIC using 10 half-years. This AIC is then a semi-annual rate which must be annualized to be comparable to the annual AIC of the
Eurobond. Because there are so many periods, we only show the first few and the last few.

<table>
<thead>
<tr>
<th>1. US Bond</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Half-Year</td>
<td>Dollar Cash Flows</td>
</tr>
<tr>
<td>0</td>
<td>100 – 1.00 = 99.00</td>
</tr>
<tr>
<td>1</td>
<td>-2.25</td>
</tr>
<tr>
<td>2</td>
<td>-2.25</td>
</tr>
<tr>
<td>....</td>
<td>....</td>
</tr>
<tr>
<td>9</td>
<td>-2.25</td>
</tr>
<tr>
<td>10</td>
<td>-102.25</td>
</tr>
</tbody>
</table>

The internal rate of return on the cash flows is 2.36%. To annualize this AIC, we compute $(1 + 0.0236)^2 – 1 = 0.0478$ or 4.78%.

For the Eurobond, the computations are more standard:

<table>
<thead>
<tr>
<th>2. Eurobond</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Euro Cash Flows</td>
</tr>
<tr>
<td>0</td>
<td>100 – 1.25 = 98.75</td>
</tr>
<tr>
<td>1</td>
<td>-4.25</td>
</tr>
<tr>
<td>2</td>
<td>-4.25</td>
</tr>
<tr>
<td>3</td>
<td>-4.25</td>
</tr>
<tr>
<td>4</td>
<td>-4.25</td>
</tr>
<tr>
<td>5</td>
<td>-104.25</td>
</tr>
</tbody>
</table>

The AIC of these cash flows is 4.54%. Hence, we see that, on an annualized basis, the Eurobond is substantially cheaper (by 24 basis points) than the U.S. bond.