Unit 8
Integrating Hedging, Sales and Financing After-Tax

Transactions Involving only one Part of Firm
• When each division (parent or subsidiary) conducts its own hedging, then the transition from pre-tax to after-tax is relatively straightforward.
• For sales or purchases
  – just substitute the hedge rate for the future spot rate
• All the financing alternatives were calculated on an after tax basis so
  – just substitute the hedge rate for the future spot rate

Example 1
• Parent sells an item for 100,000€
• Payment in 1 period
• Parent is in 20% income tax bracket
• Forward (bid rate) is 1.4800$/€
• After tax value of sale
  – Unhedged = 100,000 €(1-0.20) = 80,000 €
  – Hedged with forward
    • 100,000 €f(1-0.20) = (80,000 €)(1.4800$/€) = $118,400

Example 1 continued
• Put Option premium = 1.200 cents / Euro
• Put Option Strike Price = 1.4400$/€
• Pre-tax cost of premium = $1,200
• After tax cost of premium = $960
• Before exercise
  • 100,000 €f(1-0.20) = 80,000 € - 960
  • Exercise put
    • (100,000 €)(1.4400$/€)(1-0.2) - $960 = $114,240

Example 2
• Parent buys a good for 50,000€ - pays immediately
• Parent finances the purchase with a euro loan from a German bank
• Parent settles loan in 1 period
• e0 = 1.4800$/€
• t = 20%
• 0.4521 $/€
• Call Option premium = 1.1000 cents / euro
• Call Option Strike price = 1.4900$/€
• iF = 4%
• iS = 6%

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• A foreign currency derivative that qualifies as a foreign currency hedge gets special treatment that matches gains or losses resulting from the change in the value of the derivative with losses or gains in the value of the underlying transaction or asset, thereby removing hedge gains or losses from current income (Shapiro Chapter 10 p353)
  – Trying to separate true hedging from speculation.
  – Hedge must be deemed “Highly” effective as

\[ \frac{0.8 \leq \frac{\text{AS Value Derivative}}{\text{AS Value of Item Hedged}} \leq 1.25}{\text{AS Value Derivative}} \]
Example 2 cont.

After tax cost
• $(50,000\text{€})(1-0.20)e^0 = -59,200$

After tax euro loan
• $59,200 - 42,400 \text{€}e^1$

Total Transaction = Add above figures
• $-42,400\text{€}e^1$

Check with no change in exchange rate
• $74,000(1.02)(0.06) = -3,552$ financing cost
• $-59,200$ input cost

Total = $-3,552 - 59,200 = -62,752$

$-42,400\text{€}e^1$ at $e^0 \rightarrow -42,400\text{€}(1.4800$/€) = -62,750

Example 2 cont.

Forward hedge
• $-42,400(1.4521$/€) = -61,569$

Options hedge
• Pre-tax cost of premium = $550$
• After tax cost of premium = $440$
• Unexercised
  • $-42,400\text{€}e^1 - 440$
  • Exercised
  • $-42,400(1.4900$/€) - 440 = -63,616$

Example 3

• Subsidiary buys a good for 50,000€ paid immediately
• Subsidiary finances the purchase with a euro loan from a German bank
• Subsidiary settles loan in 1 period
  • $e^0 = 1.4000$/€$
  • $t_f = 35$
  • $s_f = 1.4272$/€
  • Call Option premium = 1.2500 cents / euro
  • $l_u = 5$
  • $l_f = 3$

Example 3 cont.

$\$ Value After tax input cost = -50,000(1-0.35)(1.4000$/€) = -45,500$

$\$ Value after tax Euro loan = $70,000(0.03)(1-0.035) = -1,365$

$\$ Value total transactions = $24,500-50,975\text{€}e^1$

Check if exchange rate didn’t change
• Purchase is worth $45,500
• Financing is worth $70,000(0.03)(1-0.035) = $1,365
• Total Cost of transaction = $46,865$

$\$ Value total transactions = $24,500-50,975\text{€}e^1 = -46,865$

With Forward Hedge
• $24,500(1.4272$/€) = -48,252$

With Option Hedge
• Pre-tax option premium = $(50,000\text{€})(-1.25\text{cent/euro}) = -625$
• After-tax option premium = -$625(1-0.35) = -$406$
• Don’t Exercise = $24,500-50,975\text{€}e^1 - 406$
• Exercise = $24,500(1.4300$/€) - 406 = -48,800$

Macro vs. Micro Hedge

• With a micro hedge, each individual transaction is matched with its own hedging instrument
• With a macro hedge, the combined (net) long or short position in foreign currency is hedged
• It is difficult to distinguish a macro hedge from speculating, so many of the accounting rules and regulations favor the micro hedge

Intracorporate Sales and Macro vs. Micro Hedges

• From Unit 7 Example 1
  • $\$ Denominated Sale
  • Parent Corp buys an input in the US for $900,000
  • Parent processes input at cost of $200,000
  • Parent sells the good to subsidiary at current equivalent of Q$ = 1,000,000
  • Subsidiary further processes good at price 50,000 €
  • Subsidiary sells final good for 2,100,000 €
  • Spot exchange rate is $e^0 = 1.4800$/€$
  • US income tax rate is $t_u = 28$
  • Foreign income tax rate is $t_f = 40$
Intracorporate Sales and Macro vs. Micro Hedges

$ Denominated Sale parent to sub

1. After tax proceeds from sale to sub \( (\$1,000,000)(1 - 0.28) = $720,000 \)

2. After tax input cost \( (-\$900,000)(1 - 0.28) = -$648,000 \)

3. After tax processing cost \( (-\$200,000)(1 - 0.28) = -$144,000 \)

4. After tax revenue from final sale \( (2,100,000)(1 - 0.40) = 1,260,000 \)

5. After tax processing cost \( (-\$50,000)(1 - 0.40) = -30,000 \)

6. After tax payment from sub to parent \( (-\$200,000 - 270,270) = -470,270 \)

7. Overall Firm After tax dollar value \( 959,730 - 272,000 = 687,730 \)

Sub has 2,100,000€ Long position from #4
- Contact to sell €
Sub has 50,000 € Short position from #5
- Contract to buy €
Sub has $1,000,000 Short Position From #6
- Contract to buy $

For a micro hedge, the sub would have to conduct 3 hedges and in this case one can substitute the hedge rate in for e1.

In general the hedge effects would bypass the income statement.

With a macro hedge the sub nets out the positions and only makes one hedge.

It’s difficult for regulators to distinguish macro hedges from speculating so the regulations treat them more as speculating and the consequences of macro hedges often go through the income statement.

• Hedge by Sub
  \( \frac{\$450,000}{1.4800} \)

  1. After tax proceeds from sale to parent \( (\$450,000)(1 - 0.40) = 182,432 \)

  2. After tax input cost \( -$120,000 \)

  3. After tax processing cost \( -$30,000 \)

  4. After tax revenue from final sale \( $432,000 \)

  5. After tax processing cost \( -$7,200 \)

  6. After tax payment from parent to sub \( -$424,800 - 186,487 = -611,287 \)

Hedge by Parent

\( \frac{\$424,800 - 186,487}{1.4800} \)

US income tax rate = 30%

Integrated Example Economic Data

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<tr>
<th></th>
<th>Bid ($/€)</th>
<th>Ask ($/€)</th>
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<td>Spot</td>
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<td>1.4050</td>
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<tr>
<td>Forward</td>
<td>1.4207</td>
<td>1.4300</td>
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<tr>
<td>Borrow</td>
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<td>3.85</td>
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<tr>
<td>Invest</td>
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<td>Premium (cents per euro)</td>
<td>Strike ($/€)</td>
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<tr>
<td>Call</td>
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<td>1.4357</td>
</tr>
<tr>
<td>put</td>
<td>1.1500</td>
<td>1.4145</td>
</tr>
</tbody>
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US income tax rate = 30%
Integrated Example 1

Parent corporation needs an input X. It can buy it in the US for $50,000 or overseas for 33,000€. In either case, payment is made immediately.

- The parent can finance the input purchase with either a dollar loan from a US bank or an € loan from a German bank. The loan is repaid in period 1.
- The parent processes the good for $10,000. These costs are paid in period 1.
- The parent sells the final good overseas for 60,000€. The payment is received in period 1.
- The parent can hedge its transactions with a forward contract or options.

Integrated Example 1 cont.

Analysis
- What parity condition applies to the purchases and sales? Does it hold?
- Determine the cash-flows from operations
  - What financing if any is necessary?
  - What parity condition applies to the financing? Does it hold?

Integrated Example 1 cont. Purchase and Sales

- The parity condition that applies to purchases and sales is PPP
- The input costs $50,000 in the US and 33,000€ overseas.
- Since payment is made immediately, the appropriate exchange rate is the spot ask.
- 33,000€*(1.4050$/€) = $46,365
- PPP does NOT hold and we should buy from overseas.

Integrated Example 1 cont. Financing Needs?

- Since payment for the input must be made immediately, and we have no inflows from operations now, we need to finance either $50,000 or 33,000€.
- The two parity conditions that apply to financing are CIP and UIP.
- We determined in the previous slide that we should buy overseas, so we need to finance the 33,000€ amount.

After-tax dollar cost of $ Loan = $46,365*(0.04)*(1-0.30) = -$1,298
After-tax cost of € loan = $32,456 – 23,793€e1

The two loans have equal dollar value at 1.4186$/€ = CIP does not hold
Whether UIP holds depends on our expectation of e1

Integrated Example 1 cont. $ values After tax cash flows

Case 1 (unhedge, $ financing)
- Parent gets dollar loan for $46,365
  - After tax financing cost $46,365*(0.04)*(1-0.30) = -$1,298
- Parent processes the good for $10,000
  - After tax processing ($10,000)*(1-0.30) = -$7,000
- Parent sells final good for 60,000€
  - After tax revenue 60,000€*(1-0.30) = 42,000 €e1
- Final After tax dollar value 42,000 €e1-$8,298

Case 2 and 3 (hedge, $ financing)
- Forward Hedge
  - After tax $premium = (60,000€)(1.15/100)*(1-0.30) = $483
  - Exercise
    - 42,000 €(1.4145$/€) - $8,298-$483 = $50,628
  - Don't Exercise
    - 42,000 €e1-$8,781
Integrated Example 1 cont.
$ values After tax cash flows

• Case 4 (unhedged, € financing)
  • Parent gets euro loan for 33,000 €
    – After tax financing cost $32,456 – 23,793€
  • Parent processes the good for $10,000
    – After tax processing ($10,000)(1-0.30) = $7,000
  • Parent sells final good for 60,000€
    – After tax revenue 60,000€(1-0.30) = 42,000 €
  • Final After tax dollar value
    $25,456+18,207€