TRANSACTION EXPOSURE EXAMPLE

Maria Gonzalez, CFO of Trident, has just concluded a sale to Regency, a British firm, for £1,000,000

- The sale is made in March for settlement due in three months' time, June
  - Assumptions
    - Spot rate is $1.7640/£
    - 3 month forward rate is $1.7540/£ (a 2.2676% discount)
    - Trident's cost of capital is 12.0%
    - UK 3 month borrowing rate is 10.0% p.a.
    - UK 3 month investing rate is 8.0% p.a.

  - Assumptions
    - US 3 month borrowing rate is 8.0% p.a.
    - US 3 month investing rate is 6.0% p.a.
    - June put option in OTC market for £1,000,000; strike price $1.75; 1.5% premium
    - Trident's foreign exchange advisory service forecasts future spot rate in 3 months to be $1.7600/£
- Trident operates on thin margins and Maria wants to secure the most amount of US dollars; her *budget rate* (lowest acceptable amount) is $1.7000/£

- Maria faces four possibilities:
  - Remain unhedged
  - Hedge in the forward market
  - Hedge in the money market
  - Hedge in the options market

Unhedged position

- Maria may decide to accept the transaction risk
- If she believes that the future spot rate will be $1.76/£, then Trident will receive £1,000,000 x $1.76/£ = $1,760,000 in 3 months' time
- However, if the future spot rate is $1.65/£, Trident will receive only $1,650,000 well below the budget rate

Forward Market hedge

- A forward hedge involves a forward or futures contract and a source of funds to fulfill the contract
- The forward contract is entered at the time the A/R is created, in this case in March
- When this sale is booked, it is recorded at the spot rate.
- In this case the A/R is recorded at a spot rate of $1.7640/£, thus $1,764,000 is recorded as a sale for Trident
- If Trident does not have an offsetting A/P in the same amount, then the firm is considered uncovered

Forward Market hedge

- Should Maria want to cover this exposure with a forward contract, then she will sell £1,000,000 forward today at the 3 month rate of $1.7540/£
- She is now "covered" and Trident no longer has any transaction exposure
- In 3 months, Trident will received £1,000,000 and exchange those pounds at $1.7540/£ receiving $1,754,000
- This sum is $6,000 less than the uncertain $1,760,000 expected from the unhedged position
- This would be recorded in Trident's books as a foreign exchange loss of $10,000 ($1,764,000 as booked, $1,754,000 as settled)

Money Market hedge

- A money market hedge also includes a contract and a source of funds, similar to a forward contract
- In this case, the contract is a loan agreement
  - The firm borrows in one currency and exchanges the proceeds for another currency
  - Hedges can be left "open" (i.e. no investment) or "closed" (i.e. investment)

- To hedge in the money market, Maria will borrow pounds in London, convert the pounds to dollars and repay the pound loan with the proceeds from the sale
  - To calculate how much to borrow, Maria needs to discount the PV of the £1,000,000 to today
  - £1,000,000/1.025 = £975,610
  - Maria should borrow £975,610 today and in 3 months' time repay this amount plus £24,390 in interest (£1,000,000) from the proceeds of the sale

  - Trident would exchange the £975,610 at the spot rate of $1.7640/£ and receive $1,720,976 at once
  - This hedge creates a pound denominated liability that is offset with a pound denominated asset thus creating a *balance sheet hedge*

Assets		**Liabilities and Net Worth**	
Account Receivable	£1,000,000	Bank loan (principal)	£975,610
		Interest payable	24,390
	£1,000,000		£1,000,000

- In order to compare the forward hedge with the money market hedge, Maria must analyze the use of the loan proceeds
  - Remember that the loan proceeds may be used today, but the funds for the forward contract may not

- Because the funds are relatively certain, comparison is possible in order to make a decision
- Three logical choices exist for an assumed investment rate for the next 3 months

- First, if Trident is cash rich the loan proceeds might be invested at the US rate of 6.0% p.a.
- Second, Maria could use the loan proceeds to substitute an equal dollar loan that Trident would have otherwise taken for working capital needs at a rate of 8.0% p.a.
- Third, Maria might invest the loan proceeds in the firm itself in which case the cost of capital is 12.0% p.a.

Received today	**Invested in**	**Rate**	**Future value in 3 months**
$1,720,976	Treasury bill	6% p.a. or 1.5%/quarter	$1,746,791
$1,720,976	Debt cost	8% p.a. or 2.0%/quarter	$1,755,396
$1,720,976	Cost of capital	12% p.a. or 3.0%/quarter	$1,772,605

- Because the proceeds in 3 months from the forward hedge will be $1,754,000, the money market hedge is superior to the forward hedge if Maria used the proceeds to replace a dollar loan (8%) or conduct general business operations (12%)
- The forward hedge would be preferable if Maria were to just invest the loan proceeds (6%)
- We will assume she uses the cost of capital as the reinvestment rate

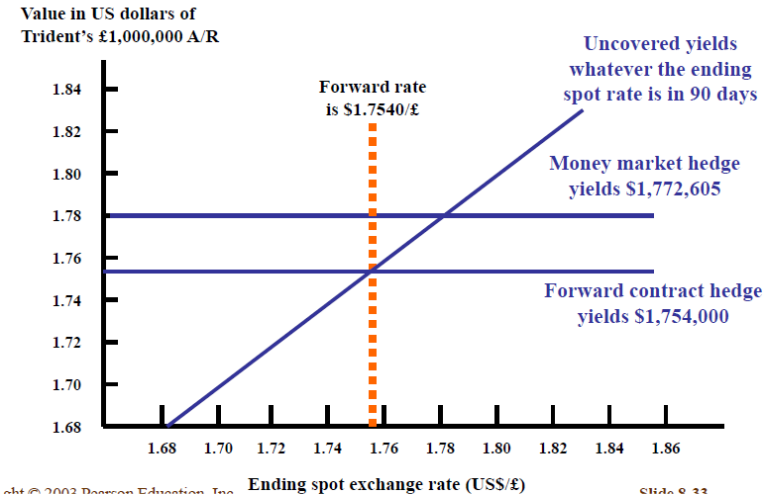
- A breakeven investment rate can be calculated in order to forgo numerous calculations and still aid Maria in her decision

$$(Loan\ proceeds) \times (1 + rate) = (forward\ proceeds)$$
$$\$1{,}720{,}976 \times (1 + r) = \$1{,}754{,}000$$
$$\boldsymbol{r = 0.0192}$$

To convert this 3 month rate to an annual rate,

$$0.0192 \times \frac{360}{90} = \mathbf{7.68}\%$$

- In other words, if Maria can invest the loan proceeds at a rate equal to or greater than 7.68% p.a. then the money market hedge will be superior to the forward hedge
- The following chart shows the value of Trident's A/R over a range of possible spot rates both uncovered and covered using the previously mentioned alternatives



Option market hedge

- Maria could also cover the £1,000,000 exposure by purchasing a put option. This allows her to speculate on the upside potential for appreciation of the pound while limiting her downside risk
  - Given the quote earlier, Maria could purchase 3 month put option at an ATM strike price of $1.75/£ and a premium of 1.5%
  - The cost of this option would be

$$(Size\ of\ option) \times (premium) \times (spot\ rate) = cost\ of\ option$$
$$£1{,}000{,}000 \times 0.015 \times \$1.7640 = \$\mathbf{26.460}$$

- Because we are using future value to compare the various hedging alternatives, it is necessary to project the cost of the option in 3 months forward
- Using a cost of capital of 12% p.a. or 3.0% per quarter, the premium cost of the option as of June would be
  - $\$26{,}460 \times 1.03 = \$27{,}254$
- Since the upside potential is unlimited, Trident would not exercise its option at any rate above $1.75/£ and would purchase pounds on the spot market
- If for example, the spot rate of $1.76/£ materializes, Trident would exchange pounds on the spot market to receive £1,000,000 × $1.76/£ = $1,760,000 less the premium of the option ($27,254) netting $1,732,746

- Unlike the unhedged alternative, Maria has limited downside with the option
- Should the pound depreciate below $1.75/£, Maria would exercise her option and exchange her £1,000,000 at $1.75/£ receiving $1,750,000
  - Less the premium of the option, Maria nets $1,722,746
  - Although this downside is less than that of the forward or money market hedge, the upside potential is not limited

- As with the forward and money market hedges, Maria can also calculate her breakeven price on the option

- The upper bound of the range is determined by comparison of the forward rate
  - The pound must appreciate above $1.754/£ forward rate plus the cost of the option, $0.0273/£, to $1.7813/£
- The lower bound of the range is determined in a similar manner
  - If the pound depreciates below $1.75/£, the net proceeds would be $1.75/£ less the cost of $0.0273/£ or $1.722/£
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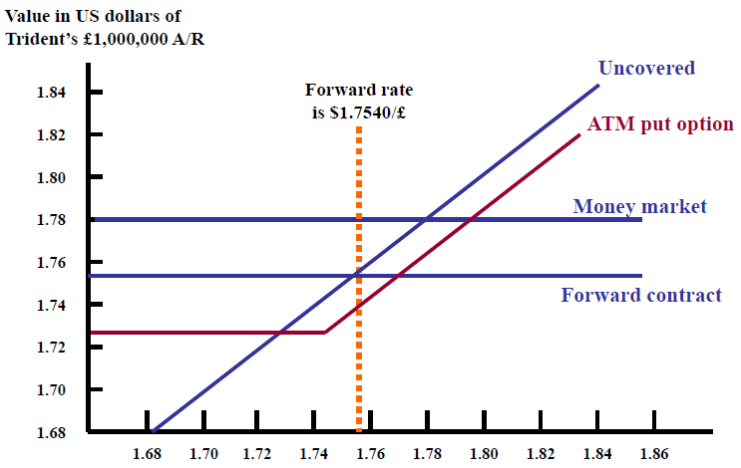

Put Option Strike Price	***ATM Option $1.75/£***
Option Cost (future cost)	$27.254
Proceeds if exercise	$1,750,000
Minimum net proceeds	$1,722,746
Maximum net proceeds	unlimited
Breakeven spot rate (upside)	$1.7813/£
Breakeven spot rate (downside)	$1.7221/£

Strategy Choice and Outcome

- Trident, like all firms, must decide on a strategy to undertake before the exchange rate changes but how will Maria choose among the strategies?
- Two criteria can be utilized to help Maria choose her strategy
  - ***Risk tolerance*** - of the firm, as expressed in its stated policies and
  - ***Viewpoint –*** Maria's own view on the expected direction and distance of the exchange rate

- After all the strategies have been explained, Trident now needs to compare the alternatives and their outcomes in order to choose a strategy
- There were four alternatives available to manage this account receivable and Maria has a budget rate at which she cannot fall below on this transaction

Hedging Strategy	*Outcome/Payout*
Remain uncovered	Unknown
Forward Contract hedge @ $1.754/£	$1,754,000
Money market hedge @ 8% p.a.	$1,755,396
Money market hedge @ 12% p.a.	$1,772,605
Put Option hedge @ strike $1.75/£	
Minimum if exercised	$1,722,746
Maximum if not exercised	Unlimited

Managing an Account Payable

- Just as Maria's alternatives for managing the receivable, the choices are the same for managing a payable
  - Assume that the £1,000,000 was an account payable in 90 days
- ***Remain unhedged*** – Trident could wait the 90 days and at that time exchange dollars for pounds to pay the obligation
  - If the spot rate is $1.76/£ then Trident would pay $1,760,000 but this amount is not certain

- ***Use a forward market hedge*** – Trident could *purchase* a forward contract locking in the $1.754/£ rate ensuring that their obligation will not be more than $1,754,000
- ***Use a money market hedge*** – this hedge is distinctly different for a payable than a receivable
  - Here Trident would exchange US dollars spot and invest them for 90 days in pounds
  - The pound obligation for Trident is now offset by a pound asset for Trident with matching maturity

- ***Using a money market hedge*** –
  - To ensure that exactly £1,000,000 will be received in 90 days' time, Maria discounts the principal by 8% p.a.

$$\frac{£1{,}000{,}000}{\left[1+\left(0.08\times\frac{90}{360}\right)\right]}=£\mathbf{980,392.16}$$

This £980,392.16 would require $1,729,411.77 at the current spot rate

$$£980{,}392.16\times\frac{\$1.7640}{£}=\$\mathbf{1,729,411.77}$$

- ***Using a money market hedge*** –
  - Finally, carry the cost forward 90 days in order to compare the payout from the money market hedge

$$\$1{,}729{,}411.77 \times \left[1 + \left(0.12 \times \frac{90}{360}\right)\right] = \$\mathbf{1{,}781{,}294.12}$$

This is higher than the forward hedge of $1,754,000 thus unattractive

- ***Using an option hedge*** – instead of purchasing a put as with a receivable, Maria would want to purchase a call option on the payable
    - The terms of an ATM call option with strike price of $1,75/£ would be a 1.5% premium

$$£1{,}000{,}000 \times 0.015 \times \frac{\$1.75}{£} = \$\mathbf{26{,}460}$$

Carried forward 90 days the premium amount is comes to $27,254

- ***Using an option hedge*** –
    - If the spot rate is less than $1.75/£ then the option would be allowed to expire and the £1,000,000 would be purchased on the spot market
    - If the spot rate rises above $1.75/£ then the option would be exercised and Trident would exchange the £1,000,000 at $1.75/£ less the option premium for the payable

Exercise call option $(£1{,}000{,}000 \times \frac{\$1.75}{£})$	$1,750,000
Call option premium (carried forward 90 days)	$27,254
Total maximum expense of call option hedge	**$1,777,254**

Risk Management in Practice

- **Which Goals?**
    - The treasury function of most firms is usual considered a cost center; it is not expected to add to the bottom line
    - However, in practice some firms' treasuries have become aggressive in currency management and act as profit centers
- **Which Exposures?**
    - Transaction exposures exist before they are actually booked yet some firms do not hedge this backlog exposure
    - However, some firms are selectively hedging these backlog exposures and anticipated exposures
- **Which Contractual Hedges?**
    - Transaction exposure management programs are generally divided along an "option-line;" those which use options and those that do not
    - Also, these programs vary in the amount of risk covered; these *proportional hedges* are policies that state which proportion and type of exposure is to be hedged by the treasury