

HEDGING FOREIGN EXCHANGE

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Agenda

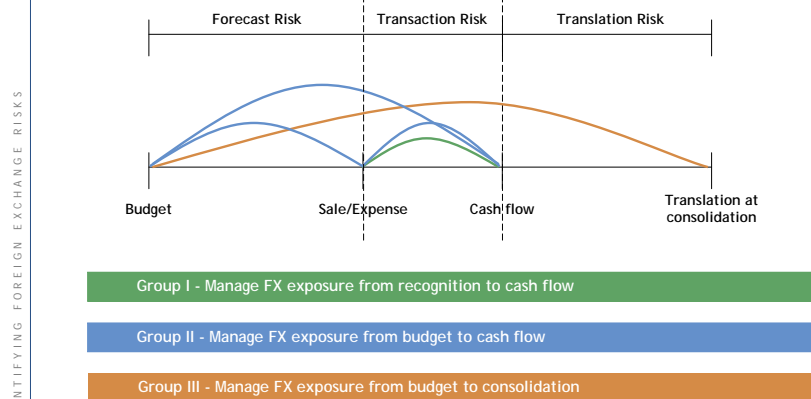
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HEDGING FOREIGN EXCHANGE

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Hedging Approaches - Forecasted Cash Flows and Related Receivables and Payables

- Companies have varying approaches with regard to the foreign currency exposures they hedge. Broadly speaking companies that hedge foreign currency exposures fall into three categories:



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Forecasting Exposure

Definition

- Forecasted transactions denominated in a foreign currency are recorded into local currency at different value than originally forecasted
- Most common example are forecasted sales and costs of goods sold, but also included forecasted capital expenditures, investments, acquisitions, dividends
- The translation of revenues and expenses of foreign subsidiaries directly impacts reported earnings to shareholders but is itself obscure
 - In their MD&As, firms often delineate changes in operating income items (sales, cost of goods sold) due to changes in exchange rates

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Transaction Exposure

Definition

- Transactions recorded in a foreign currency are revalued into local currency on each balance sheet date, through earnings
- Most common example are trade receivables/payables, but also includes revaluation of foreign currency denominated notes, investments and other balance sheet items
- Change in value of receivables/payables and short-term notes are recorded as FX Gains/(Loss) in income statement
- Change in value of long-term assets/liabilities are recorded in equity until liquidated
- Most often hedged currency risk among firms
 - Most firms hedge 100% of currency A/R and A/P using forwards

Example: Firm sells its products in foreign countries priced in foreign currency terms

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Translation Exposure

Definition

- Translation of foreign currency denominated assets and liabilities, and revenues and expenses into home (parent company) currency
- The translation of revenues and expenses of foreign subsidiaries directly impacts reported earnings to shareholders but is itself obscure
 - In their MD&As, firms often delineate changes in operating income items (sales, cost of goods sold) due to changes in exchange rates

Example: Firm has a subsidiary in Switzerland, and is required to translate the Swiss sub's CHF denominated financial statements into USD on each reporting date (usually quarterly)

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Economic Exposure

Definition

- Long term cumulative cash flow effect of exchange rate movements for all future periods
- A firm can have no foreign currency cash flows and still have economic exposure to exchange rate movements
- Economic exposure includes both transaction and translation exposure, but is impossible to detect in a firm's financial statements - it is obscure

Example: Manufacturer of autos produces and sells exclusively in its domestic market. Its primary competitors are Japanese auto makers. If the JPY depreciates significantly against the USD, Japanese auto makers can reduce the USD price of their cars, attracting customers away from the US manufacturer

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Hedge or not

- There are two prevalent academic theories regarding hedging at the corporate level:
 - Risk management is irrelevant to the firm; shareholders seek risk and can manage risk by holding well diversified portfolios (Modigliani & Miller)
 - Hedging is a value increasing strategy for the firm (various)

Enhancing firm value by reducing earnings and cash flow volatility

- Determinants of shareholder value are the expected future cash flows AND the expected volatility of those future cash flows
 - The **Sharpe Ratio** is the ratio of expected excess returns of a stock (vs the risk free rate) over the expected volatility of those returns
 - Investors use the Sharpe Ratio to compare various assets to each other and to measure the aggregate risk of their portfolio
 - Higher expected returns (and thus a lower stock price) are required to compensate for higher expected volatility
- Hedging foreign exchange, interest rates and/or commodities reduces volatility of earnings without impacting expected future cash flows - thus raising the Sharpe Ratio and the Market Value of the firm
- Investors typically do not want exposure to foreign currencies - they can speculate in the currency markets to get that

Protecting funding sources of investments

- Firm value is created by making value enhancing investments that increase operating cash flow
 - Key to supporting good investments is the internal generation of cash to fund those investments
 - Internally generated cash flow can be disrupted by changes in interest rates, foreign exchange rates, and commodity prices
 - Hedging activity can therefore increase firm value to the extent it ensures the firm has sufficient cash flow available to make value enhancing investments (by reducing or eliminating these disruptions)

Communicating expectations with external observers

- Firm value is created by reducing the asymmetries of information between internal management and external observers, including shareholders, equity analysts, credit agencies, etc.
 - Reducing fluctuations caused by exogenous factors (interest rates, foreign exchange rates, and commodities prices) provides more reliable information on the firm's outlook and increases stability of credit ratings and borrowing costs
 - It also helps provide more reliable information to evaluate management's performance

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Forward Contracts incorporate Cost of Carry and Interest Rates (i.e. Interest Rate Differential)

- If I want to SELL EUR and BUY USD 1mm in one year, I can execute a Forward Contract

OR

- Borrow EUR, exchange for USD at spot, and hold dollars on deposit for one year
 - I will owe interest on the euros I borrowed
 - I will receive interest on the dollars I deposited
 - In one year, I will pay off loan (principal plus interest) and collect deposit (principal plus interest)
- No Arbitrage Rule says that the Forward Price has to be the same

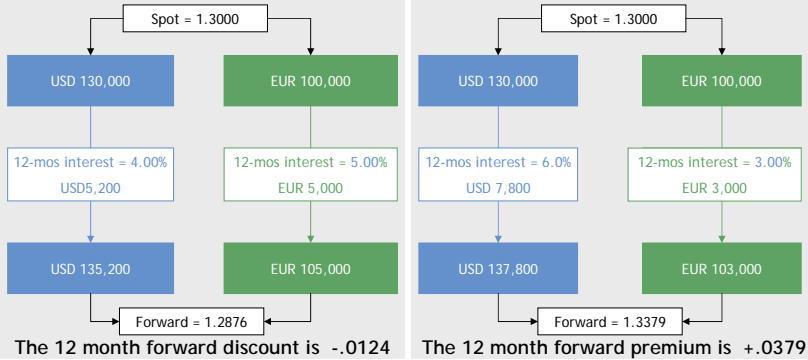
<u>Day 0</u>	Accrue interest	<u>Day 365</u>
Borrow €732,601 at 3%	€732,601 x 3% = €21,978	Principal & Interest €732,601 + €21,978 = €754,579
<i>Exchange at 1.3000</i>		
Deposit \$952,381 5%	\$952,381 x 5% = \$47,619	\$952,381 + \$47,619 = \$1,000,000

$$\frac{\$1,000,000}{€754,579} = 1.3252 \text{ Effective Forward Exchange Rate}$$

Forward Prices

Forward Prices are based upon the difference in interest rates between the currencies bought & sold

- High interest rate currencies trade at a **forward discount**: the forward price is cheaper than spot
 - Low interest rate currencies trade at a **forward premium**: the forward price is more expensive than spot
- With spot = 1.3000, if 12 month USD interest rates are 4.00% and EUR interest rates are 5.00%:
- With spot = 1.3000, if 12 month USD interest rates are 6.00% and EUR interest rates are 3.00%:

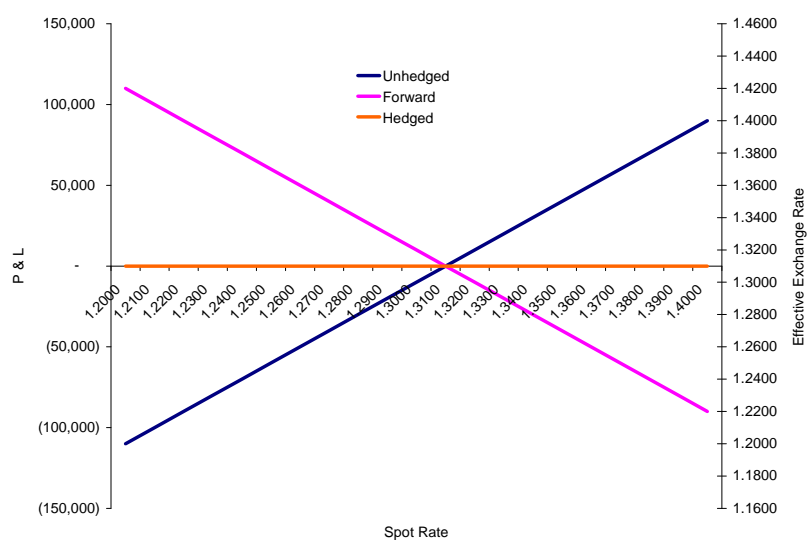


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Forward Contract Payout Profile



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Options offer the right to buy or sell currencies at a given strike rate

- A EUR Put offers the owner the right, but not the obligation, to SELL euros and buy US dollars at the maturity of the contract at the strike rate
 - If the euro is LESS valuable than the strike rate at maturity, then the EUR Put is exercised and the owner sells euros at the strike rate
 - However, if the euro is MORE valuable than the strike rate, the EUR Put expires worthless
- The US dollar value of the EUR Put at maturity is given by:

$$\text{EUR Notional} * \text{Maximum}[(\text{Strike} - \text{Spot}), 0]$$
- A EUR Call offers the owner the right, but not the obligation, to BUY euros and sell US dollars at the maturity of the contract at the strike rate
- The US dollar value of the EUR Call at maturity is given by:

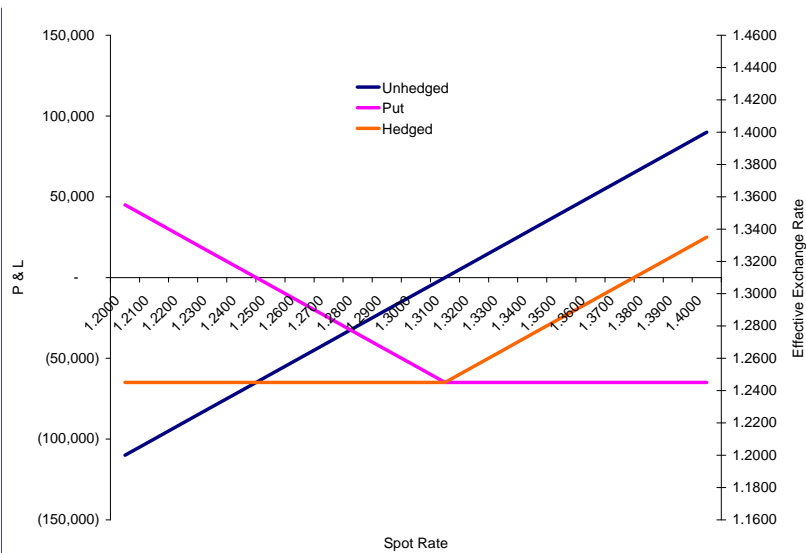
$$\text{EUR Notional} * \text{Maximum}[(\text{Spot} - \text{Strike}), 0]$$
- The Upfront premium is given by the probability-weighted distribution of pay-offs at maturity
 - Premium is calculated using Black-Scholes option pricing formula

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EUR Put Contract Payout Profile



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Determinants of Option Premium

- Option's value is determined by:

- Spot Rate
- Strike Rate
- Time to Maturity
- Interest Rates
- Volatility

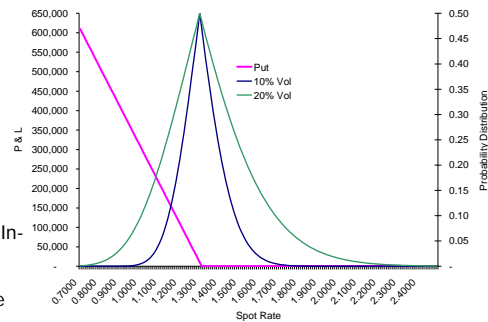
- Spot and Strike will determine how "In-the-Money" the option is

- The longer the tenor, the greater the potential move in spot

- The first four are determined, volatility is what the market maker's are really quoting

- Option traders are quoting Implied Volatility

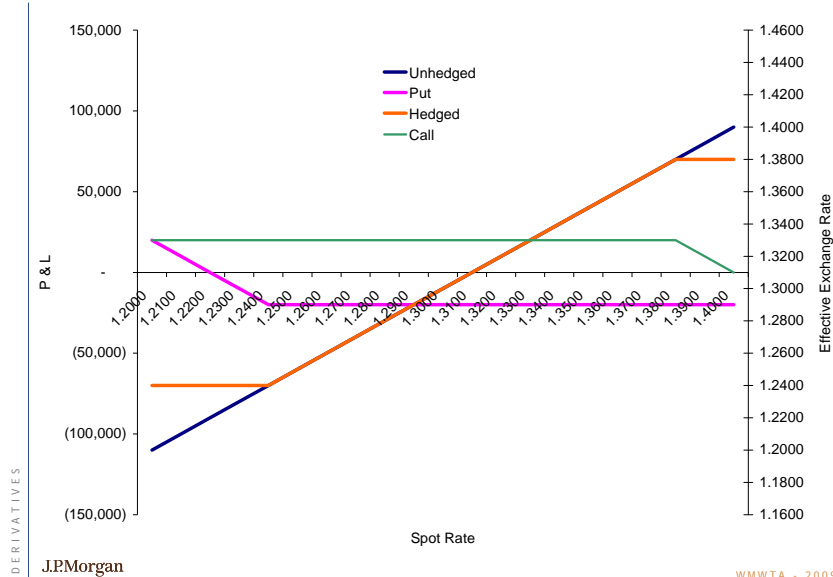
- The higher the volatility, the greater the potential pay-out at maturity
- Therefore, the higher the implied vol, the higher the premium



To finance the protection that the EUR Put provides, a Collar includes a "Short" EUR Call that caps the upside

- By selling (or writing) a EUR Call, a client is OBLIGATED to sell euros to the owner of the option at the strike rate at maturity
 - If the euro is more valuable than the strike rate at maturity, then the EUR Call is exercised and the Owner buys euros at the strike rate from the Writer
 - If the euro is cheaper than the strike rate, the EUR Call expires worthless
- A Client sells the EUR Call to finance the purchase of a EUR Put; the combination of options creates a Collar
- A Collar provides a best and worst-case rate to sell euros, and allows a Client to trade at the prevailing spot rate at maturity if it lies within the "collar"
 - If the spot rate is above or below the strike rates, the options are exercised and the Client sells euros at the respective strike rate
 - If, at maturity, the euro trades between the strike rates of the EUR Put and EUR Call, then both options will expire worthless, and the Client can sell euros at the spot rate
- The strike rate, tenor and maturity of both options are set such that the premium that the Client receives for the EUR Call is equal to the cost it pays for the EUR Put - resulting in a ZERO COST hedge

Collar Contract Payout Profile



Knock-In and Knock-Out Options

- Knock-In Options become effective only if a certain rate is triggered
- A Knock-In EUR Put, with a strike at 1.30 and a knock-in at 1.20, for example, becomes effective if spot is at or below 1.20 at maturity
- A Knock-Out EUR Put, with a strike at 1.30 and a knock-out at 1.20, for example is effective unless spot is at or below 1.20 at maturity.
- The Knock-In and Knock-Out features, which reduce the probability weighted distribution of payoffs, makes the options cheaper than plain vanilla options

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Interest Rates + Foreign Exchange

2008  #1 Global overall
 #1 USD Swaps 2 - 10 years
 #1 USD Swaps 10 - 50 years
 #1 USD Inflation products
 #1 USD Vanilla Options
 #1 USD Exotic Rates
 #1 EUR Vanilla Options
 #1 JPY Exotic Rates

2008  #1 bank for corporate interest rate swaps


2006  Interest Rate + Commodities house of the Year

2006  #1 Interest Rate Options
 #1 USD Exotic Interest Rate Products

Overall Derivatives

2008  Derivatives House of the Year

2007  Best Derivatives House from 1987-2007

2006  Interest Rate + Commodities House of the Year

2005  Best Overall Provider of Risk Management Solutions

2004  #1 Overall Risk Management
 #1 Overall Tailored/Structured Products
 #1 Hybrid Products
 #1 Long-Dated Cross Currency Swaps

Credit Derivative Products

2006  #1 Credit Derivatives Overall
 #1 Credit Default Swaps
 #1 Credit-Linked Notes

2005  #1 Credit Derivatives Overall

2004  Credit Derivatives House of the Year

Commodity Derivative Products

2006  Energy Derivatives House of the Year

2006  Natural Gas House of the Year

2005  Energy Risk Manager of the Year

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