Dear Students,

Thanks for asking these great questions! The answer to my question (what is the difference between transaction exposure and economic exposure) is that transaction exposure deals with future cash flows already contracted for, while operating exposure focuses on expected, i.e. not yet contracted for, future cash flows that might change.

Here are the answers to your questions.

Hedging reduces risks, but doesn't it also reduce the potential for profits? If so, it is just a risk/return situation?

Yes, exactly! The Capital Asset Pricing Model intuition (higher return comes with higher risk) rocks!

Are we going to be talking about how <u>FAS 52</u> and <u>FAS 133</u> affect multinationals who are exposed to fluctuations in FX?

Statement FAS 52 presents a standard for how foreign currency translations are to be made. Basically, adjustments for forex changes are excluded from net income for fluctuations that *do not* impact cash flows & are included for the ones that *do*. In particular, *translation adjustments are not included* in determining net income but are disclosed in separate account of consolidated equity until sale/liquidation of the net investment in the foreign subsidiary happens. *Transaction gains & losses* are included in determining net income unless the transaction serves as a hedge on forex commitment or net investment in company abroad. Inter-company long-term investment transactions do not give rise to gains or losses.

Statement FAS 133 mandates that derivative contracts be marked-to-market and recorded as assets or liabilities on the balance sheet. It also addresses the way three different hedges, <u>a fair value hedge</u>, <u>a cash flow hedge (hedge of upcoming forecasted event)</u>, and <u>a hedge associated w/ forex exposure of an investment in foreign entity</u>, are market-to-market and accounted for (i.e. whether it shall be included into the current income).

So, in a nutshell, what would be the impact on MNE of the introduction of these rules? It definitely would improve the transparency in foreign operations.

Why is the Swiss franc "CHF" How did they get CH from Switzerland?

I guess because Switzerland in German is *Schweiz,* you can check out the official abbreviation @ <u>http://www.jhall.demon.co.uk/currency/by_abbrev.html</u>. I personally always use SF for the Swiss Franc.

When are individual case write-ups due?

One week after the presentation.

Could you re-explain the difference between the volatility of the underlying asset vs. the volatility of the option price?

Great, volatility of the underlying asset is the riskiness, or changeability of the underlying currency. The volatility of the option price is a different creature – it is the volatility of the price of the option itself, not the underlying currency on which the option is written. In class I mentioned that since currencies are more volatile than stocks, it is the case that the currency options are usually more expensive.

Who uses options on FX? Mostly hedge fund or multinational companies as well? Can individuals also use FX options?

Mostly multinationals, however as you know, the option market is in zero net supply, i.e. if somebody is a holder of an option, somebody else must have written (supplied) that option, i.e. the demand and supply are always equal. So, the suppliers oftentimes happen to be other multinationals.

What exactly are credit derivatives?

Credit derivatives are the instruments used to hedge against credit risk. What is credit risk? For a bank, that is the risk that the debtors will not be able to repay their loans. In the wake of the dot-com bubble, many hi-tech companies went under, and so banks that financed them experienced serious losses (to the extend that one year ago, one could buy telco debt for 6 cents on the dollar!) due to credit risk. To diversify this risk away, credit derivatives came in play. There are different kinds of credit derivatives, such as credit swaps, credit default swaps, and options on credit risky (junk) bonds. I found a cool website w/ a lot of examples for credit derivatives http://www.finpipe.com/crederiv.htm, check it out!

When replicating a portfolio in option valuation of forex, will you always borrow the present value of the option's payoff? Is this different than when you value options where the hedge ratio (amount of stock to buy) is equal to H = (C$^+$-C$^-$)/(S$^+$-S$^-$), and you use a risk free rate to find the amount to borrow?

You see, the idea of the replicating strategy is the same. So, no difference ☺.

Could you please explain again the example you gave in class on replicating the portfolio? I did not understand why the debt of portfolio was 90 cents (PV of) when the cost of asset is $1. Shouldn't debt be $1 to be able to get the Euro? Is that because of exchange rates? If spot value is $1 how do you make up for 10 cents?

Below is the slide of interest. How to read it? Suppose I gave you (no questions asked!) one Euro and debt obligation of PV $0.90. Notice, you do not do a self-financing strategy

that would have a zero cost. Just think about it – I give you this portfolio, and you just take it (please do not think of what is the cost of setting up such a portfolio). Now, what is the payoff structure of this portfolio? In a good state, where the EUR appreciates, your portfolio will be worth $1.10. However, the debt you carry is worth at maturity $(0.90), so the net value of this portfolio is $0.20. If the situation is such that the dollar actually depreciated to $ 0.90 (this is the only other choice in town ☺), then your portfolio is worth zero at maturity (why? By assuming portfolio, you owe 0.90$ and your Euro is worth that much, so net is zero). Now compare these payoffs w/ the payoffs in the two cases (appreciation & depreciation of the Euro) for the European call option on the Euro. What are the payoffs? If Euro appreciates to $1.10/ EUR, then your European option on the Euro is worth $0.10 since you can exercise the option and purchase the underlying asset for $1, but at the same time sell it spot @ $1.10/EUR. What if the EUR depreciated to 0.90$/EUR? In this case, you would not exercise your option, letting it expire. The value of the option then is zero.

Now compare the two payoff structures. State by state (that is in each of the cases of appreciation and depreciation) your portfolio has twice as high a payoff as compared to the European option. So, if there is to be no arbitrage, your portfolio has to be valued twice as high today. That's the way we determine the price of the option!

Replicating Portfolio Evaluation

- Suppose US$-EUR rate is $S_0(\$/EUR) = \$1$.
- Suppose $S_1(\$/ EUR)$ **can only be** $1.10 or $0.90.
- Consider call w/ K=$1/EUR (exercise price).
- Can replicate payoffs of **call** w/ levered position in EUR.
- Borrow PV $.90 today & buy1 EUR.
- Net payoff: $0.20 or $0.
- Portfolio value: $\$1 - \dfrac{\$.90}{(1 + i_\$)}$ so option value: $C_0 = \dfrac{1}{2}\left(\$1 - \dfrac{\$.90}{(1 + i_\$)}\right)$

$S_0(\$/EUR)$	$S_1(\$/EUR)$	$C_1(\$/EUR)$	Debt	Portfolio
	$1.10	$0.10	-$0.90	$0.20
$1				
	$0.90	$0	-$0.90	$0.00

So, what is the value of your portfolio today? $1 – $0.90/(1+i$^\$$).
What is the value of the European option? Half of your portfolio value: 0.5 * [$1 – $0.90/(1+i$^\$$)].

Could you also manipulate your exposure as an MNE w/ tax differences by pricing internal transaction to your benefit?

Sure, that is part of the MNE tax management in order to minimize costs.

How can management use hedging as a benefit? Usually hedging strategies are expensive and aren't meant to make money? How does hedging benefit the manager in particular?

Taking a complete hedge might be cost inefficient, however, the manager could privately enjoy the full hedge. How? Well, he has less stress to worry that his position as a manager can be jeopardized (i.e. less worry that he will get fired) because of un-hedged forex risk. To see that in practice, please read the case study at the end of chapter eight on the way the Lufthansa's chairman back in the 80s handled hedging forex risks.

Is hedging only in management's interests?

No, if conducted within reasonable limits (i.e. reasonable costs).

Are more options traded b/n floating exchange rate regime type countries? Countries in economic trouble or boom?

Yes, countries w/ floating exchange rate regimes are more likely to have options written on their currencies. Why would you write an option on an asset that is supposedly fixed and no one for-see any change? We are talking about US$, Euro, Japanese Yen, British Pound, Swiss Franc, Australian Dollar. All of these are very stable currencies. So, it is unlikely that options will be readily written on currencies of countries in economic trouble.

Could you elaborate on Black-Scholes?

The Black-Scholes model shows how to price an option by a no-arbitrage condition. The idea is, you come with a replicating portfolio, that will have the same payoff at maturity as the option, and then you value that portfolio. The present value of such a portfolio has to be the same as the present value of the option value at maturity.

Now for a specific option, say an option on the British pound, the exact Black-Scholes price can be computed as follows (really, this is just for math enthusiasts ☺, I do not intend to ask anything like that from you guys, come on, we are humans after all): price of European call: $c = \exp(-r^\$ \times T)\left[Spot \times \exp[(r^\$ - r^{Pound}) \times T] \times N(d_1) - Strike \times N(d_2)\right]$, where *N(d)* is a value you can look up at the end of every statistics textbook (it is basically a probability that an event will occur), where d_1 and d_2 are known constants that depend on the historic volatility of the exchange rate, the maturity of the option, and the strike price. Again, just let your eyes glaze at this peace-of-art for ten secs and that will be it!

Source: "Options, Futures, And Other Derivative Securities," by John Hull, 3rd edition, page 272. The best book ever on options (for undergrads, well at least when I was an undergrad that's where I was taught from ☺).