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Chapter 11 - Managing TE

Last Lecture

Managing TE

- Receivables-Sell forward future, buy put
- Payables- Buy forwards future, buy call

Receivables-MMH ⇒ borrow FC
Payables-MMH ⇒ borrow DC

Last Lecture

We will explore the choices that options provide. In our case: different strike prices.

Hedging with Options

We have more instruments to choose from => different strike prices (X):

1. Out of the money (cheaper)
2. In the money (more expensive)

• Review: Reading Newspaper Quotes

Typical Newspaper Quote

		Calls		Puts		
		PHILADELPHIA OPTIONS				(PHLX is the exchange)
		Wednesday, March 21, 2007				(Trading Date)
		Calls		Puts		=>(Contracts traded)
		Vol.	Last	Vol.	Last	=>(Vol.=Volume, Last=Premium)
Australian Dollar					**79.92**	=>(S_t=.7992 USD/AUD)
50,000 Australian Dollars-cents per unit.						=>(AUD 50,000=Size, prices in USD cents)
78	June	9	3.37	20	1.49	
79	April	20	1.79	16	0.88	
80	May	15	1.96	8	2.05	
80	June	11	2.29	9	2.52	
82	June	1	1.38	2	3.61	
↑	↑		↑		↑	
X=Srike Price	T=Maturity		Call Premium		Put Premium	

Example: Payable AUD 100M in Mid-June

S_t= .7992 USD/AUD

$X_{call\text{-}June}$ = .78 USD/AUD, P = USD .0337
$X_{put\text{-}June}$ = .78 USD/AUD, P = USD .0149
$X_{call\text{-}June}$ = .80 USD/AUD. P = USD .0229
$X_{put\text{-}June}$ = .80 USD/AUD. P = USD .0252
$X_{call\text{-}June}$ = .82 USD/AUD, P = USD .0138
$X_{put\text{-}June}$ = .82 USD/AUD. P = USD .0361

1. Out-of-the-money: $X_{call\text{-}June}$ = 0.82 USD/AUD (or $X_{call\text{-}June}$ = .80 USD/AUD, almost ATM)
   - $X_{call\text{-}June}$ = 0.82 USD/AUD, Premium = USD .0138

Cost = Total premium = AUD 100M * USD .0138/AUD = ***USD 1.38M***
Cap = AUD 100M x 0.82 USD/AUD = USD 82M (Net cap = **USD 83.38M**)

- $X_{call\text{-}June}$ = 0.80 USD/AUD, Premium = USD .0229 (almost ATM)

Cost = Total premium = AUD 100M * USD .0229/AUD = ***USD 2.29M***
Cap = AUD 100M x 0.82 USD/AUD = USD 80M (Net cap = **USD 82.29M**)

2. In the Money: $X_{call\text{-}June}$ = 0.78 USD/AUD, Premium = USD .0337

Cost = Total premium = ***USD 3.37M***
Cap = USD 78M (Net cap = **USD 81.37M**)

Note**:** The higher the cost, the lower the cap established for the AUD 100M (payables). ¶

Example: Receivables AUD 20M

1. Out-of-the-money: $X_{put\text{-}June}$ = 0.78 USD/AUD

Cost = Total premium = AUD 20M * USD .0149/AUD = ***USD 298K***
Floor = 0.78 USD/AUD x AUD 20M = USD 15.6M (Net Floor = **USD 15.302M**)

2. In the money: $X_{put\text{-}June}$ = 0.82 USD/AUD, (or $X_{put\text{-}June}$ =.80 USD/AUD –ATM)
   - $X_{put\text{-}June}$ = 0.82 USD/AUD

Cost = Total premium = AUD 20M * USD .0361/AUD = ***USD 722K***
Floor = 0.82 USD/AUD * AUD 20M = USD 16.4M (Net Floor = **USD 15.678M**)

- $X_{put\text{-}June}$ = 0.80 USD/AUD (ATM option)

Cost = Total premium = ***USD 504K***
Floor = USD 16M (Net Floor = **USD 15.496M**)

Note**:** The higher the cost, the higher the floor for the AUD 20M (receivables). ¶

Lesson from these 2 examples:
1) Options offer the typical insurance trade-off: Better coverage (lower cap, higher floor) => Higher cost (higher premium)
2) Insurance is expensive. For example, for the $X_{put\text{-}June}$ = 0.80 USD/AUD case, it costs **USD .504M** to insure **USD 15.496M** (a 3.2% premium).

Q: Is it possible to lower the cost of insurance lower?
A: With a Collar (buy put, sell call/buy call, sell put).

Example: Buy $X_{put\text{-}June}$ = 0.78 USD/AUD (P = USD .0149)
Sell $X_{call\text{-}June}$ = 0.82 USD/AUD (P = USD .0138)

Cost = 20M x [USD .0149 - USD .0138] = ***22K*** (very close to zero!)
Floor = USD 15.6M (Net Floor = **USD 15.578M**)
Cap = 20M x 0.82 USD/AUD = USD 16.4M (Net Cap = Best case scenario = **USD 16.378M**)

A collar is cheaper, but it limits the upside of the option.
Note: zero (or almost zero) cost insurance is possible! ¶

Real World: Walt Disney Company
According to Disney's 2006 Annual Report:
The Company utilizes option strategies and forward contracts that provide for the sale of foreign currencies to hedge probable, but not firmly committed transactions. The Company also uses forward contracts to hedge foreign currency assets and liabilities. The principal foreign currencies hedged are the AUD, British pound, Japanese yen and Canadian dollar. Cross-currency swaps are used to effectively convert foreign currency denominated borrowings to USD denominated borrowings. By policy, the Company maintains hedge coverage between minimum and maximum percentages of its forecasted foreign exchange exposures generally for periods not to exceed five years. The gains and losses on these contracts offset changes in the value of the related exposures.

Chapter 12 – Managing Economic exposure (EE)

EE measures how changes in FX rates affect CFs. It is easy to see that importers benefit from a strong domestic currency (the cost of buying foreign goods decreases as S_t decreases); while exporters benefit from a weak domestic currency (domestic exports become to foreign buyers as S_t increases). But, not only importers and exporters face economic exposure, many purely domestic firms are exposed too.

Example: As the USD becomes stronger, more U.S. tourism goes to visit the active volcano Arenal, in Costa Rica. Restaurants in Cost Rica buy and sell everything in CRC (CRC = Costa Rican Colón), thus having no direct EE. But, as U.S. tourism increases (decreases) in Arenal, the cash flows of restaurants in Arenal will also increase (decrease). Thus, even smaller Costa Rican restaurants (called sodas) face EE. In this case, they behave like an exporter. ¶

Understanding EE

Let's look at the simplified cash flow of an MNC's subsidiary, which exports all its production, Q, at the international price, P, denominated in foreign currency (FC):

Revenue: Price in FC x Quantity = PQ

Cost: Variable + Fixed = α PQ + Fixed Costs (α: proportion of PQ as VC, $0<\alpha<1$)
Gross profits: (1- α) PQ – Fixed Costs
EBT = [(1- α) PQ – Fixed Costs] - IE (IE: Interest Expense)
EAT = [(1- α) PQ – Fixed Costs - IE] (1-t) (t: tax rate)

Costs & IE have, potentially, two components: a FC & a DC. Say, for VC: α_{FC} & α_{DC} ; and for $IE=IE_{DC}+IE_{FC}$. Usually, Fixed Costs are in DC, not sensitive to FC.

EE: How changes in S_t affect CFs of the firm (say, EAT)? Let's take a first derivative:

$$\frac{\partial EAT}{\partial S_t} = \left[(1-\alpha_{FC})\frac{\partial PQ}{\partial S_t} - \frac{\partial IE_{FC}}{\partial S_t}\right](1-t)$$

where we assume the DC components of VC are independent of the FC part.

If the derivative is 0, EAT is not affected by changes in S_t. That is, there is no EE. For example, if $\alpha_{FC}=1$ & $IE_{FC}=0$, EAT is not sensitive to changes in S_t. Obviously, $\alpha_{FC}=1$ is not a very interesting case! But, as $\alpha_{FC}\rightarrow 1$, EE decreases. That is,

the better the FC match, between Revenue and Cost, the smaller the EE.

The degree to which P and Q affect EE depends on the type and structure of the firm and the industry structure in which the firm operates. In general, importing and exporting firms face a higher degree of EE than purely domestic firms do.

Also, in general, monopolistic firms face lower EE than firms in competitive markets (monopolistic firms can increase prices in response to changes in S_t.).

Note: The amount exposed is not total revenue in FC, but the difference between Revenue in FC and Cost in FC. If Revenue in FC > Cost in FC, *selective hedging of receivables* –i.e., no full hedging of receivables in FC- may work well to reduce short-term EE.

Example: Foreign Auto Exporters
During the last semester of 2014, the USD appreciated against the major currencies (13% against the EUR, and 15% against the JPY). Because of the expected loose monetary policies from the ECB and the Bank of Japan, the strong USD was expected to continue in 2015. According to earnings forecasts, reported by the WSJ, Germany's three large car manufacturers were expected to increase their (unhedged) earning by EUR 12 billion (USD 14.2 B).

On the other hand, according to Nissan Motor Co.'s Chief Executive Carlos Ghosn, Nissan was planning to make more vehicles for the U.S. market in Japan in 2015, but the profit impact was expected to be "marginal," because it makes so many of its vehicles in North America.
Source: Wall Street Journal, Jan 12, 2015. ¶

Example: H&M vs. Zara

In late June 2015, Sweden's Hennes & Mauritz, the world's second-biggest fashion retailer, warned it expects the strong USD to translate into rising sourcing costs throughout the year after it hurt second-quarter profits.

H&M, which buys the bulk of its clothes in Asia on USD contracts while selling most of them in Europe, is more exposed to the strong USD than bigger rival Inditex, the Zara owner which produces more garments in house and sources most of them in or near Europe.

And it is harder for the budget brand to pass on costs by raising prices as it faces growing competition from discounters like Primark and Forever 21, which pose less of a threat to mid-market brand Zara.
Source: Reuters, July 2015. ¶

As both examples show, a better match => lower EE. Zara has a better match between FC receivables and FC costs than H&M, and, thus, lower EE. Similar situation applies to Nissan relative to the big three German automakers. Moreover, according to Nissan's executive Ghosn, Nissan has a very good match in USD, creating a very low EE.

Managing EE

Q: How can a firm get a good match? Play with α_{FC} to establish a manageable EE. For example, if FC and IE are small relative to variable, then, the bigger α_{FC}, the smaller the exposed CF (EAT) to changes in S_t.

When a firm restructures operations (shift expenses to FC, by increasing α_{FC}) to reduce EE, we say a firm is doing an *operational hedge*.

Note: In math terms, EE measures a first derivative: $\delta EAT/\delta S_t$.

Case Study: Laker Airways (Skytrain) (1977-1982)

Skytrain: Low cost carrier, no-reservation, no-frills, from LON to NY (1977): GBP 59 one-way ticket (≈1/3 of the competition). Huge success. Rapid expansion, financed with debt.

Situation: UK airline expands rapidly: Laker buys airplanes from MD (a DC10-10 in the picture), financing in USD.

• Cost structure
As most major airlines before Airbus, Laker Airways had three major categories of costs:
(i) fuel, typically paid for in USD
(ii) operating costs incurred in GBP (administrative expenses and salaries), but with a non-negligible USD cost component (advertising and booking in the U.S.)

(iii) financing costs from the purchase of U.S.-made aircraft, denominated in USD.

• Revenue structure
Sale of transatlantic airfare (probably, evenly divided between GBP and USD), plus other GBP denominated revenue.

Currency mismatch (gap):

Revenues	Payables
mainly GBP, USD	mainly USD, GBP

Q: How did S_t affect CFs?
1977-1981: USD depreciates against the GBP (from 1.71 USD/GBP to 2.12 USD/GBP).
1981-1982: USD strong appreciation against the GBP (reaching 1.60 USD/GBP).
⇒ 1982: Laker Airlines files for bankruptcy.

Solutions to Laker Airlines problem (economic exposure):
- More sales in US
- Borrow in GBP
- Transfer cost out to GBP/Shift expenses to GBP (increasing α_{FC}/reduce α_{DC})
- Diversification (always a good risk management technique)

Q: Why operational hedging?
Financial hedging –i.e., with FX derivative instruments- is inexpensive, but tends to be short-term, liquid only for short-term maturities. Operational hedging is more expensive (increasing α_{FC} by building a plant, expansion of offices, etc.) but a long-term instrument.

Moreover, financial hedging only covers FX risk (S_t through P), but not the risk associated with sales in the foreign country (Q-risk). For example, if the foreign country enters into a recession, Q will go down, but not necessarily S_t. An operational hedge will work better to cover Q-risk.

CHAPTER 12 - BONUS COVERAGE: Brief Laker Airways Story

After a legendary six-year battle won in the courts, Freddie Laker obtained a permit for his Laker Airways, established in 1966, to operate the Laker Skytrain service on both sides of the Atlantic, using two DC-10 planes. The Skytrain was a no-reservation, low cost air service, which revolutionized the air transport industry. It was the first low-cost transatlantic operation. Skytrain flew from New York to London and back for USD 236 (USD 400 less than the going rate). Breakfast was USD 1.25 extra.

On September 26, 1977, the first Skytrain flight departed London for New York, and subsequently went on to carry over 50,000 passengers before the end of the year with each flight over 80 percent full. The success was such that the Skytrain service was expanded to include a London to Los Angeles service in 1978, London to Miami in 1980 and London to Tampa in 1981.

During this time of expansion, the USD was weak against the GBP, and U.S. trips were relatively cheap for U.K. residents. Freddie Laker was able to expand the Skytrain concept by buying more DC-10s, financing them in USD. Thus, Skytrain's debt payments were in USD, while Skytrain's revenues were primarily in GBP.

Although popular with the public, Laker Airways became embroiled in price wars with more powerful companies. (Rumors and stories of collusion against Laker Airways are still told today.) The start of the Reagan presidency, with a consistent USD appreciation against European currencies, did not help Laker Airways' fortunes. On February 5, 1982, Laker Airways was forced to file for bankruptcy, owing GBP 270 million.

Thousands of pounds poured into a "Save Laker" fund, set up by members of the public sympathetic to the flamboyant tycoon. The "Save Laker" fund collected over GPB 1 million in donations. But it was too little too late. Within weeks Sir Freddie was attempting to re-launch an airliner by transferring the Laker Airways licenses to a new company. The Civil Aviation Authority officially blocked his efforts in May after objections from other airlines and the public.

Freddie Laker retired to Florida, then the Bahamas. He died in Miami aged 83 on 10 February 2006.

Richard Branson, founder of Virgin Atlantic, credited Freddie Laker for some of the success of Virgin Atlantic. "Perhaps his best advice was to make sure that I took British Airways to court before they bankrupted us — not after, as he (Laker) did."

Taken From "A brief history of price-fixing," by Simon Calder
The Independent (London), Jun 24, 2006

In the bad old days when airlines were run by, and for the benefit of governments and civil servants, colluding on fares was not illegal - it was compulsory. National airlines cosily agreed fares between themselves. Indeed, when the inspectors called on airlines, it was to uncover evidence of cutting fares, rather than artificially inflating them. Airlines from Laker Airways to British Caledonian were fined for the heinous practice of lowering their prices to allow more people to fly. Indeed, it was one such raid at Gatwick that prompted the late, great Sir Freddie Laker to start his Skytrain enterprise.

One day in 1970, Laker was summoned to the airport because Civil Aviation Authority staff were interrogating his passengers. His airline was involved in "affinity group charters", which at the time represented the only way for an ordinary working man or woman to travel the Atlantic. The big airlines had the scheduled business sewn up, and governments had imposed such a stranglehold on charters that only genuine clubs and societies were allowed on board transatlantic flights at reasonable rates. You can guess the result: all sorts of spurious associations were created to circumvent the stifling regulations. Everyone knew somebody who knew a dodgy agency that dabbled in cheap transatlantic air fares, and issued specious membership cards to the "Left Hand Club" to go with the tickets. Which made these flights prime targets for government inspectors seeking to stop people traveling - as happened to a Laker Airways departure from Gatwick to New York in 1970.

Sir Freddie later told me he was more appalled by the fact that they were "chucking old women off the aeroplanes" than by the hefty fine that he had to pay for the temerity of trying to take people across the Atlantic at an affordable price.

That episode led directly to the creation of the Laker Skytrain, which was allowed to cut prices and transform travelers' lives.

CHAPTER 11 – BRIEF ASSESMENT

1. It is March 3, 2017. Malone, a U.S. company, exports mining equipment to South Africa. Malone expects to receive a payment of ZAR 500 million in August 3, 2017 (ZAR=South African Rand). Malone decides to hedge this exposure using an August forward contract, which expires on August 3, 2012. The 1-month, 3-month and 5-month South African interest rates are 8.5%, 8.7% and 9%, while the 1-month, 3-month and 5-month U.S. interest rates are 0.3%, 0.5% and 0.8%, respectively. On March 3, the spot exchange rate is 15.62 ZAR/USD and the August 3 forward trades at 16.15 ZAR/USD. A Bank offers Malone OTC options with expiration August 3 with the following prices (in USD cents –i.e., 6.3 USD cents=USD 0.063):

ZAR August 6.3 p (put)	0.07
ZAR August 6.3	0.24

(A) Calculate the amount to be received on August 3, using a forward hedge.
(B) Calculate the amount to be received on August 3, using the PHLX option.

2. MSFT has a payable in GBP. Details:
Amount = GBP 10M
T= 180 days.
S_t = 1.35 USD/GBP
TE (in USD) = USD 13.5M
MSFT decides to manage this TE with the following tools:
Hedging Tools: Futures/Forwards/Options/Money Market Hedge/Do Nothing

Data:
Interest USD = 2% - 2.25%
Interest GBP = 3% - 3.5%
$F_{t,180\text{-day}}$ = 1.341 - 1.344 USD/GBP
Put (X_p = 1.34 USD/GBP; p_p = USD .03)
Call (X_c = 1.38 USD/GBP; p_c = USD .02)
Distribution for S_{t+90}

S_{t+90} (USD/GBP)	Probability
1.33	.30
1.37	.60
1.42	.10

Which alternative is best?

3. A U.S. company has AUD 20M receivables in mid-June 2007. Using the PHLX quotes, reported below, construct the following hedges (calculating total premium cost and worst case scenario):
(A) OTM
(B) ITM

(C) Collar (using out-of-the money options)

PHILADELPHIA OPTIONS

Wednesday, March 21, 2007

		Calls		Puts	
		Vol.	Last	Vol.	Last
Australian Dollar					**79.92**
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78	June	9	3.37	20	1.49
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